

**BHEL-GE Gas Turbine Services Pvt. Ltd.**

11/Mark-VIe/PPCL  
ember, 2011

Verma  
Manager  
Power Corporation Limited  
Power Station  
Ring Road  
hi 110 002.

A Joint Venture of BHEL and GE  
Northern Region Office : 55, Community Centre,  
East of Kailash, New Delhi - 110 065, India  
Tel : 91-11-26220124, 26448432 /33 / 34  
Fax : 91-11-2644 8436

Budgetary estimate for Mark-VIe

Our various discussions

Dear Sir,

With reference to our discussion regarding budgetary estimate for mark-VIe, we would like to submit the following for your kind consideration:

**1. Supply portion**

- 1.1 Scope of supply: Mark-VIe along with recommended spares
- 2 Budgetary price: Rs. 4.85 Crores on FOR Site basis including taxes and duties, freight and Insurance.
- 3 Delivery period: 06 to 08 months from the date of receipt of firm order

**Site services**

- 1 Scope of services: Installation and commissioning of Mark-VIe at site.
  - 2 Budgetary price: Rs. 35 lacs excluding service tax
  - 3 Work completion period: approx. 22 days from the start of work at site
- Offer validity: up to 31<sup>st</sup> March, 2012.

It is kindly be appreciated that we have considered prevailing taxes & duties for the above budgetary prices and above prices are indicative. In case you require any clarification, kindly do let us know.

Thanking you,  
Sincerely,

BHEL-GE Gas Turbine Services Ltd.

Bimlendu Rajesh

Bimlendu Rajesh  
Regional Manager



(6)

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G.M. Office (MCTD)  
I.P. Extn. High Road, N.D.  
Diary No. 3642  
Date 22/12/11

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SE has been carrying out intensive research for constantly upgrading the reliability and availability of gas turbines besides uprating the machines for better efficiency and output. Upgrading of controls is a part of this program.

Due to phasing out of the technology, GE had stopped manufacturing Mark V control system in April 2004. The support for spare parts can be extended only up to 2014. Extension of the further support would be difficult due to obsolescence of the technology and is subject to availability of components. We encourage our esteemed customers, like you, to plan ahead for the migration to new control system to continue getting benefit of your assets without compromising on reliability and availability.

The current technology platform called Mark VIe system already has an experience base of well over four hundred turbine and plant systems. The Mark VIe supports additional advanced applications and DCS control features for both combined cycle and fossil power plants in addition to compressor / pipeline applications. The GE flexible architecture platforms, on-board processors, networks, versatile programming libraries, and many other features offer significant advancements over past controls to drive lower overall life cycle costs. They provide a common control platform to directly monitor the unique sensors and actuators on the rotating machinery, communications with other GE systems (i.e. PLC, protection relays, and asset management products) and direct control of balance-of-plant equipment, therefore, simplifying operation and reducing spare parts, training, and maintenance costs.

an support Mark VIe control upgrades from concept to commissioning. Should you require  
ther inputs or discussions, please feel free to contact us.

GE Gas Turbine Services Pvt Ltd.

Simlendu Rajesh  
Regional Manager

Allen,



Corporate Office (PPCL)  
1, Laxmi Nagar Road, N.D.  
D. No. 1653  
Date 19/8/11

From: Puneet Audichya/Vivek vashista  
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[vivek.vashista@in.abb.com](mailto:vivek.vashista@in.abb.com)

To,  
Pragati Power Corporation Ltd  
IP station, Ring Road  
New Delhi  
INDIA

Date: 08-08-2011

- Subject: Your requirement for Upgradation of Procontrol P13 System  
Ref: Your e-mail Dated 29-07-2011

At the outset, we thank you very much for patronizing on ABB products in your plant. In order to bring your plant to the current technology level from time to time and market trends, ABB is committed towards upgrading your plant with products based on the technological upgrades and continuous enhancements, globally over the years.

In reference to your email enquiry for the Progress3 solution of Procontrol P13 System. We are pleased to Submit our Techno-Commercial offer for the same. Hope the same is inline with your requirement.

Looking forward for your valued P.O.

Thanking you and assuring best services all the times!!!

