DETAILED PROJECT REPORT
ON
MEMBRANE FILTER PRESS (40 PLATES)

(AHMEDABAD CHEMICAL CLUSTER)

Bureau of Energy Efficiency

Prepared By

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MEMBRANE FILTER PRESS (40 Plates)

AHMEDABAD CHEMICAL CLUSTER

BEE, 2010

Detailed Project Report on Membrane Filter Press (40 plates)

Chemical SME Cluster, Ahmedabad, Gujarat (India)

New Delhi: Bureau of Energy Efficiency;

Detail Project Report No. ***AMD/CHM/MFP/07***

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Winrock International India

New Delhi

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List of Abbreviations

MT	Metric Tonne
kWh	kilo Watt Hour
GoI	Government Of India
MoMSME	Ministry of Micro Small and Medium Enterprises
GHG	Green House Gas
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
ID	Induced Draft
FD	Forced Draft
HAG	Hot Air Generator
DBT	Dry Bulb Temperature
SIDBI	Small Industries Development Bank of India

EXECUTIVE SUMMARY

Winrock International India is executing BEE-SME program in Ahmedabad chemical Cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Ahmedabad chemical cluster is one of the largest chemical 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 chemical clusters in India.

The main energy forms used in the cluster units are wood. Wood is used as fuel in hot air generator for drying process. The cost incurred in the drying process constitutes major portion in the overall energy cost in majority of chemical industries in Ahmedabad cluster.

Function of filter press in chemical industries is to remove moisture from the intermediate product. The material from mixer is fed into the filter press using pumps. Filter press contains parallel plates between which this material is pressed. De-moisturising is one of the major energy and time consuming process in the overall manufacturing process of chemicals. Apart from the energy and time, final product quality will depend on quality of removal of moisture.
The current system for de-moisturisation of the wet dye slurry is the manual filter press. The filter press uses pumps for feeding the material into the press and uses compressor for providing compressed air for giving the required pressure for caking. Proposed energy efficient membrane filter press replaces the caking walls of the filter press with membranes which allow water to drain out more efficiently

Implementation of New Energy Efficient Membrane Filter Press of 40 plate capacity will lead to reduction in wood consumption by 242 tons per year in typical chemical unit in Ahmedabad chemical cluster.

This DPR highlights the details of the study conducted for assessing the potential for replacement of conventional filter press by new energy efficient membrane filter press , 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 for three 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)	24.20
2	Wood saving	tonnes/year	242
3	Monetary benefit	₹(in Lakh)	7.26
4	Debit equity ratio	Ratio	3:1
5	Simple payback period	years	3.33
6	NPV	₹(in Lakh)	7.60
7	IRR	%	17.68
8	ROI	%	20.84
9	DSCR	Ratio	1.54
10	Process down time	Days	7
11	CO_2 reduction	Tons/year	227

The projected profitability and cash flow statements indicate that the proposed project implementation i.e. energy efficient membrane filter press 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. Ahmedabad chemical 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*:**

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 Cluster

Ahmedabad city and its surrounding areas have various types of chemical SME units like dyes, dye Intermediates and pigments manufacturing units. All these chemical manufacturing units are located at Vatva, Naroda and Odhav industrial areas. There are about 500 chemical units in Vatva, 60 units in Naroda and 40 units in Odhav. Most of manufacturing units in these areas are in operation from last 10 to 15 years.

Ahmedabad chemical cluster like many other SME clusters, were in a dire state in regard to the energy efficiency and conservation. In almost all units, whether big or small, there had been no conscious efforts to take up energy conservation and energy efficiency measures as a part of day to day operations. In majority of cases, the small scale entrepreneur are not even aware of the measures that could bring down the energy cost, which will automatically have positive bearing on the overall manufacturing cost. Some of the bigger units had experimented with few parameters to improve the energy efficiency in the units, but the results and outcome were confined to them only. All the units in cluster have been operating in traditional conditions and most of the equipments in cluster were procured from the local suppliers, who are fabricating / manufacturing the equipments on basis of their age old expertise / technology.

These units are using various types of raw material such as Sulphuric acid, Hydrochloric acid, Acetylic acid, Chlorine gas, Benzene, Sodium nitrate, Ethylene, Ammonia, Disulphonic-acid, Copper, Chlorine, Ammonia and Potassium sulphate etc, The nature of raw material depends on their final product manufactured in the unit. All these raw materials are being procured from local suppliers/traders or bought from neighboring states. There are various types of chemical products manufacturing in cluster, few of them are DASDA, Alpha & Beta Pigment, Reactive dyes, Acid dyes, and direct dyes. In fact majority of the chemical units in these clusters manufacture two or three different types of chemical related products as per the market requirements.

1.1.1 Existing production process

The main production process used in chemical industry which is followed in the entire cluster with minor changes according to the requirement is shown in Figure 1.1 below:

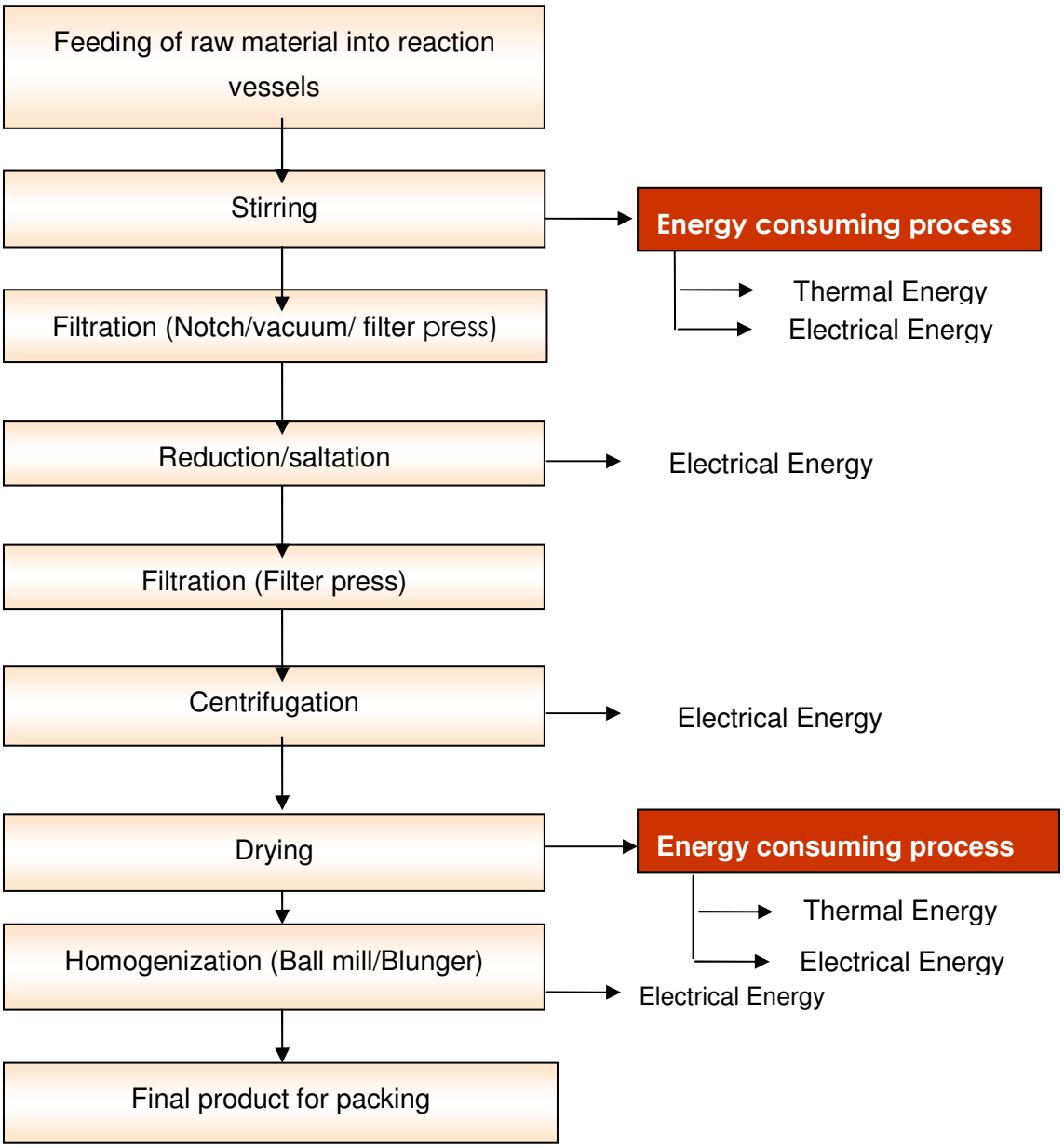


Figure 1.1: Process flow chart

The production process as depicted in the above chart is typical to almost all the chemical units in the Ahmedabad chemical cluster. However, depending on the final product, quality of final product and the attributes of the raw material, the above stated process flow is altered to suit the requirement of the unit.

