

Assembly of Diesel Generator Set

PRODUCT CODE (ASICC)	: 77212
QUALITY AND STANDARDS	: There is no separate IndianStandard specification for this product. However, the diesel engine shall conform to IS 10001
PRODUCTION CAPACITY	: Quantity: 24 Nos. (per annum) Value : Rs. 10,08,000
YEAR OF PREPARATION	: 2002_2003
PREPARED BY	: Small Industries Service Institute 386, Patel Road, Ram Nagar, Coimbatore-641009 and Office of the Development Commissioner Small Scale Industries ,Electrical and ElectronicsDivision, 7th Floor, Nirman Bhavan, New Delhi - 110011.

Introduction

Diesel Generator set is used to generate electricity for meeting the electricity requirement of small establishments such as commercial buildings, Hotels, Railway Stations, Telephone Exchange, Shops etc. when there is a power supply failure from the State Electricity Board or other power supply undertakings.

The Diesel Generator sets proposed in this project profile are of lower capacity only i.e. below 7.5 kVA. The prime mover of the Generator set will be a diesel engine and the prime mover will be coupled to an alternator (single phase for small units). There will be a control panel to control the on/off

operation/change over from mains supply to Generator set supply etc. Generator sets of higher rating has to be started with battery starters. Diesel Generator sets of smaller rating can be started by cranking.

Market Potential

Since power failure is very common in India, this equipment has got good demand. Diesel Generator set of 5 kVA rating is having very good market as it suits to most of the commercial establishments.

Basis and Presumptions

- i) The basis for calculation of production capacity has been taken on single shift basis on 75% efficiency.
- ii) The maximum capacity utilization on single shift basis for 300 days a year. During first year and second year of operations the capacity utilization is 60% and 80% respectively. The unit is expected to achieve full capacity utilization from the third year onwards.
- iii) The salaries and wages, cost of raw materials, utilities, rents, etc. are based on the prevailing rates in and around Coimbatore. These cost factors are likely to vary with time and location.
- iv) Interest on term loan and working capital loan has been taken at the rate of 16% on an average. This rate may vary depending upon the policy of the financial institutions/agencies from time to time.
- v) The cost of machinery and equipments refer to a particular make/model and prices are approximate.
- vi) The break-even point percentage indicated is of full capacity utilization.
- vii) The project preparation cost etc. whenever required could be considered under pre-operative expenses.
- viii) The essential production machinery and test equipment required for the project have been indicated. The unit may also utilize common test facilities available at Electronics Test and Development Centres (ETDCs) and Electronic Regional Test Laboratories (ERTLs) and Regional Testing Centres (RTCs).

Implementation Schedule

The major activities in the implementation of the project has been listed and the average time for implementation of the project is estimated at 12 months:

<i>Sl. No.</i>	<i>Activity</i>	<i>Period (in Months)</i>
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1.	Preparation of project report	1
2.	Registration and other formalities	1
3.	Sanction of loan by financial institutions	3
4.	Plant and Machinery:	
	a) Placement of orders	1
	b) Procurement	2
	c) Power connection/ Electrification	2
	d) Installation/Erection of machinery/ Test Equipment	2
5.	Procurement of raw materials	2
6.	Recruitment of Technical Personnel etc.	2
7.	Trial production	11
8.	Commercial production	12

Notes

1. Many of the above activities shall be initiated concurrently.
2. Procurement of raw materials commences from the 8th month onwards.
3. When imported plant and machinery are required, the implementation period of project may vary from 12 months to 15 months.

Technical Aspects

Process of Manufacture

The proposed unit is doing the assembly of diesel generator sets with necessary control panel as per the requirement of the customer.

The load requirement of the customer is studied in consultation with the customer. Any special requirements such as minimum start up period, fluctuations of load etc. are noted. A suitable alternator to meet the load requirement is procured from an alternator manufacturer. A diesel engine suitable for the alternator is also selected and procured from the diesel engine manufacturer. The diesel engine and alternator are coupled and fixed on a frame. A control panel for starting the engine using battery bank, isolating the mains while the alternator is running, disconnecting the alternator when the mains supply is available etc. is designed and assembled as stipulated by the customer. The assembly is tested for fuel efficiency, load capacity of the alternator, operational sequences etc.

The Diesel Generator set is then despatched to the premises of the customer in dismantled condition or in assembled condition depending upon the size of the Diesel Generator set.

Quality Control and Standards

The alternator has to meet the requirements of the customer with regard to voltage, frequency, power etc. and the diesel engine has to conform to IS 10001.

The performance of alternator and diesel engine may be tested at the manufacturers' works before taking delivery.

The control panel requires contactors and relays. The contactors and relays shall conform to relevant IS Specification and shall be from a reputed manufacturer.