Sincerely,  
ABB Limited


  
Puneet Kumar Audichya  
Manager - Service & Application Sales  
Power Plant Automation Solutions  
Region - North





ABB Limited

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Corporate Office  
Industrial Estate  
Mumbai, Peenya  
400 058, INDIA

Telephones:  
(01)-(80)-8395181

Facsimile:  
(01)-(80)-6396121

Cable:  
ABBFILIAL  
Bangalore-58

Corporate Office:  
11th Floor,  
East Wing, Khanija  
Bhavan, No 49  
Race Course Road  
Bangalore - 560001

Regd. Office:  
11th Floor,  
East Wing, Khanija  
Bhavan, No 49  
Race Course Road  
Bangalore - 560001


Pragati Power Corporation Limited  
 Upgrade of Protection P11 Engineering & Diagnostic Station to  
 latest Progress 3  
 E.UAPS.RN.11.000224.R0 DATED 08.08.2011  
 Your Email dt.29.07.2011

ABB

### 3.0 Commercial Proposal

#### Schedule:

Description	Qty	Total Ex-Works Price (in INR)
<b>Supply Portion</b>		
Price for Supply of Progress 3 as per above mentioned Scope of supply	1 set	5,650,000/-
<b>Service Portion</b>		
Price of Erection, Testing and Commissioning of above offered system	1 set	350,000/-
<b>Lump-Sum Price for Progress 3 (Rupees Six Million only)</b>		<b>6,000,000/-</b>
Function Block Development for Controller/Controller	1 No	100,000/-
Function Block Development for Controller/Controller	38 Nos	2,500,000/-
<b>Price for (1+2+4) (Rupees Eight Million And Five Hundred and Only)</b>		<b>8,500,000/-</b>



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Techno-Commercial Proposal  
 Confidential

Page 9 of 12





## Infrastructure & Cities

Pragati Power Station  
Prapasta, Near ITO  
MH

Attn: Mr. Yogender Aggarwal

Name Rakesh Barman  
Department IC-SG-S NR EA

Telephone +91 (124) 284 6783  
Fax +91 (124) 284 6820  
Mobile  
E-mail rakesh.barman@siemens.com

Your letter of Mail enquiry  
Our reference SG-S NR-EA20111222/RBM  
Date 08.11.2011

**Subject: Budgetary offer for Supply & Retrofitting of Generator Protection Relays for 330 MW  
Pragati Power Station**

Dear Sir,

We are pleased to submit our budgetary offer for Supply & Retrofitting of Generator Protection Relays for 330 MW  
Pragati Power Station as per the following annexure.

Annexure – (i)	Price Schedule
Annexure – (ii)	Special Terms and Conditions.
Annexure – (iii)	General Condition of Supply
Annexure – (iv)	List of Protection functions Allocation (Technical)
Annexure – (v)	BOM

This is a budgetary price quote based on preliminary information, thus is purely indicative and does not constitute an offer or commitment nor does it contain any representation or warranty on Siemens' part. Should there be a requirement to progress this transaction please revert back with details and specifications and we shall address the request appropriately at that time and subject to all internal approvals as may be required by us.

We trust, you will find the above in line with your requirement and shall look forward to receive your valued order.

Thanking you,

Yours faithfully,  
SIEMENS LTD

*Gaurav Bhatta*  
Gaurav Bhatta  
Regional Head Business Admn.  
Northern Region

*Sandeep Mathur*  
Sandeep Mathur  
Regional Head Sales  
Northern Region

Siemens Ltd.  
Management: Dr. Armin Bruck  
Infrastructure & Cities Sector; Management: Tika Raj Seth

Plot BA, Sector 18  
Maruli Industrial Area, HUDA  
Gurgaon 122 015

Tel: +91 124 284 6000  
Fax: +91 124 284 6024  
www.siemens.co.in

Registered Office: 130, Pandurang Bhatkar Marg, Worli, Mumbai 400 018. Telephone +91 22 39677000. Fax +91 22 39677500.  
Sales Office: Ahmedabad, Bangalore, Chandigarh, Chennai, Coimbatore, Hyderabad, Kharghar, Kolkata, Lucknow, Mumbai, Nagpur, New Delhi, Pune, Vadodra.