1.2 Energy Performance in Ahmedabad chemical cluster

Majority of the industries located in Ahmedabad are engaged in manufacturing of different types of chemicals. Different chemical units in the Ahmedabad chemical cluster is using the different types of energy sources including electricity and fuels such as wood, natural gas, biomass & coal depending on technology, process requirement, availability, economic and safety point of view. There are two forms of energy used in manufacturing of chemicals in typical chemical units in Ahmedabad cluster; electrical and thermal energy. Electrical energy is being used in operation of equipment & other electrical utilities and thermal energy is being used in process and drying applications. Energy cost is representing around 10-15 percent of manufacturing cost in a typical manufacturing unit, out of which thermal energy costs around 60 percent of the total energy cost and remaining accounts for electrical energy. In majority of the units in the Ahmedabad chemical cluster wood is used for thermal energy generation due to its easy availability at economical cost.

Annual energy consumption and average production of a typical chemical manufacturing unit are given in Table 1.1 below:

Table 1.1 Annual Energy consumption and production

S.No	Particular	Unit	Value
1	Electricity consumption	kWh	130000
2	Wood consumption	MT	350
3	Production	MT	110

1.2.1 Specific energy consumption

Specific electrical and thermal energy consumption in chemical unit is varying on the final product manufactured in that unit. Specific electrical and thermal energy consumption in a typical chemical is shown in Table 1.2 below:

Table 1.2 Specific energy consumption of a typical unit

S.No.	Particular	Unit	Value
1	Electricity	kWh/kg of product	1.2
2	Fuel	Kg of wood/kg of product	3.0

1.3 Identification of existing technology/ equipment

1.3.1 Description of equipment

The current system for de-moisturisation of the wet dye slurry is the manual filter press. The filter press uses pumps for feeding the material into the press and uses compressor for providing compressed air for giving the required pressure for caking.

From energy use and technology gap audit studies in various chemical industries in Ahmedabad chemical cluster, below mentioned things are identified:

- Energy efficiency improvement opportunities
- Environment and safety improvement of workers
- Design flaws in the conventional filter press
- Operational & maintenance practices in conventional filter press

1.3.2 Technical gap analysis in conventional Filter Press

Technology gaps/design flaws in conventional recess filter press system being identified during technology audit studies and details of the same are presented below:

➢ **Design of filter plates:**

Conventional filter press have poor design of filter plates. Due to poor design this type of plates are unable to remove maximum moisture content from chemical fluids.

➢ **Pressure between filter plates:**

From technology audit studies it was observed that pressure between the two filter plates is different; this causes the uneven moisture content in wet cake from various plates.

➢ **Drying time:**

Time required to evaporate moisture content will be directly proportional to moisture content in wet cake. Due to poor design of conventional filter press, wet cake discharged from conventional filter press has more moisture content. More moisture content in wet cake will increases drying time, which automatically increases drying cost.

1.3.3 Role in the process

Function of filter press in chemical industries is to remove moisture from the intermediate product. The material from mixer is fed into the filter press using pumps. Filter press contains parallel plates between which this material is pressed. The filter allows the water to drain through and results in the caking of the material. This is required to allow the dye/intermediary to dry partially. De-moisturising is one of the major energy and time

consuming process in the overall manufacturing process of chemicals. Apart from the energy and time, final product quality will depend on quality of removal of moisture.

1.3.4 Specification of existing system

The details design data and specification of existing manual filter is not available.

1.3.5 Need for up gradation of existing equipment

The drying cost is one of the major costs in the overall production process of chemicals, in typical chemical industry. Apart from the energy cost, drying time is one of the major time consuming area in overall production process of chemicals, in typical chemical industry the drying time would be around 72 hours per batch.

The existing installed conventional dryer takes 72 hours for processing one batch. If combined with a membrane filter press the drying time is reduced to 49 hours per batch. This not only saves energy consumed by the dryer, through reduced hot air consumption but also enhances the productivity of the dryer as the drying process becomes faster press.

Advantages of replacing the conventional filter press with Energy Efficient tray membrane filter press are:

- Reduction in load on HAG and hence wood consumption
- Improved productivity
- Improved working environment
- Faster filter press process, it leads to energy savings
- Improves the efficiency of the unit
- Reduction of deforestation and GHGs emissions

1.4 Baseline energy consumption of existing equipment

Energy consumption in dryer due to the type of the filter press would depend on below mentioned things:

- Moisture content in the product.
- Volume of air / fan capacity.
- Design of the filter press
- Operational & maintenance practices
- Contents of wood

Energy use and technology audit studies were conducted in various units of Ahmedabad chemical cluster to establish the baseline energy consumption of the unit with filter press.

1.4.1 Design and operating parameters

Technology gaps/design flaws in conventional recess filter press system being identified during technology audit studies and details of the same are presented below:

- **Design of filter plates:**

Conventional filter press have poor design of filter plates. Due to its improper design of plates, the removal of moisture content in chemical fluids is not removed fully.

- **Pressure between filter plates**

The technology audit studies, it was observed that pressure between the two filter plates is different; this causes the uneven moisture content in wet cake from various plates.

- **Drying time:**

Time required to evaporate moisture content will be directly proportional to moisture content in wet cake. Due to poor design of conventional filter press, wet cake discharged from conventional filter press has more moisture content. More moisture content in wet cake will increases drying time, which automatically increases the overall drying cost. Present drying time is 72 hours for drying one batch.

1.4.2 Specific fuel consumption

Fuel consumption of typical filter press of adequate capacity to remove moisture content in wet cake discharge from recess filter press is around 5.04 tons per batch. Performance of manual filter press was evaluated and same is presented in Annexure 1.

1.5 Barriers in adoption of proposed technology/equipment

The processes to do with technology and innovations in SMEs are different from those that take place the large firm context. Technology in the SME sector has an increasingly complex or combinative character, most of the SMEs units in clusters is regarded for their labour intensive and the capability to work with local resources. In the past, SME entrepreneurs have stressed less emphasis on technology due to cut the initial cost of plant /machinery. Major barriers in the up gradation of technology in the cluster are non availability of technology; distrust on technology supplier, lack of information about energy efficiency among small and medium enterprises still persists, preventing increased adoption of efficient technologies and non availability of skilled manpower and cost of new technologies. Details of the other barriers in the implementation of energy efficient

technologies/equipments in the Ahmedabad Chemical cluster are presented in following sections:

1.5.1 Technological Barrier

Majority of the Chemical units entrepreneurs in Ahmedabad chemical cluster do not have in-depth technical expertise and knowledge on energy efficiency, and are dependent on local technology suppliers or service companies, which normally also rely on established and commonly used technology. The lack of technical know-how made it also impossible for the chemical unit owners to identify the most effective technical measures.