Production Capacity (per annum)

The actual manufacturing depends up on the orders received and the marketing efforts taken by the unit. The proposed unit will have a capacity to assemble 24 diesel generator sets in a year. For the purpose of financial projections a standard rating of 5 kVA diesel generator set is taken.

Motive Power

10 KW.

Pollution Control

The Government accords utmost importance to control environmental pollution. The small-scale entrepreneurs should have an environmental friendly attitude and adopt pollution control measures by process modification and technology substitution.

India having acceded to the Montreal Protocol in September 1992, the production and use of Ozone Depleting Substances (ODS) like Chlorofluore Carbon (CFCs), Carbon Tetrachloride, Halons and methyl Chloroform etc. need to be phased out immediately with alternative chemicals/solvents. A notification for detailed Rules to regulate ODS phase out under the Environment Protection Act, 1986 have been put in place with effect from 19th July 2000.

Energy Conservation

With the growing energy needs and shortage coupled with rising energy cost, a greater thrust in energy efficiency in industrial sector has been given by the Govt. of India since 1980s. The Energy Conservation Act, 2001 has been enacted on 18th August 2001, which provides for efficient use of energy, its conservation and capacity building of Bureau of Energy Efficiency created under the Act.

The following steps may help for conservation of electrical energy:

- i) Adoption of energy conserving technologies, production aids and testing facilities.
- ii) Efficient management of process/manufacturing machineries and systems, QC and testing equipments for yielding maximum Energy Conservation.
- iii) Optimum use of electrical energy for heating during soldering process can be obtained by using efficient temperature controlled soldering and de_soldering stations.
- iv) Periodical maintenance of motors compressors etc.
- v) Use of power factor correction capacitors. Proper selection and layout of lighting system; timely switching on-off of the lights; use of compact fluorescent lamps wherever possible etc.

Financial Aspects

A. Fixed Capital

(i) Land and Building	(Rs.)
Built up area	2000 sq/ft.
Rent payable (per month)	4000

(ii) Machinery and Equipments

Sl. No.	Description	Qty.	Rate (Rs.)	Amount (Rs.)
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1.	Pendent operated Electric Hoist 5Ts capacity with supporting frame	1 No.	22,000	22,000
2.	Welding Transformer 2 kVA	1 No.	6,000	6,000
3.	Gas cutting equipment	1 No.	8,000	8,000
4.	Flexible shaft grinder	1 No.	8,000	8,000
5.	Bench Drilling Machine ½" Cap.	1 No.	10,000	10,000
6.	Set of tools such as spanners, Screw drivers, crimping tools etc.	1 No.	12,000	12,000
7.	Resistance load bank for loading the Alternator (10 kW capacity)	1 No.	8,000	8,000
8.	Testing panel for testing the Performance of the Diesel Generator set (Fitted with ammeters, voltmeter, watt meter, Indication lamp etc.)	1 No.	22,000	22,000
			Total	96,000
9.	Electrification and Installation charges (a) 10% of Cost of machinery and equipments			9,600
10.	Office equipments and furniture			40,000
11.	Tools/Jigs/ fixture			20,000

(iii) Pre-operative expenses **10,000**

Total **1,75,600**

B. Working Capital

(i) Raw Material Required (per month)

Sl. No.	Description	Qty.	Rate (Rs.)	Amount (Rs.)
1.	Diesel Engine 7.5 HP	2 Nos.	8,000	16,000
2.	Alternator 5 kVA single phase, 230 V, 50 Hz	2 Nos.	6,000	12,000
3.	Relays and Contractors	2 sets	3,000	6,000
4.	PVC insulated cable for Control Panel wiring	1 Coil	650	650
5.	M.S. channels, bolts, nuts and M.S. Plates	LS	-	2,000
6.	Sheet metal enclosure for Control Panel	2 Nos.	-	1,000
7.	Other misc. items such as crimping lugs, hardware etc.	LS	-	500
Total				38,150

(ii) Salaries and Wages (per month)

Sl.	Description	Qty.	Rate	Amount
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No.			(Rs.)	(Rs.)
1.	Electrical Fitters	1	2,000	2,000
2.	Helper	1	1,500	1,500
3.	Production Supervisor	1	3,000	3,000
4.	Marketing Executive	1	3,000	3,000
		Total		9,500

Add 15% Testing Perquisites 1,425

Total 10,925

Say 11,000

(iii) Utilities (per month)

Sl.	Description	Amount
No.		(Rs.)
1.	Power	2,000
2.	Water	250
	Total	2,250

(iv) Other Contingent Expenses (per month)

Sl.	Description	Amount
No.		(Rs.)
1.	Sales expenditure	2,000
2.	Consumable Stores	2,500
3.	Postage and Stationery	2,500
4.	Telephone	2,000
5.	Rent	4,000