Gen Protection Relays A/c -Pragati Power- DELHI GENCO						
S. No.	Description	Unit	Quantity	Unit Ex-works price	Total Ex-works price	
1	Supply and Retrofitting of Generator Protection Relays					
a	Generator Protection Relays	Set	1	1,919,858	1,919,858	
b	Generator Transformer Protection Relays	Set	1	658,580	658,580	
c	UAT Protection Relays	Set	1	497,471	497,471	
d	Retrofitting, Installation, Testing and Commissioning of New Relays (Lumpsum Charges)	Set	1	770,641	770,641	
				Total Ex Works(INR)	3,846,548	

Q337 Siemens Ltd

Ganesh Kumar Sankar, K. P. S.

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SPECIAL TERMS AND CONDITIONS

1. Delivery: Within approximately 8-10 months Ex Works India. The delivery period will be counted from the date of drawing approval. However actual delivery schedule shall be discussed at the time of order finalization.
2. Prices:
  - The prices quoted are in Indian Rupees & Firm on Ex-Works basis. Our Prices quoted are only for the Supply of Equipment included in the price schedule.
  - Following taxes / duties and other charges shall be reimbursed by you:
    - Excise Duty: Excise duty will be charged extra as applicable at the time of delivery. Present rate of Excise duty @10% and 3% Education Cess levied on Excise duty is shown in price schedule.
    - Sales Tax: Extra as applicable at the time of delivery (CST Present rate 2% against Form 'C'), indicated separately in price schedule. In case no Concessional Sales Tax Declaration form (FORM C) is provided then full rate of C.S.T / VAT shall be charged as applicable at the time of despatch.
    - Freight & Insurance Extra @ 2% of exworks price.
    - Any other taxes and duties applicable at the time of dispatch will be extra as applicable at the time of delivery.
    - (Applicable for Deemed Export Projects only). Deemed Export Benefits towards NIL Customs duty & NIL Excise duty have been considered in our offer. We shall need valid documentation incl. PAC & Excise Duty Exemption Certificates for the same during contract execution. The CIF Content in our bid is .....
3. Validity: Our offer shall remain valid for your acceptance till 60 days from the date of the offer after which the same is subject to our written confirmation.
4. Terms of Payment:
  - 20% advance along with LOI/ P.O whichever is earlier.
  - Balance 80% along with full taxes and duties against proforma Invoice prior to dispatch.
5. Correspondence: All communications/ correspondence in this connection should be to SIEMENS LTD., Tower B, 11th Floor, Energy one Sales- Energy Automation, Plot no. 6A, Sector 18, Manali Industrial Area, HUDA, Gurgaon (Haryana) 122015.
6. Export Control
  - This quotation is made subject to all necessary Export Licenses and other permissions being obtained by the recipient, from the relevant authorities, for the destination and intended use of the goods and / or services
  - "Siemens' obligation to fulfill this agreement is subject to the proviso that the fulfillment is not prevented by any impediments arising out of national and international foreign trade and customs requirements or any embargos [or other sanctions]."
7. Other Conditions: Other terms shall apply as per the "General Conditions of Supply" enclosed. However, in case of contradictions, the terms and conditions indicated under the "Special Terms and Conditions" shall prevail.
8. Limitation of Liability: No Other Warranties / Guaranties:  
We, Siemens Ltd., to the maximum extent permitted by applicable law, disclaim all warranties / guaranties, either express or implied, other than what is expressly stated in this Agreement / Offer / Order Confirmation.  
No Liability for Damages:  
We, Siemens Ltd., to the maximum extent permitted by applicable law, in no event shall be liable for any damages whatsoever, including without limitation, special, incidental, consequential, direct or indirect damages, for personal injury, loss of business profits, business interruptions, loss of business information, or any other pecuniary loss, arising out of the use of or inability to use the products / equipment / systems.