One of the main barriers that prevented implementation of energy efficiency measures/technology up gradation projects in the Ahmedabad Chemical cluster are lack of awareness and information on the energy efficiency & energy efficient technologies. Most of chemical units in Ahmedabad chemical cluster have been established several years ago when energy efficiency was not important issue for the operation of plant and therefore operating with outdated technology and low end technologies. Since around 15-20 years same technologies in various processes/utilities are continuing in most of the chemical industries in Ahmedabad Chemical cluster.

Core business of the SME owners is focused on uninterrupted production of the plant by conducting necessary repair work at lowest costs, than on investing in new technology. From the point of view of the operators the direct effect on income from a constant or increased production is much more important for the economic viability of the plant, than benefits in form of future savings due to efficiency measures. Maintaining the equipment requires additional efforts, organizational capacity and technical know-how not related to the core business, all together resulting in additional costs. Therefore, even if they were aware of the benefits many chemical unit owners are shied away from such measures or investments. This short term view is strongly influenced by uncertainties described under the barrier of limited financial resources. Investments in replacing single still operational equipment are therefore seen as a rather unnecessary expenditure, and short-term planning has higher priority than sustainable long-term issues.

As the majority of the Entrepreneurs in cluster are not aware of the energy losses in the plant, there may be a strong feeling that the energy efficiency initiatives in manufacturing facility can have a cascading or domino effect of failure in critical production areas directly or indirectly connected if the intended performance of the replaced / retrofitted equipment falls below design values.

There is a strong feeling with the owners, that energy efficiency initiatives is a challenge to take the risk of such as business interruption due to production loss against the drive to

save energy. These however can be overcome by motivating them to attend the awareness programs and detailed report on the benefits of the measures identified and cost benefit analysis. Further, sourcing of expertise on maintenance service provider or training by the equipment supplier will definitely overcome the barriers.

1.5.2 Financial Barrier

Significant amount of investment is not commonly seen in SME industry sectors in India. Further, from the business perspective for any industry owner, it is more viable, assured and convenient to invest on project expansion for improving the production capacity or quality, rather than make piecemeal investment in retrofit and replace options for energy savings. Investment returns on large capacity addition or technology adoption shows up prominently in terms of savings and helps in benchmarking operations. Further, there is a strong feeling among the industry owners that, energy conservation-initiatives of replacement and retrofit nature is not a common practice as it involves large capital investment against low returns. In view of this and given the limited financial strength of the chemical units it is clear that the industry owners would not have taken up the risks and invest in energy efficiency measures.

1.5.3 Skilled manpower

The availability of the skilled manpower in the industry is one of the major barriers in the Ahmedabad chemical cluster. Though, the skilled manpower is available in the cluster, they are not aware of the energy conservation and efficiency and its importance, their prime responsibility is for zero machine down time and uninterrupted production as per the targets set by the management.

Specialized training with the local service providers for better operation and maintenance of the equipments, importance of the energy and its use will create awareness among workforce and these programs to be organized with the equipment suppliers.

2 IMPLEMENTATION OF PROPOSED TECHNOLOGY

2.1 Description of proposed equipment

Proposed energy efficient membrane filter press replaces the caking walls of the filter press with membranes which allow water to drain out more efficiently. In figure 2.1 below the membrane of a membrane filter press is shown.

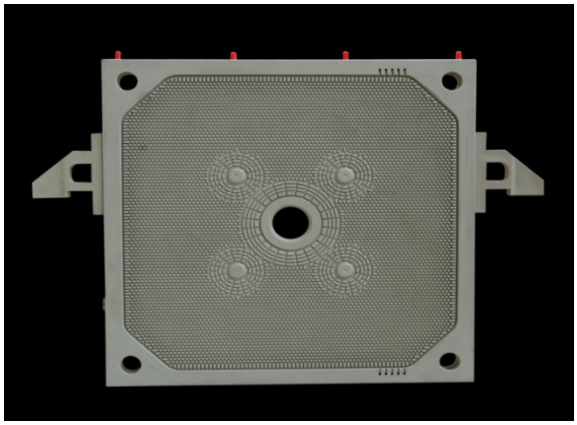


Figure 2.1 Filter plates in membrane filter press

2.1.1 Comparison of conventional filter press with membrane filter press

Technical, economic, Environmental, safety aspects of conventional filter press and energy efficient membrane filter press are compared on life cycle of equipment, same is presented in Table 2.1 below:

Table 2.1 Comparison of conventional equipment and proposed equipment

S. No	*Details*	*Conventional Filter Press*	*Energy efficient Membrane filter press*
1	Drying time in Dryer due to caking	More	Less
2	Load on HAG	More	Less
3	Environment pollution	High (*partial combustion & more fuel consumption*)	Low (*Complete combustion & less fuel consumption*)
4	Caking time	High	Low
5	Operational cost (due to compressed air usage)	High	Low
6	Heat losses	High	Low

From the above table it is clear that Energy efficient membrane filter press has significant advantages in Energy, Environmental, Economic & safety aspects over the conventional

filter press. It is therefore, justifiable to install energy efficient membrane filter press in place of conventional filter press.

2.1.2 Equipment specification

Complete information about the new equipment along with specification is placed at Annexure 7.

2.1.3 Suitability over existing system

The proposed equipment is completely replaced the existing system and suitable with the existing process.

2.1.4 Superiority over existing system

The new system has better control than existing system and hence would yield better result in productivity.

2.1.5 Technical specifications

The technical specifications of the membrane filter press are provided below

Table 2.2 Technical specifications

S.No	*Parameters*	*Details*
1	Size of membrane filter press plates	1000mm X 1000mm
2	Operating pressure	3-4 Kg/cm^2
3	Squeezing pressure	8-10 Kg/cm^2 (Max)
4	Cake thickness	40mm+/-2mm
5	Type of material of Squeezing Header with Hose Pipes & all Accessories Membrane Plates of type P.P	SS- 3004
6	Membrane plates of type P.P	1000mm*1000mm
7	Recess plates of type P.P	1000mm*1000mm
8	One side recess first plate of type P.P	1000mm*1000mm
9	One side recess end plate of type P.P	1000mm*1000mm
10	Hydraulic cylinder type	Pull back
11	Power back unit	2 hp

2.1.6 Availability of proposed equipment

Based on the detailed energy use and technology audit conducted in various chemical industries in Ahmedabad Chemical cluster, it was suggested to replace conventional filter press with energy efficient membrane filter press of suitable capacity.

The new system identified for implementation is available locally and are indigenously produced. The technology/ equipments will be procured from local equipment suppliers. The proposed equipment is locally manufactured by well known vendor in Ahmedabad chemical cluster for making energy efficiency equipments in cluster.

The technology identified is available in the State of Gujarat (Ahmedabad) and implemented successfully in few units in cluster. The investment required for implementation of the identified measures has good financial returns and the proposed measure is technically and financially viable.

2.1.7 Equipment providers

Technology/service provider selected for implementation of the proposed energy efficiency project is having the 20 years of experience in the Ahmedabad Chemical cluster in implementation of energy efficiency projects. This technology/service provider is having in house R&D team to develop the new products, which are energy & eco friendly. Recommended supplier having the trust in cluster on products developed by them. Details of equipment suppliers are furnished in Annexure 6.

2.1.8 Terms and conditions in sales of menbrane filter press

The technology/service provider will provide performance guarantee for the products supplied and warranty. The terms of sales from the proposed supplier is given at Annexure 8.

2.2 Process down time during implementation

The process down time for implementing the replacement of conventional manual filter press with energy efficient membrane filter press will be completed within one week time. The implementation can be taken up during weekly holiday, or other holidays, so that the effective process down time can be avoided to have production loss.