6.	Misc. Expenditure	1,500
	Total	14,500
	(v) Recurring Expenditure (per month)	65,900
(i+ii+iii+iv)		
	(vi) Working Capital Requirement	(Rs.)
	The approximate amount of	1,97,700
	working capital requirement is	
	taken as 3 months recurring	
	expenditure	
	(i.e. $3 \times 65,900$)	

C. Total Capital Investment

(i) Fixed Capital	Rs. 1,75,600
(ii) Working Capital on 3 months basis	Rs. 1,97,700

Total **Rs. 3,73,300**

Financial Analysis

(1) Cost of Production (per annum)	(Rs.)
(a) Total recurring expenditure	7,90,800
(b) Depreciation on machinery and equipment @ 10%	9,600
(c) Depreciation on tools, jigs and fixtures @ 25%	5,000
(d) Depreciation of office equipment,	8,000

furniture @ 20%

(e) Interest on total capital investment @ 16%	59,728
Total	8,73,128
Say	8,73,000

(2) Turn over (per annum)

Item	Qty. (Nos.)	Rate/ Unit (Rs.)	Total Sales (Rs.)
Diesel Generator	24	42,000	10,08,000
Set 5 kVA with control Panel			

(3) Profit (per annum) (Before Taxes) Rs. 1,35,000

(4) Net Profit Ratio

$$= \frac{\text{Profit per annum} \times 100}{\text{Sales per annum}}$$

$$= \frac{1,35,000 \times 100}{10,08,000}$$

$$= 13.39\%$$

(5) Rate of Return

$$= \frac{\text{Profit per annum} \times 100}{\text{Total capital investment}}$$

$$= \frac{1,35,000 \times 100}{3,73,300}$$

$$= 36.16\%$$

(6) Break-even Point

Fixed Cost (per annum)	(Rs.)
Rent	48,000
Depreciation on machinery and equipment @ 10%	9,600
Depreciation on tools, jigs and fixtures @ 25%	5,000
Depreciation on office equipment, furniture @ 20%	8,000
Interest on total capital investment @ 16%	59,728
40% Salaries and wages	52,800
40% other contingent expenses and utilities (excluding rent)	61,200
Total	2,44,328
Say	2,44,000

$$\begin{aligned}
 \text{B.E.P.} &= \frac{\text{Fixed cost} \times 100}{\text{Fixed cost} + \text{Profit}} \\
 &= \frac{2,44,000 \times 100}{2,44,000 + 1,35,000} \\
 &= \mathbf{64.38\%}
 \end{aligned}$$

Additional Information

- a. The Project Profile may be modified/tailored to suit the individual entrepreneurship qualities/capacity, production Programme and also to suit the locational characteristics, wherever applicable.
- b. The Electrical Technology is undergoing rapid strides of change and there is need for regular monitoring of the national and international technology scenario. The unit may, therefore, keep abreast with the new technologies in order to keep them in pace with the developments for global competition.

c. Quality today is not only confined to the product or service alone. It also extends to the process and environment in which they are generated. The ISO 9000 defines standards for Quality Management Systems and ISO 14001 defines standards for Environmental Management System for acceptability at international level. The unit may therefore adopt these standards for global competition.

d. The margin money recommended is 25% of the working capital requirement at an average. However, the percentage of margin money may vary as per bank's discretion.

Addresses of Machinery and Equipment Suppliers

1. M/s. Automation Props Test Equipment (Elec.) Pvt. Limited

Dr. Annie Besant Road,

Worli, Mumbai - 400 018.

(For Test Panel)

2. M/s. Mecco Instrument Pvt. Ltd. 301, Bharat Industrial Estate,

T.J. Road, Sewree, Mumbai- 400 015

(For Measuring Instruments)

3. Local dealers

(For Tool kits)

Addresses of Components and Parts Suppliers

1. M/s. Jyothi Limited

Alternative Division,

P.O. Chemical Industries, Vadodara

(For alternates)

2. M/s. Crompton Greaves Ltd. Marketing Office: 1,

Dr. V.B. Gandhi Nagar, Fort,

Mumbai - 400 023.

(For alternates)

3. M/s. J.P. Engineering Works

A-70, G.T. Karnal Road,

Industrial Area,

Delhi - 110033.

(For Alternates)

4. M/s. Kirloskar Cummus Ltd. Pune

(For Diesel Engine)

5. M/s. Mono tex Agency

165, Dr. Nanjappa Road,

Coimbatore - 12.

(For Diesel Engine)

6. M/s. Asia Electric Company Katara Mansion,

Dr. A.B. Road, Worli,

Mumbai- 400 018.

(For Control Panel Assembly)

7. Local dealers for other items.