SIEMENS LTD

*Gaurav Sharma*

*Sandeep Mathur*

*[Signature]*

*[Signature]*



# **GENERAL CONDITIONS OF SUPPLY**

1. **Scope :** Scope of supply shall be governed by supplier's offer and purchaser's acceptance of purchaser's order.
2. **Prices :**
  - 2.1 Prices quoted are for delivery as stated in offer.
  - 2.2 Supplier's prices prevailing at the time of actual delivery shall be applicable.
3. **Taxes and Levies:**
  - 3.1 The prices are exclusive of Excise Duty and sales tax (i.e. Central and/or State Sales Tax and/or Works Contract Sales Tax and/or Turnover Tax and/or Sales Tax Surcharge and/or etc. commonly known as sales tax, recovery whereof from customers is not prohibited under the provisions of the relevant law) and/or any other Central and/or State and/or Local Tax and/or Surcharge of any kind, which if levied will be charged extra.
  - 3.2 Prices of all products unless otherwise specified in the offer are exclusive of excise duty.
  - 3.3 Particulars of sales tax declaration form, under which purchaser is entitled to partial / full exemption from sales tax, shall be given by purchaser in his purchase order so that correct Sales Tax can be charged in supplier's bill. This form shall be sent along with order.
4. **Insurance :**  
In your scope.
5. **Tests :**  
Equipment shall be tested as per standard practice of manufacturer. Additional tests required by purchaser shall be subject to supplier's confirmation and acceptance of extra charges by the purchaser.
6. **Performance Figures :**  
The technical data and dimensions are subject to alteration unless otherwise specified. The figures relating to performance are furnished on the basis of experience gained during various tests; supplier does not undertake any liability for failure in obtaining equivalent results on any specific installation.
7. **Packing:**  
Supplier shall pack equipment in suitable railroad worthy packing as per supplier's standard practice.
- 7a. **Inspection:**  
In case of inspection of equipment by purchaser prior to delivery / despatch, 7 days advance notice for this purpose shall be given by the supplier. In the event of inspection not being carried out on the scheduled date, the supplier reserves the right to despatch such equipment which shall deem to have been duly inspected and approved, supplier shall however, furnish copies of test certificates.
8. **Delivery :**
  - 8.1 Delivery period shall be reckoned from date of receipt by supplier, from purchaser, of  
-Purchaser's technically & commercially clear order.  
-Agreed advance payment, and/or  
-Agreed Letter of Credit  
whichever shall be later.
  - 8.2 Supplier, at his option may supply material earlier than quoted delivery period and/or make part supplies.
  - 8.3 In case delivery/despatch of material by supplier is delayed due to non-availability of any suitable mode of delivery / despatch OR In case purchaser has not given to supplier instructions for delivery / despatch of materials.  
date of supplier's notice to purchaser, of readiness of material for delivery / despatch, shall be deemed to be the date of delivery. In such an event, agreed payment due on delivery shall be made forthwith by purchaser on supplier's request.
  - 8.4 The delivery period has been given in good faith, but however, the supplier shall not be liable for any losses, direct or indirect due to late/non-delivery of any equipment. Supplier shall however, endeavour to deliver the equipment within the stipulated delivery period.
  - 8.5 In case of delay from Customer end in drawings approval, if any, or any other statutory approval which allows us to start manufacturing or conduct despatch of goods or provide services in lieu of consideration for a price, we reserve our right to ask for Time Extension including compensation in monetary terms due to such delay for the reasons beyond our control.
9. **Guarantee :**  
The equipment offered is covered by guarantee under proper use, for faulty material or workmanship for twelve months from date of delivery.  
Purchaser shall inform supplier in writing of any defect in equipment noticed during guarantee period. On receipt of purchaser's written notice, supplier shall at his option, replace or repair free of cost.

equipment supplied by him. Purchaser shall not return the equipment in supplies before receiving supplier's confirmation to this effect. The equipment in such cases shall be returned to our works on freight & pay basis.

The guarantee under this clause is subject to the conditions that purchaser shall not have subjected the equipment to alteration, addition or repair by anyone except supplier or his authorised representative.