2.3 Suitable unit for proposed equipment

The proposed system membrane filter press of 40 plates is suitable for unit having 150 TPA production capacities.

3 ECONOMIC BENEFITS OF PROPOSED SYSTEM

Energy use and technology audit studies were conducted in various units of the Ahmedabad chemical cluster to evaluate the performance of existing filter press, technical gaps in existing filter press and analyzed energy, economic, environmental and social advantages of energy efficient Membrane Filter Press over conventional filter press are presented below:

3.1 Energy & monetary benefits

3.1.1 Fuel Saving

From Energy use and technology audit studies it was observed that energy consumption of filter press depends on the time required for drying and moisture content. Batch time required in existing filter press for removing moisture content from 65% to 38% is 72 hours while new system takes only 49 hours. Hence, due reduction in processing time, about 242 Tons wood saving would be possible for process 150 batch (1280 liter per batch) per year.

3.1.2 Electrciity saving

No Electricity saving ***directly or indirectly.***

3.1.2 Monetary benefit

Annual monetary savings of implementation of energy efficient membrane filter press in place of conventional filter press is ₹ 7.26 lakh per annum. Details of monetary saving calculation are furnished at Annexure 3.

3.2 Environmental benefits

3.2.1 Reduction of deforestation

Most of units of the cluster are using the non renewable wood for hot air generation; by installing the proposed energy efficient membrane filter press in place of conventional filter press will reduce consumption of non renewable wood which will automatically reduce the deforestation.

3.2.2 GHG emission reductions

Energy consumption of proposed energy efficient membrane filter press is less than conventional filter press; therefore it automatically leads to reduction of about 227 tCO_2 emissions. Reduction of GHG emissions leads to improved environment and better compliance with environmental regulations and makes the project eligible for carbon benefit under Clean Development Mechanism [CDM].

3.3 Social benefits

3.3.1 Impact on working environment

Replacement of conventional filter press with energy efficient Membrane Filter Press will improve the working condition & safety of workers.

3.3.2 Impact on manpower skills

Proposed energy efficient membrane filter press were procured from other companies and also generate employment during installation and commissioning. As training will be provided by equipment suppliers will improve the technical skills of manpower required for operation of the equipment.

3.3.3 Impact on wages/emoluments

The awareness among the technologies and training retained during implementation of the project will lead to increase the wages of the employees indirectly, as it improves the technical skills of the workforce during operation and maintenance of equipments. Further, the remuneration will improve in the market or in other companies for the work force.

3.4 Other benefits (If any)

3.4.1 Productivity improvements

Due to improved design of membrane filter press the caking quality increases and this automatically reduces drying time of chemicals. It was observed that drying is one of major time consuming area, drying time reduction in chemical manufacturing unit will improves productivity of chemical units in Ahmadabad chemical cluster.

3.4.2 Quality improvements

Most of the chemicals manufactured in Ahmedabad chemical industries are temperature sensitive. As already discussed in above chapters that inbuilt membrane design of membrane filter press will control temperature of hot air in tray dryers, this automatically improves quality of material.

4 ECONOMICS & IMPLEMENTATION OF MEMBRANE FILTER PRESS

4.1 Cost of project implementation

4.1.1 Equipment cost

Technical and financial quotations of proposed energy efficient membrane filter press are collected from reputed vendors in cluster. Cost of energy efficient Membrane Filter Press is ₹ 19.89 lakh excluding applicable charges and taxes as per the quotation provided at Annexure 7.

4.1.2 Other cost

Erection & commissioning cost of energy efficient membrane filter press is ₹ 2.2 lakh only. Details of project cost are furnished in Table 4.1 below:

Table 4.1 Details of proposed equipment installation cost

S.No	Particular	Unit	Value
1	Equipment cost	₹ (in Lakh)	19.89
2	Other misc. cost (charges and taxes)	₹ (in Lakh)	2.11
3	Erection & Commissioning cost	₹ (in Lakh)	2.20
4	Total cost	₹ (in Lakh)	24.20

4.2 Arrangement of funds

Proposed financing for the new system is made considering a debt equity ratio of 3:1, which is normally allowed by financial institutions for financing energy efficiency projects. On the basis of debt equity ratio of 3:1 the promoter's contribution works out to 25% of the project cost and the balance would be term loan from the Bank / FIs.

4.2.1 Entrepreneurs contribution

Total cost (Equipment and erection& commissioning) of project works out to be ₹ 24.20 lakh. Out of which entrepreneur's contribution is 25%, which work out to be ₹ 6.05 lakh.

4.2.2 Loan amount

75% of the project cost would be available as term loan from the banks/financial institutions, which works out to be ₹ 18.15 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 7 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 10 years, being period, with in which the entire term loan would be repaid. The financials have been worked out on the basis of certain realistic assumptions, which are outlined below

- The project is expected to achieve monetary savings of ₹ 7.26 lakh per annum, based on 12 hours and 300 days working.
- The operational and Maintenance cost is estimated at 2% of cost of fixed assets with 5% increase every year to take care of escalations.
- The erection and commissioning charges is estimated at 10% of the total project cost for the plant and machinery
- Interest on term loan is estimated at 10%. The tenure of the loan is considered 7 years and repayment starts after 6 months from the first date of disbursement of loan in 60monthly installments.
- Depreciation is provided as per the rates provided in the companies Act.
- Income tax provision is made as per IT Act 1961.
- Based on the above assumptions, profitability and cash flow statements have been prepared.

4.3.2 Simple payback period

Simple payback period is 3.33 year.

4.3.3 Net Preset Value (NPV)

The Net present value of the investment on project is at @ 10.00% interest works out to ₹ 7.60 lakh.

4.3.4 Internal rate of return (IRR)

After tax Internal Rate of Return of the project is works out to be 17.68%. 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 20.84%.

Details of all the financial parameter are presented in Table 4.2 below:

Table 4.2 Financial parameters of energy efficient membrane filter press

S. No	Parameter	Unit	Value
1	Simple payback period	Years	3.33
2	NPV	₹ in lakh	7.60
3	IRR	%age	17.68
4	ROI	%age	20.84
5	DSCR	Ratio	1.54

4.4 Sensitivity analysis

In different situation fuel saving may increase or decrease on the basis of this scenarios a sensitivity analysis in realistic, pessimistic and optimistic scenario has been carried out which is as under

- Fuel saving increased by 5%
- Fuel saving decreased by 5%

Table 4.3 Sensitivity analysis

Particulars	DSCR	IRR	ROI	NPV in lakh
Normal	1.54	17.68%	20.84%	7.60
5% increase in fuel savings	1.61	19.19%	21.11%	9.19
5% decrease in fuel savings	1.46	16.14 %	20.53%	6.02

Assuming all provision and resource input would remain same during sensitivity analysis

4.5 Procurement and implementation schedule

Total time required for implementation of proposed project is about 13 weeks from the date of financial closure. Detailed procurement and implementation schedules are furnished at Annexure 5.