10. **Arbitration :**  
Any dispute or difference or claim arising out of our in relation to this transaction including construction, validity, performance or breach thereof shall, failing amicable settlement be referred to arbitration under Arbitration and Reconciliation Act, 1996 or any statutory modification thereof for time being in force. Such arbitration shall take place in Bombay. Award of arbitrators shall be final and binding on parties.
11. **Legal Construction :**  
The contract shall in all respects be construed after supplier's confirmation of purchaser's order and operated as Indian contract and in conformity with Indian Law and shall be subject to Jurisdiction of courts in India.
12. **Applicability of Variation/s in Conditions :**  
In the event of any variation between these printed General Conditions of Supply and the specific conditions given in the offer, the latter shall be applicable.
13. **Destination Control Clause:**  
To the best of our information the goods are supplied for use and not supplied for any prohibited use.
14. **Termination / Exit Clause:**  
In the event of delayed payment or non-payment by the customer as well as breach of contract by the customer, Siemens shall reserve the right to stop future despatches & suspend the works resulting in termination of the contract. Any Costs incurred till the date of such notice of suspension / termination shall be to the account of Customer.
15. **Limitation of liability. No Other Warranties / Guarantees:**  
We, Siemens Ltd., to the maximum extent permitted by applicable law, disclaim all warranties / guarantees, either express or implied, other than what is expressly stated in this Agreement / Offer / Order Confirmation.
16. **No Liability for Damages:**  
We, Siemens Ltd., to the maximum extent permitted by applicable law, in no event shall be liable for any damages whatsoever, including without limitation, special, incidental, consequential, risk purchase, direct or indirect damages, for personal injury, loss of business profits, business interruptions, loss of business information, or any other pecuniary loss, arising out of the use of or inability to use the products / equipment / systems.
17. **RESERVATION CLAUSE**  
Siemens' obligation to fulfil this agreement is subject to the proviso that the fulfilment is not prevented by any impediments arising out of national and international foreign trade and customs requirements or any embargos or other sanctions.
18. **Compliance with Export Control Regulations**
  - i) If Recipient transfers goods (hardware and/ or software and/ or technology as well as corresponding documentation, regardless of the mode of provision) delivered by Siemens or works and services (including all kinds of technical support) performed by Siemens to a third party Recipient shall comply with all applicable national and international (re-) export control regulations. In any event of such transfer of goods, works and services Recipient shall comply with the (re-) export control regulations of the Federal Republic of Germany, of the European Union and of the United States of America.
  - ii) Prior to any transfer of goods, works and services provided by Siemens to a third party Recipient shall in particular check and guarantee by appropriate measures that  
  
There will be no infringement of an embargo imposed by the European Union, by the United States of America and/ or by the United Nations by such transfer, by brokering of contracts concerning those goods, works and services or by provision of other economic resources in connection with those goods, works and services, also considering the limitations of domestic business and prohibitions of by passing those embargos;

*[Handwritten signature]*



Agreement

Such goods, works and services are not intended for use in connection with armaments, nuclear technology or weapons, if and to the extent such use is subject to prohibition or authorization, unless required authorization is provided;

The regulations of all applicable Sanctioned Party Lists of the European Union and the United States of America concerning the trading with entities, persons and organizations listed therein are considered.

Recipients of goods, works and services provided by Siemens shall be required to enable authorities or Siemens to conduct export control checks. Recipient, upon request by Siemens, shall promptly provide Siemens with all information pertaining to the particular end user, the particular destination and the particular intended use of goods, works and services provided by Siemens, as well as any export control restrictions existing.

Recipient shall indemnify and hold harmless Siemens from and against any claim, proceeding, action, fine, loss, cost and damages arising out of or relating to any noncompliance with export control regulations by Recipient, and Recipient shall compensate Siemens for all losses and expenses resulting therefrom.

SIEMENS LTD

*Simon Schuster*

*Sanjay Mittal*

*Sanjay Mittal*

*Simon Schuster*

# Protection function allocation

Customer: Pragati Power Station  
 Project: Generator Protection Scheme Retrofit for one unit of PPCL (PPS-1)-DELHI GENCO

Protection Functions	Siemens				
	7UM622-Group-1	7UM622-Group-2	7UT613	7SJ50	7SJ50
Generator Protection Functions					
Generator Back up impedance protection, 21G	x				
Generator Diffr. Protection, 87G1, 87G2	x	x			
Generator Stator Earth Fault Protection (100% 3rd harmonic) (84G1 & 84G2)					
Field failure/Loss of excitation, 40G	x	x			
Generator Negative Sequence protection, 46G	x				
Generator OverCurrent 51G	x				
Reverse/Forward Power Protection, 32G1 & 32G2	x	x			
Gen. Dead machine relay, 50GDM		x			
Over/Under Voltage Protection, 59G1, 59G2, 27G	x	x			
Under/Over Frequency (81G1, 81G2)	x	x			
Rotor Earth Fault Protection, 64F	x				
Gen Overfluxing relay, 99G					
GCB LBB Protection, 60GLBB		x			
Gen VT supervision (separate MVAF M32 considered)-60VT		x			
No volt relay 27GT					
GT Protection Functions		x			
Over all Differential Protection 87GT					
GT Restricted E/F Protection, 87NGT			x		
GT Over Flux Protection 89GT				x	
GT Stand by E/F Protection 51NGT			x		
GT E/F Protection 84GT				x	
UAT Protection Functions			x		
UAT Diffr. Protection 87UAT					
UAT HV Side O/C Protection 61UAT					x
UAT LV Side E/F Protection 51NUAT					x
UAT REF Protection (87NUAT)					x
UAT HV Instantaneous O/C (50 UAT)					x

Control, Generator, Transformer, Unit Auxiliary Transformer Protection relays

Siemens Ltd

Sunday H. Thru

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PART - II FIRE RISK SURVEY OF PRAGATI POWER PROJECT

1. **INTRODUCTION :-** Pragati Power Project is a Government of Delhi Public Sector company raised to generate power for utilizing in Delhi. The Project is under construction stage and is spread over a land of 16 acres on the western bank of Yamuna River. GTPS is on its north and railway line on its south. Pragati Main and Main Ring Road are on its western side. An access road is linked from main ring road. Total installed capacity of this power plant will be 330 MW generated from 104 MW X 2 NO = 208 MW Gas Turbines and 123 MW X 1 NO = 123 MW Steam Turbine. First Gas Turbine will be commissioned on 19 Nov 2001.

2. **FIRE RISK ANALYSIS :-** (i) The main fuel for Turbines is natural Gas to be supplied by Gas Authority India Ltd. The Gas coming through HBJ pipe line from Bombay high to GAIL Terminal at GTPS will be received in Pragati Power Plant. The alternative second fuel coming through Railway tankers will be liquid Naptha. This liquid hydrocarbon fuel will be stored in GTPS premises in 4000 KL X 4 No surface tanks constructed floating decks. One HSD surface tank of 300 KL capacity will also be located in GTPS and supply fuel for gas turbines. Both natural gas and Naptha liquid fuel are highly inflammable. Their storage and fuel forwarding system present extra fire risks. The GAIL gas terminal located inside GTPS is a vital installation and high fire prone. Gas turbine generators having combustion chambers and burners are itself complicated fire safety hazardous. Steam generator system has high temperature and pressure pose high fire risks. Fire risks are present in waste heat recovery system, Boilers, auxiliary system, cooling water system, chlorination plant, DM Plant, instrumentation system, control room, computer system, compressed air system, air conditioning system, ventilation system, electronic system etc.

(ii) General fire risks are existing all over operational and non-operational area of plant in general viz: office buildings, stores/warehouse, canteen, vehicle parking area etc. Cable layout system, cable galleries/cable trenches, cable spreader rooms, transformers, power substation, switch yard, lubricating oil storage and its system, electrical panels, control room, EOP installation etc. have numerous fire risks. Apart from Natural Gas and Naptha, warehouse/store variety items, including paints and chemicals which have moderate fire risks. Fire risks are spread all around and if preventive measures are not taken from fire safety point of view, fire can occur in any corner of plant. If a fire is not controlled in its incipient stage or breaking out than it may take very dangerous shape.

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### 3. GENERAL FIRE PREVENTION RECOMMENDATIONS

(i) Fire Orders:- The first essential requirement is preparation and issue of detailed Fire Orders which will through sufficient thought on the fire protection measures, inbuilt protection systems, major fire fighting arrangements, fire alarm system and action to be taken by different individuals in case of outbreak of fire. Fire orders will also include functions and responsibilities of Fire Wing (crew) and plant staff.

(ii) Portable extinguishers:- A number of appropriate type portable extinguishers called first aid fire fighting appliances will be installed to cover every fire prone point for better protection. Extinguishers will always be standard make and is marked.

(iii) Fire detection/alarm system:- It is an essential requirement for automatic fire detection which will have both manual alarm as well as automatic detection devices. The plant as per design shall be divided into zones and each zone will have a number of alarm points and automatic detectors in form of smoke/heat/optical type detectors. The system shall be audio-visual alarm panel in the fire control room where a crew will be on round the clock duty to attend any alarm detected in any part of the plant. This will ensure better protection to the plant from any possible occurrence of fire.

(iv) Automatic extinguishing system:- It is generally incorporated/inbuilt in the turbines which in case of fire will automatically actuate and extinguish the fire by carbon dioxide flooding and consequently by smothering effect. This system is supplied with turbines by its manufacture. It comprises of detectors of a combination of ionisation type smoke and optical alarm system, high pressure cylinders, a manifold release mechanism, trip mechanism device and ventilation opening. The response indicators shall be provided with an inbuilt indicating lamp to the place which is visible, shall be provided for those areas.