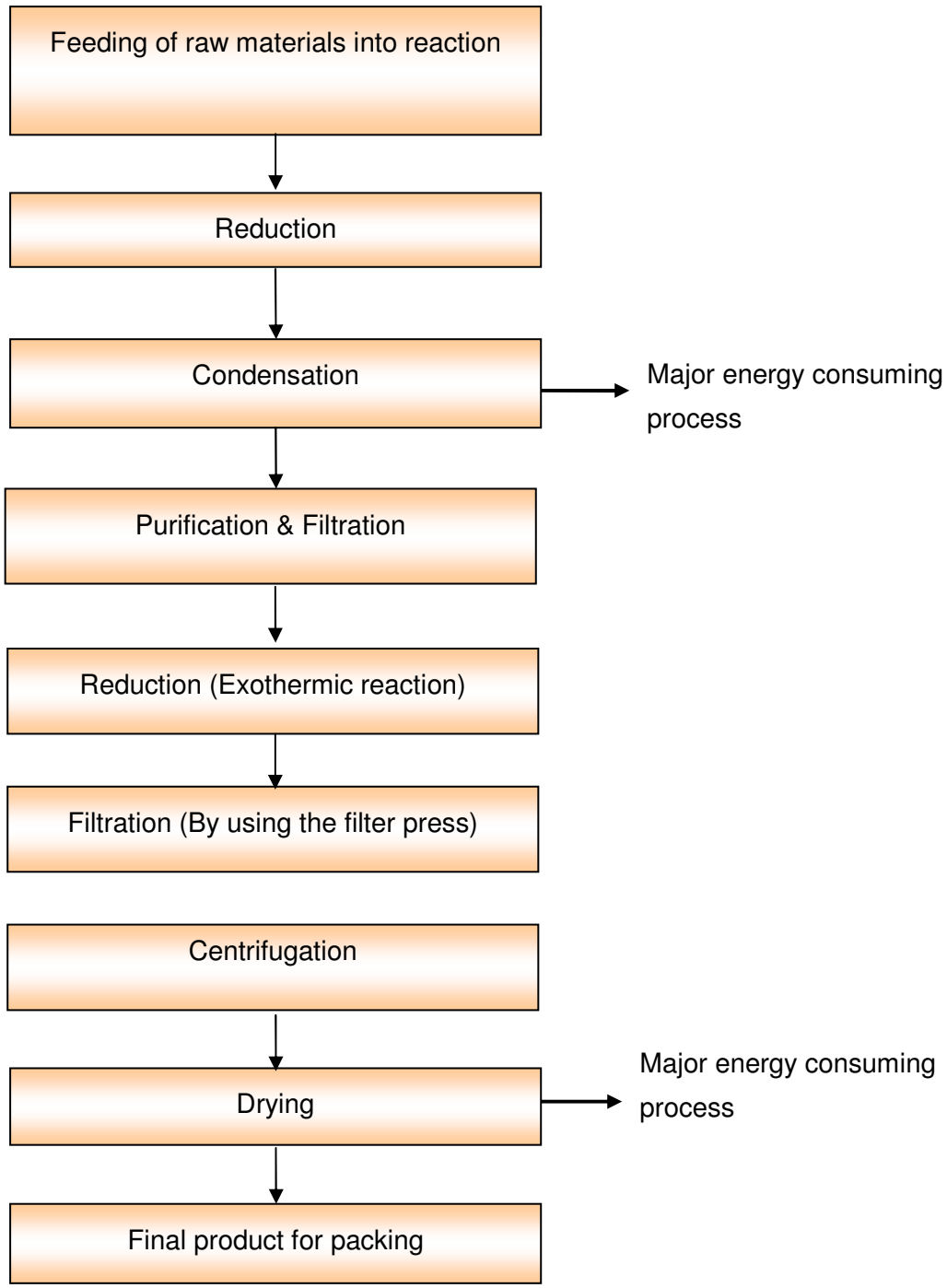
ANNEXURE

Annexure-1 Energy audit reports of conventional filter press

Parameter	Units	Value
Moisture content in wet cake discharged from recess filter press	% age	65
Moisture content in wet cake discharged from membrane filter press	% age	38
Reduction in moisture content using membrane filter press instead of recess filter press	% age	27
Reduction of water in wet cake (@ considering 1000 kg of solid liquid material)	liters	270
Drying time with manual filter press	hours	72
Wood consumption in hot air generator	kg/hr	70

Annexure 2 Process flow diagram

Process flow diagram of chemical industry in Ahmedabad Chemical cluster is furnished in figure below



Annexure-3 Detailed technology assessment report

Most of the chemical industries in Ahmedabad chemical cluster are in unorganized sector with low engineering, limited technology innovation and poor R&D base as well as low level of human resource on knowledge of technology, operational skill etc. This sector also faces deficiencies such as the lack of access to technology and technology sharing and the inadequacies of strong organizational structure, professional attitude etc.

Comprehensive Study conducted at various chemical units in Ahmedabad Chemical cluster to assess the technology gap in different processes and utilities. Following technical gaps are observed during our study:

- The technology of the unit for some of the equipments installed is poor as compared to technologies available in market. Various technological gaps were identified in chemical units and these may be due to lack awareness on the technologies available, quantum of energy loss and its monetary benefit, lack of awareness among the workforce etc.
- There is a tremendous need for this cluster to modernize/upgrade its technology and adopt energy efficient technologies in some of their operational areas. Further, the management based on discussions, are interested in improve the efficiency of the plant by adopting this type of technology instead of going for retrofit options in the existing equipments.

The various factors which influence the management towards implementation of energy efficiency and energy conservation projects in chemical units in Ahmedabad Chemical cluster are:

- Energy efficiency and energy conservation is a low cost investment option which reduces energy consumption
- Low capital investment
- The energy efficiency improvement will enhance the plant management to be competitive in local and global markets by reducing production cost
- To conserve depleting fossil fuels
- The energy efficiency and conservation reduces GHG emissions because of low carbon dioxide and particulate emissions
- Energy efficiency and conservation is a viable strategy to meet future energy needs of the expanding plans in the industry
- The return on investment is attractive with lower pay back periods.

S.No	Parameter	Unit	Value
1	Drying time in conventional filter press	hrs/batch	72.00
2	Drying time in new membrane filter press	hrs/batch	49.00
3	Volume processed per batch	litre	1280.00
4	Wood consumption in HAG	Kg/hr	70.00
5	Wood consumption in HAG with conventional filter press	kg/batch	5040.00
6	Wood consumption in HAG with proposed filter press	kg/batch	3430.00
7	Sp. fuel consumption for conventional filter press (@1280 Litre/batch)	kg/litre	3.94
8	Sp. fuel consumption for proposed filter press (@1280 Litre/batch)	kg/litre	2.68
9	Savings in sp. fuel consumption	kg/litre	1.26
10	Annual operating batches	Nos.	150.00
11	Annual production capacity @ 1280 Litre/Batch	litre/annum	192000.00
12	Wood energy saved per annum	tonnes/annum	241.50
13	Average fuel cost	₹/tonne	3000.00
14	Total monetary saving	₹ (in lakh)	7.26
15	Total investment required	₹ (in lakh)	24.20
16	Simple payback period	Years	3.33

Annexure-4 Detailed cash flow evaluations

Name of the Technology	Membrane Filter Press		
Rated Capacity			
Details	**Unit**	**Value**	**Basis**
Installed Capacity	Plates	40	Feasibility Study
No of working days	Days	300	Feasibility Study
No of Operating Hours	Hrs.	12	Feasibility Study
Proposed Investment			
Cost of plant & Machinery	₹(in lakh)	19.89	Feasibility Study
Other charges	₹(in lakh)	2.11	Feasibility Study
Erection & Commissioning (10% of plant machinery)	₹(in lakh)	2.2	Feasibility Study
Total Investment	₹(in lakh)	24.20	Feasibility Study
Financing pattern			
Own Funds (Internal Accruals)	₹(in lakh)	6.05	Feasibility Study
Loan Funds (Term Loan)	₹(in lakh)	18.15	Feasibility Study
Loan Tenure	Years	7	Assumed
Moratorium Period	Months	6	Assumed
Repayment Period	Months	90	Assumed
Interest Rate	%	10.00	SIDBI Lending rate
Estimation of Costs			
O& M Costs	%(on Plant & Equip)	2.00	Feasibility Study
Annual Escalation	%	5.00	Feasibility Study
Estimation of Revenue			
Wood savings	Tons/annum	241.50	-
Cost of Wood	₹/tons	3000	-
St. line Depreciation	%	5.28	Indian Companies Act
IT Depreciation	%	15.00	Income Tax Rules
Income Tax	%	33.99	Income Tax Act 2008-09