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(v) Medium velocity water spray system:- It shall be provided to cover Naptha storage tanks. The system consists of all necessary components and a running water pressure at sprayers shall not be less than 1.4 Kg/cm<sup>2</sup> and not to exceed 3.5 Kg/cm<sup>2</sup>. Foam extinguishing system shall be provided on the top for the protection of floating roof tanks. Dyke surrounding the tanks shall protect naptha from spillage/leakage. Suitable hydrant connection with landing valve shall be provided at dyke so that in case of fire hose to be connected to header to fight fire.

(vi) High velocity water spray system:- It is automatically shall be provided for the protection of transformers. This system consists of all necessary components viz; isolation valve piping and fittings, deluge valves, projectors, fire detection devices, alarm and control devices and pressure gauge. This system is fully automatic. The operation of the deluge valves and fire pumps shall be controlled by fire detection device. Minimum running water pressure at any projector/sprayer nozzle will not be below 3.5 Kg/cm<sup>2</sup> and will not exceed 5.0 Kg/cm<sup>2</sup> at any projector. Pneumatically operated deluge valve shall be employed. Quarzoid bulb type detectors shall be employed for actuating deluge system.

(vii) Hydrants network system:- It constitutes landing valves and water monitors connected pipe line network. Fire water storage tanks and pumps of designed capacity. Hydrants network is always charged with pressured water round the clock. The pump shall be electric driven but can be switched over to diesel standby pumps either automatically or manually in case of failure of electrical system. Three fire pumps of suitable capacity viz; electrical driven motor, diesel engine driven motor and one jockey electrical driven motor pump are essentially installed as per approved design to charge water in the hydrant network and for supply of water for the spray and foam systems. The jockey pump should be capable of giving 4.5 Kg/cm<sup>2</sup> pressure at the farthest point of plant. Fixed monitors are to be provided on the hydrant line at appropriate high fire prone places which shall be capable to be rotated through 360° horizontally and 45° angle elevation and 15° approximate depression.



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# III DUTY POINTWISE DEPLOYMENTWISE JUSTIFICATION

(I) Supervisory staff :- Day to day fire prevention duties fire fighting operations are to be looked after by a Supervisory staff of the rank of Inspector/Fire. He shall be the incharge of entire fire defence organisation of the company which involves supervision maintainance of major fire fighting systems and first aid fire fighting appliances. The schdeule of preventon has to be worked out by him for strict compliance of Fire Wing. Insp./Fire staff. For the general administration of Fire Wing, Insp./Fire remains in general shift duty and supervises functioning of Fire Wing. For all purposes he shall be reporting to the Unit Commanding. though he shall have full operation controlled of Pragati power plant fire brigade. He shall have round the clock communication by intercom/PAT telephone facility in his office at Fire station and residence.

INSPECTOR/FIRE

ONE (1)

(II) Staff for Turbine area :- As explained above turbine generator area is most vital and sensitive installation from fire point of view. Fire has to be attended promptly within shortest possible time by trained fire crew personnel. The crew shall possess sufficient fire fighting appliances and thorough knowledge of topography, fire hazardous and fire prone points in the area. They are the first to attack fire. Their first turnout appliances shall be portable extinguishers of various types, one light engine fully equipped and selfcontained with extinguishing agents and rescue gears. The light fire engine shall have towing eye for towing trailer fire pump. The trailer fire pump may be 1800 LPM capacity generally conforming to IS: 944 standard. The light fire engine and trailer fire pump shall be driven and operated by one HC/DCPO in each shift. Fire crew has to be headed by one Sub-Inspector/Fire capable to take decision independently odd hours to use suitable fire fighting appliance correctly. fire engine, trailer fire pump, portable extinguishers, gears, hydrant/monitor operating key, personal protective equipments and other miscellaneous fire safety items are required to be kept at one place in turbine area to be named as FIRE STATION. The repair and maintenance of portable extinguishers including refilling/re-charging has to be carried out by fire attendance staff. The so called fire station/ crew shall have communication in the form of telephone/intercom well communicated from all vital installation. One fire of standard strength is of 08 personnel but in view of thness of plant the following manpower is proposed :-

SI/Fire	HC/Fire	HC/DCPO	Const/Fire	Total
03	03	03	03	12

*M. R.* 116



58  
27  
:12:

(iii) Naptha tank area:- As explained above, naptha tanks have foam extinguishing system and pressurised water sprayers. SD tank is also located nearby naptha tank. This area has high susceptibility to fires and has to be protected round the clock by one fire trained man so that in case of any fire he operates the foam-cum-water system instantly. The fire has to be extinguished by him in its incipient stage. Constable/Fire 1X3=03.