Estimation of Interest on term loan ***₹(in lakh)***

Years	Opening Balance	Repayment	Closing Balance	Interest
1	18.15	0.90	17.25	2.10
2	17.25	1.80	15.45	1.64
3	15.45	2.00	13.45	1.46
4	13.45	2.40	11.05	1.24
5	11.05	2.60	8.45	1.00
6	8.45	2.80	5.65	0.72
7	5.65	3.60	2.05	0.42
8	2.05	2.05	0.00	0.06
		18.15		

WDV Depreciation ***₹ (in lakh)***

Particulars / years	*1*	*2*
Plant and Machinery		
Cost	24.20	4.84
Depreciation	19.36	3.87
WDV	4.84	0.97

Projected Profitability ***₹ (in lakh)***

Particulars / Years	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Total*
Revenue through Savings											
Fuel savings	7.26	7.26	7.26	7.26	7.26	7.26	7.26	7.26	7.26	7.26	72.60
Total Revenue (A)	7.26	7.26	7.26	7.26	7.26	7.26	7.26	7.26	7.26	7.26	72.60
Expenses											
O & M Expenses	0.48	0.51	0.53	0.56	0.59	0.62	0.65	0.68	0.72	0.75	6.09
Total Expenses (B)	0.48	0.51	0.53	0.56	0.59	0.62	0.65	0.68	0.72	0.75	6.09
PBDIT (A)-(B)	6.78	6.75	6.73	6.70	6.67	6.64	6.61	6.58	6.54	6.51	66.51
Interest	2.10	1.64	1.46	1.24	1.00	0.72	0.42	0.06	-	-	8.64
PBDT	4.67	5.11	5.27	5.46	5.68	5.92	6.20	6.52	6.54	6.51	57.87
Depreciation	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	12.78
PBT	3.39	3.83	3.99	4.19	4.40	4.64	4.92	5.24	5.27	5.23	45.09
Income tax	-	0.42	1.79	1.86	1.93	2.01	2.11	2.21	2.22	2.21	16.77
Profit after tax (PAT)	3.39	3.41	2.20	2.33	2.47	2.63	2.81	3.02	3.04	3.02	28.33

Computation of Tax **₹ (in lakh)**

Particulars / Years	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Profit before tax	3.39	3.83	3.99	4.19	4.40	4.64	4.92	5.24	5.27	5.23
Add: Book depreciation	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
Less: WDV depreciation	19.36	3.87	-	-	-	-	-	-	-	-
Taxable profit	(14.69)	1.24	5.27	5.46	5.68	5.92	6.20	6.52	6.54	6.51
Income Tax	-	0.42	1.79	1.86	1.93	2.01	2.11	2.21	2.22	2.21

Projected Balance Sheet

Particulars / Years	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Liabilities										
Share Capital (D)	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05
Reserves & Surplus (E)	3.39	6.80	9.00	11.33	13.80	16.43	19.24	22.26	25.31	28.33
Term Loans (F)	17.25	15.45	13.45	11.05	8.45	5.65	2.05	0.00	0.00	0.00
TOTAL LIABILITIES (D)+(E)+(F)	26.69	28.30	28.50	28.43	28.30	28.13	27.34	28.31	31.36	34.38
Assets										
Gross Fixed Assets	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20
Less Accm. depreciation	1.28	2.56	3.83	5.11	6.39	7.67	8.94	10.22	11.50	12.78
Net Fixed Assets	22.92	21.64	20.37	19.09	17.81	16.53	15.26	13.98	12.70	11.42

Cash & Bank Balance	3.77	6.66	8.14	9.34	10.49	11.60	12.09	14.34	18.66	22.95
TOTAL ASSETS	26.69	28.30	28.50	28.43	28.30	28.13	27.34	28.31	31.36	34.38
Net Worth	9.44	12.85	15.05	17.38	19.85	22.48	25.29	28.31	31.36	34.38
Debt Equity Ratio	2.85	2.55	2.22	1.83	1.40	0.93	0.34	0.00	0.00	0.00

Projected Cash Flow: ***₹ (in lakh)***

Particulars / Years	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***
Sources											
Share Capital	6.05	-	-	-	-	-	-	-	-	-	-
Term Loan	18.15										
Profit After tax		3.39	3.41	2.20	2.33	2.47	2.63	2.81	3.02	3.04	3.02
Depreciation		1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
Total Sources	24.20	4.67	4.69	3.48	3.61	3.75	3.91	4.09	4.30	4.32	4.30
Application											
Capital Expenditure	24.20										
Repayment Of Loan	-	0.90	1.80	2.00	2.40	2.60	2.80	3.60	2.05	-	-
Total Application	24.20	0.90	1.80	2.00	2.40	2.60	2.80	3.60	2.05	-	-
Net Surplus	-	3.77	2.89	1.48	1.21	1.15	1.11	0.49	2.25	4.32	4.30
Add: Opening Balance	-	-	3.77	6.66	8.14	9.34	10.49	11.60	12.09	14.34	18.66
Closing Balance	-	3.77	6.66	8.14	9.34	10.49	11.60	12.09	14.34	18.66	22.95

IRR **₹ (in lakh)**

Particulars / months	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***
Profit after Tax		3.39	3.41	2.20	2.33	2.47	2.63	2.81	3.02	3.04	3.02
Depreciation		1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
Interest on Term Loan		2.10	1.64	1.46	1.24	1.00	0.72	0.42	0.06	-	-
Cash outflow	(24.20)	-	-	-	-	-	-	-	-	-	-
Net Cash flow	(24.20)	6.78	6.33	4.94	4.84	4.74	4.63	4.51	4.36	4.32	4.30
IRR	17.68%										
NPV	7.60										

Break Even Point

Particulars / Years	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***
Variable Expenses										
Oper. & Maintenance Exp	0.36	0.38	0.40	0.42	0.44	0.46	0.49	0.51	0.54	0.56
Sub Total*(G)*	0.36	0.38	0.40	0.42	0.44	0.46	0.49	0.51	0.54	0.56
Fixed Expenses										
Oper. & Maintenance Exp 25%	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.19
Interest on Term Loan	2.10	1.64	1.46	1.24	1.00	0.72	0.42	0.06	0.00	0.00
Depreciation *(H)*	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
Sub Total (I)	3.50	3.05	2.87	2.65	2.42	2.16	1.86	1.51	1.46	1.47
Sales (J)	7.26	7.26	7.26	7.26	7.26	7.26	7.26	7.26	7.26	7.26
Contribution (K)	6.90	6.88	6.86	6.84	6.82	6.80	6.77	6.75	6.72	6.70
Break Even Point (L= G/I)	50.80%	44.31%	41.86%	38.80%	35.50%	31.73%	27.40%	22.39%	21.66%	21.88%
Cash Break Even {(I)-(H)}	32.27%	25.73%	23.24%	20.11%	16.76%	12.93%	8.54%	3.46%	2.66%	2.80%

Break Even Sales (J)*(L)	3.69	3.22	3.04	2.82	2.58	2.30	1.99	1.63	1.57	1.59

Return on Investment **₹ (in lakh)**

Particulars / Years	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***Total***
Net Profit Before Taxes	3.39	3.83	3.99	4.19	4.40	4.64	4.92	5.24	5.27	5.23	45.09
Net Worth	9.44	12.85	15.05	17.38	19.85	22.48	25.29	28.31	31.36	34.38	216.40
											20.84%

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

Particulars / Years	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***Total***
Cash Inflow											
Profit after Tax	3.39	3.41	2.20	2.33	2.47	2.63	2.81	3.02	3.04	3.02	22.26
Depreciation	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	10.22
Interest on Term Loan	2.10	1.64	1.46	1.24	1.00	0.72	0.42	0.06	0.00	0.00	8.64
Total (M)	6.78	6.33	4.94	4.84	4.74	4.63	4.51	4.36	4.32	4.30	41.13

DEBT

Interest on Term Loan	2.10	1.64	1.46	1.24	1.00	0.72	0.42	0.06	0.00	0.00	8.64
Repayment of Term Loan	0.90	1.80	2.00	2.40	2.60	2.80	3.60	2.05	0.00	0.00	18.15
Total (N)	3.00	3.44	3.46	3.64	3.60	3.52	4.02	2.11	0.00	0.00	26.79
Average DSCR (M/N)	1.54										

Annexure-5 Details of procurement and implementation plan

Procurement and implementation schedule of energy efficient Membrane filter press in place of conventional filter press are presented below.

Activity	*Weeks*												
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Energy data reconfirmation													
Technical discussion & finalization													
Collection of vendor quotes													
Order placement													
Material receipt													
Installation & Commissioning													
Measurement of savings													
Certification of savings													

Annexure-6 Details of equipment and service providers

Name of Company	Sachin Filtech
Name of Contact Person	Mr. K D patel
Address of Company	Plot No: 77-4, F Road, Phase I, GIDC Estate, Vatva, Ahmedabad, 382445
Contact No & Fax Nos	079-25832204/5, 25897562/3
Contact Email Ids	kaumil@sachininternational.com, exports@sachininternational.com
Website of Company	www.filterpressindia.com

Annexure 7 Quotations of energy efficient Membrane filter press

An ISO 9001-2000 certified company

Mfgrs. & Exporters of Filter Press & Filter Plates

SACHIN FILTECH
PRIVATE LIMITED

Corporate Office ➢ Sachin House, Plot # 77-4, F-Road, Phase 1, GIDC Estate, Vatva, Ahmedabad-382 445, Gujarat, INDIA.
Phone ➢ +91-79-2583 2204 / 05, 2589 7562 / 63 Telefax ➢ +91-79-2589 6384, 2583 2205
E-mail ➢ exports@sachininternational.com ➢ kaumilinad1@sancharnet.in
Website ➢ www.filterpressindia.com ➢ www.sachininternational.com

Ref. No.: SFPL/N 1627/ 2009-10 **Date: 15/03/2010**

To,
M/s. Winrock International India
788- Udyog Vihar, Phase – V,
Gurgaon – 122 001

Phone :- 0124-4303809
Fax :- 0124-4303862
Email :- chaman@winrockindia.org

Kind Attn: Chaman Kumar Shukla (9899748347)

Dear Sir,

Sub: Quotation for Filter Press and Filter Press Parts
(Central Excise Chapter, Heading, Sub Heading: 8421.1999 & 3926.9080)

With reference to your Email Dt. 12th March, 2010 for your requirement of Filter Press – Membrane, we are pleased to Quote our best offer as under.

A) P. P. MEMBRANE TYPE FILTER PRESS: 1000mm X 1000mm (40" X 40") size:
(Operating Pressure 3 - 4 Kg/cm2 & Squeezing Pressure 8-10 Kg/ Cm^2 Max.)

1) 1000mm X 1000mm size heavy duty **Mild Steel Fabricated structure** with M. S. Rail and Hydraulic type of closing device with suitable **Pull Back type Hydraulic Cylinder** along with **Control Panel** and 2 H. P. Power Pack unit, to accommodate **41 Nos.** of 1000mm X 1000mm size **P. P. Membrane & P.P. Recess Filter Element (Mix pack type),** with S.S. Cladding on the top of the M. S. Rails.
(Cake Thickness 40mm +/- 2mm)
2) Set of **S. S.** Nozzles
3) 1000mm X 1000mm size **P. P. Membrane** Plates **20 Nos.**
4) 1000mm X 1000mm size **P.P. Recess** Plates **19 Nos.**
5) 1000mm X 1000mm size P.P. One side Recess First Plate
6) 1000mm X 1000mm size P.P. One side Recess End Plate
8) Suitable **S.S. 304** type **Squeezing Header with Hose Pipes &** all Accessories

Basic Price for One Unit: Rs. 19,89,000.00
Basic Price for One Unit: Rupees Nineteen Lac Eighty Nine Thousand Only.

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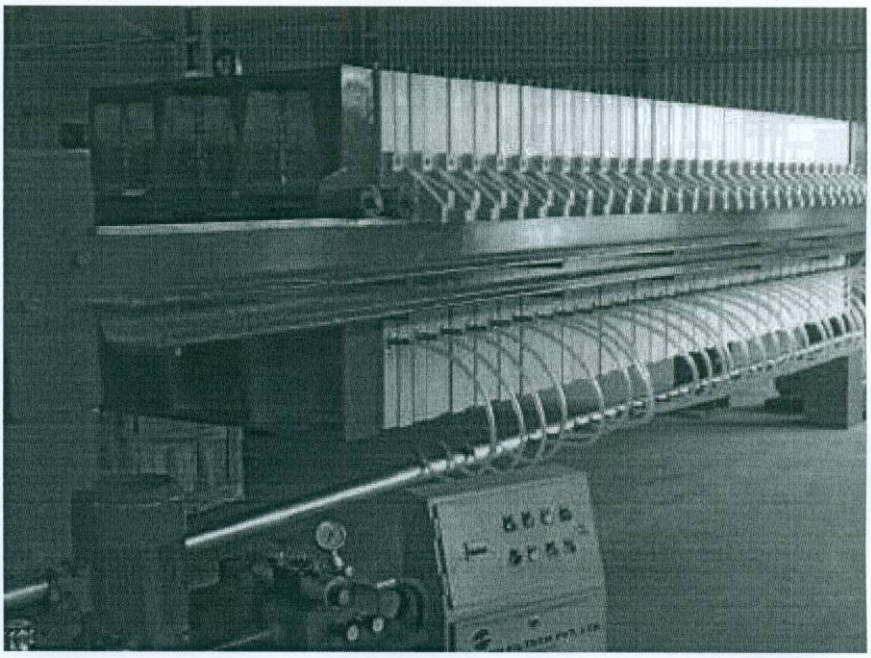
Ref. No.: SFPL/N 1627/ 2009-10 Date: 15/03/2010