(iv) Switch yard area :- This area is fire prone. Switch gears, transformers etc are to be protected. In case of any fire, fire trained person deployed there round the clock may detect the fire and extinguished with the help of first aid fire fighting appliances and simultaneously inform to the fire control room in charge. Constable/Fire 1X3=03.

(v) Fire prevention :- Fire prevention is related with maintainance of fixed fire fighting appliances and portable extinguishers placed in different locations and vital installations of plant. Refilling/recharging, cleaning, testing and inspection of extinguishers are the responsibilities of fire prevention team under direct supervision of Inspector/Fire. The team has to work as per the maintainance schedule to be followed at fire station in general shift. Regular checking and testing of fixed fire fighting system viz; testing of monitors and hydrants, water spray system, foam pourers, fire detectors, checking operational area from good house keeping point of view etc are the duties of this team. Big fire services has good work-op to do all technical work. Since this is a compact plant and the provision of limited fire staff, the minor repairs can be taken by this staff. The fire staff required for this purpose is taken out ASI/Fire (Fitter)-One and Constable/Fire-03.

#### MAJOR FIRE FIGHTING APPLIANCES:

(1) Light Fire engine/mini fire tender:- The project has a fire fighting system. The crew has to be mobile and well equipped to attend a fire promptly with in shortest possible time that it may not go beyond out of control. It will be essential to have a light fire engine fully equipped to deal with all types of fires specially with oil/liquid hydrocarbon and electrical fires. This will be called turned out vehicle for the rapid response and this has to be operated/driven by H/O/Driver-cum-pump operator. The specification of the fire engine to be fabricated on ATA 407/SWARAJ MAZADA chassis will be drafted separately by a trained Assistant Commandant/Fire and to be approved by the Engineer of the project.



(234) 36  
(21) 36

::13::

(ii) A Portable fire pump :- 02 Nos. portable fire pumps of higher capacity 1000 LPM to 1600 range are required to be kept at fire station for firefighting and dewatering purpose. These are to be operated by HC/Driver-cum-pump operator, and each pump will have all accessories as per standard specification.

(iii) DCP Trailor :- 02 Nos DCP trailers of 250 Kg each capacity shall be kept at fire station control room and whenever required, the same will be towed by light fire engine. DCP trailor can be operated by fire trained personnel on electrical and oil fires.

(iv) High Expansion foam generator :- One high expansion foam generator with accessories and foam making equipments are essentially required to be used by fire fighting crews on oil fires.

6. REQUIREMENT OF TRANSPORT :- The Inspector/Fire also called fire officer of the project shall be made mobile to perform multifarious duties. The crew is made mobile with light fire engine. Inspector/Fire functions as fire prevention officer and visits to the vital installations regularly. He has to supervise the work of all staff member under him, carryout checkings, inspections, to liaise with outside agencies for various fire fighting requirements. As per norms Inspector/Fire is provided one built Motor cycle for above duties. Bi-cycles are to be provided to fire prevention staff for smooth functioning. Since CISF Unit is one under the administrative control of one Unit Commander, the adm. requirements are clubbed together.

Motor Cycle	-01
Bi-cycle	-04

7. FIRE STATION/FIRE CONTROL ROOM :- As indicated above the Pragati Power Project is small compact unit. Turbine area is the core plant where a small fire station may function with a crew of SI/Fire-01, HC/Fire-01, HC/DCPO -01 and Constable/Fire-01. Total-04 in one shift round the clock. This small fire station control room will have space for placing fire engine, trailor, fire pump, DCP trailor and other miscellaneous items. Crew will also be there to take turnout in case of fire. This control cum watch room having main fire alarm panel, pressure gauge for monitoring fire hydrant system, intercom, telephone, P&T Telephone, siren, portable appliances and rescue gear. Space will also be made available for fire prevention staff to do minor repairs/maintenance portable extinguishers and for fire crew in off duty.