SACHIN MAKE MEMBRNAE TYPE FILTER PRESS



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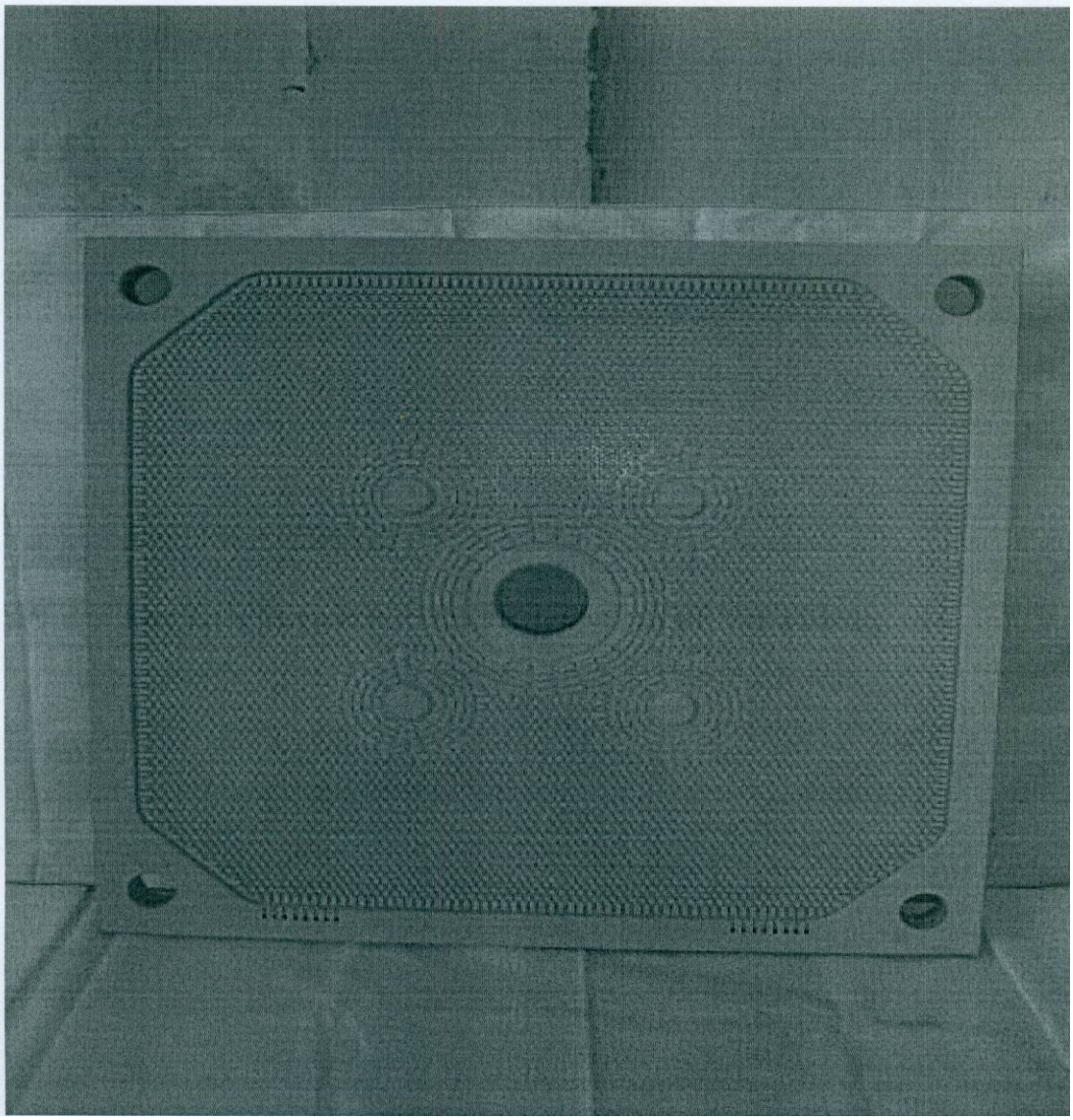
Ref. No.: SFPL/N 1627/ 2009-10 Date: 15/03/2010

SACHIN MAKE P.P. MEMBRANE TYPE FILTER PLATE



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Ref. No.: SFPL/N 1627/ 2009-10	**Date: 15/03/2010**

The above Quotation is subject to your general terms and conditions enclosed herewith.

P.N.: The above offer does not Includes:

- Filter Cloth
- Feeding Pump
- Feeding / Washing / Airing Valves
- Foundation Bolts
- Hydraulic Oil – ENCLO 68

Hope you shall find the offer most competitive and shall oblige us by placing your valued order with us which shall receive our prompt attention to serve your esteemed organization.

Thanks & regards,

For, SACHIN FILTECH PVT. LTD.

KAUMIL K. PATEL
Jt. Managing Director
Cell: 098242 56078

Cont..5..

Ref. No.: SFPL/N 1627/ 2009-10	Date: 15/03/2010

-: Commercial Terms & Conditions:-

Price Basis: The prices mentioned are ex-our factory, Ahmedabad and Central Excise duty @ 10 % E. C. @ 3% and VAT @ 5 %/ CST 2% against Form 'C' (or 10 % without form'C') Insurance, Fright, Loading – Unloading and octroi if any at your end shall be charged extra. If this is for exports you have to bear all the necessary cost related to dispatch as the quoted price is ex- our works, Ahmedbad only.

Packing charges: Packing & forwarding @ 4% shall also be charged extra.

Payment: 40% Advance, 40 % during work in progress and balance 20 % on Performa Invoice on completion of the work at our factory site before delivery including all other duties & taxes & other cost if any. If this is for exports you have to transfer the 40% advance payment by T.T. & balance against performa invoice before delivery by confirmed & irrevocable T.T. of 60% on any prime bank & Confirmed by our Banker State Bank if India Prior to Shipment. All charges for the T.T. are to be on buyers account.

Delivery: Within 4 to 5 months time after receiving technically and commercially Clear order duly stamped & sign in original Purchase order along with the advance payment with complete technical clarification and is subject to force majeure clause. Your delivery date will start after receipt of the above. Payment by D.D. or T.T. only. All the charges to be born by you for the payment.

Validity: 1 – 2 weeks from the date of quotation / conformation.

Warrantee: Our quoted products are warranted for six months against all mfg. defects but damages due to improper handling, poor storage, normal tear and wear and use of such material which effects the quoted machinery and or its parts etc. are not covered in this warrantee clause.

Inspection: You shall have to carry out the inspection at our works at your cost and after the dispatch of the goods our responsibility ceases.

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Ref. No.: SFPL/N 1627/ 2009-10 **Date: 15/03/2010**

Supervision of Installation:

The machine will be delivered in dismantle condition only. We will provide you commissioning engineer for Max. 4-5 days. You have to provide all necessary manpower as well as machines for the same. If any delay cause due to incomplete installation will be charge extra as actual. If the installation is out side India, you have to provide all necessary working Visa(Other wise he will supervise the installation), tickets from Ahmedabad to Ahmedabad (To – fro), food, hotel accommodation, pick up & drop down arrangement form the airport / hotel.

Order: If you do not take the delivery of the ordered goods within a stipulated time as above, your order shall be treated cancelled and your deposit shall be forfeited and all other damages due to no-upliftment of the goods shall be to your account.

Disputes: If any arising out of order conformation shall be compulsorily refereed to arbitration of two arbitrators, one to be appointed by each party with liberty to the arbitrators to appoint an umpire shall be binding on the parties.

Jurisdiction: Ahmedabad (India) courts alone.

P. N: The above all Photographs & details are of proprietary of Sachin Filtech Pvt. Ltd. And any misuse of the above will attract legal action.

For, SACHIN FILTECH PVT. LTD.

KAUMIL K. PATEL
Director
Cell: 098242 56078

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Ref. No.: SFPL/N 1627/ 2009-10 **Date: 15/03/2010**

SPECIFICATION SHEET FOR 40" X 40" SIZE FILTER PRESS

1.	**SKELETON (STRUCTURE)**	**1000mm X 1000mm**
	Inlet body and Tightening End Body	Mild Steel Fabricated – 2062
	Moving Plate	Mild Steel Fabricated – 2062
	M.S. Plate (Tie Bar)	34 X 150mm
2.	**TYPE OF PLATE**	**1000mm X 1000mm**
	Material of Construction	Polypropylene
	Cake Thickness (Recess Thickness)	45mm(Each side 22.5mm +/-2mm)
	Type of Washing	Washing / Non – Washing
	Number of Chamber	**40 Chambers**
	Plate Type	Mix Membrane
	Drainage Surface	Raised Pipes
	Cocks	P. P. (Two Way)
3.	**NOZZLES**	**S. S.**
4.	**FILTERATION AREA**	**1.69 Sq. m. Per Plate**
		67.6 Sq. m. Per Press
5.	**CAKE HOLDING CAPACITY**	**32 Liters Per Plate**
		1280 Liters Per Press
6.	**DELIVERY**	**Open type / Close type**
7.	**CLOSING MACHANISM**	**Pull Back Type Hydraulic Cylinder**
8.	**MAX. OPERATING PRESSURE**	**5 Kg./Cm Sq. At ambient temp.**

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