




भारत हेवी इलेक्ट्रिकल्स लिमिटेड  
BHARAT HEAVY ELECTRICALS LIMITED

पारेषण व्यापार अभियांत्रिकी प्रबंधन

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

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TITLE/ शीर्षक <b>DAMPERS &amp; DIFFUSERS FOR AIR- CONDITIONING &amp; VENTILATION SYSTEM</b>				नाम / NAME	HK	SKS	SS	
				दिनांक/ DATE	10.06.14	10.06.14	10.06.14	
				समूह/GROUP	TBEM	W.O. No	80012	
ग्राहक/ CUSTOMER	APGENCO							
ठेकेदार / CONTRACTOR	BHARAT HEAVY ELECTRICALS LIMITED							
सलाहकार / CONSULTANT	DESEIN PRIVATE LIMITED							
परियोजना/ PROJECT	400/220KV SWITCHYARD, RAYALSEEMA, 1 X 600MW, STAGE-IV, UNIT-6							
विषय-सूची/ CONTENTS								
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1.	20.10.2014	दिमांड HK	श्री. श्री. SKS	श्री. श्री. NSR	1. DETAILS OF NON-RETURN DAMPER ADDED AS PER APPROVED BOM.			
Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS			
Distribution				To	TBEM	TBMM	TBQM	Vendor
				Copies	1	3	1	0

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**SECTION -1**

**INTENT, DESIGN CRITERIA AND SCOPE**

**1.0.0 INTENT OF SPECIFICATION**

- 1.1.0 This specification covers the design, manufacture, inspection and testing at bidder's and/ or his sub-vendor's work(s), proper packing, transportation, delivery at site of **Dampers & Diffusers for Air Conditioning & Ventilation System** as detailed in this section and in various other sections of this specification for **Switchyard Control Building** of **1 X 600MW, Stage-IV, Unit-6 TPS at Rayalseema** of APGENCO.
- 1.2.0 The requirement(s) specified under 'SECTION 2, SECTION 3, SECTION 4' and 'SECTION 5' of this specification shall be considered as part of this section. In case of variance between various sections, requirements of Section-1 shall prevail.
- 1.3.0 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to Purchaser/ Owner, who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgment is not in full accordance herewith.
- 1.4.0 The bidder shall be deemed to have understood completely all the tender drawings and documents and quoted accordingly.
- 1.5.0 The bidder has to note carefully the parameters, estimated capacities of equipment indicated and the tender drawing in the specification are only for guidance of the bidder. The system shall be designed as per relevant standards / codes and exact capacities and quantities are to be estimated by the bidder. All such estimations and design calculations shall be submitted for Purchaser's approval.
- 1.6.0 In case of any deviation, the bidder shall indicate separately the deviations clause-wise with respect to the specification in the 'Schedule of Deviation'. Deviations in any other form including clarifications / assumptions / etc will not be considered and it will be construed that the bid conforms strictly to the specification.

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1.7.0 The **contract** shall be on **UNIT RATE basis** for the package. Within the scope of the contract no variation shall be admissible to the contractor.

1.8.0 The Purchaser, Consultant and Owner in this specification stand for **BHEL, DESEIN** and **APGENCO** respectively. The successful bidder shall be referred to as Contractor.

## **2.0.0 HVAC REQUIREMENTS FOR VARIOUS AREAS**

The packaged indoor evaporative units shall be kept in AHU room where as condensing unit shall be kept outside the AHU Room either on ground or on roof. Outlet of all the package units shall be collected in a common plenum chamber through flexible canvass connection & volume control dampers. The conditioned air is then distributed to various AC areas through duct along with diffuser (with volume control damper) running above false ceiling. The return air from all these areas shall be collected above false ceiling & shall be taken back to the AHU room where it will be mixed with a fixed amount of fresh air before being circulated again.

Necessary air balancing shall be achieved through volume control dampers in the ducts.


Both supply and return air openings shall have one number fusible link fire damper respectively.

## **3.0.0 SCOPE**

### **3.1.0 SCOPE OF SUPPLY**

3.1.0.1 Complete supplies of Dampers & Diffusers for Air Conditioning & Ventilation System (As per clause no 2.0.0 above.)


<b>Sl. No.</b>	<b>Item Description</b>	<b>Unit</b>	<b>Qty.</b>
1	Al. Extruded Section Supply Air Diffuser ( SAD) with MS Black Painted Collar Damper, Size: 450 mm x 450 mm ( Neck Size )	Nos.	11

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2	Al. Extruded Section Supply Air Diffuser ( SAD) with MS Black Painted Collar Damper, Size: 375 mm x 375 mm ( Neck Size )	Nos.	03
3	Al. Extruded Section Return Air Diffuser ( RAD) without Dampers, Size: 450 mm x 450 mm ( Neck Size )	Nos.	11
4	Al. Extruded Section Return Air Diffuser ( RAD) without Dampers, Size: 375 mm x 375 mm ( Neck Size )	Nos.	03
5	GI Volume Control Damper, Size: 1150 mm x 450 mm	Nos.	01
6	GI Volume Control Damper, Size: 450 mm x 300 mm	Nos.	01
7	Fire Damper with fusible link (UL marked) in GI construction, Size: 1500 mm x 500 mm	Nos.	01
8	Fire Damper with fusible link (UL marked) in GI construction, Size: 1150 mm x 450 mm	Nos.	01
9	Fire Damper with fusible link (UL marked) in GI construction, Size: 650 mm x 300 mm	Nos.	01
10	Fire Damper with fusible link (UL marked) in GI construction, Size: 450 mm x 300 mm	Nos.	01
11	Non return damper (NRD) fabricated from MS black painted sheet. Each NRD to be of maximum 0.4 sq. m. size. (Dimensions of NRD to suit the PAC unit supply air outlet matching with the particular make of PAC unit. Make of PAC unit will be confirmed later.)	Nos.	03

3.1.2 **SCOPE OF SERVICES :**

**NIL**

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### 3.2.0 Exclusions :

- i. **Any Erection, Testing & Commissioning (ETC) requirements**
- ii. **Any Civil Works**
- iii. Supply & installation of false ceiling and openings in false ceiling for diffusers as required.
- iv. Supply of Cable trays for laying cables. Installation wherever required is in contractor scope.
- v. Supply of power and control cables.
- vi. Laying & termination of power and control cables.


### 3.3.0 Utilities Available :

Construction water and 415 V power shall be available at one point each at the site.

### 3.4.0 ENGINEERING DRAWING / DOCUMENT SUBMISSION :

The successful bidder will start detail engineering immediately after placement of purchase order. The engineering drawing/ document submission schedule is as follows:

SL. NO.	ACTIVITY	ACTIVITY TIME IN WEEKS	CUMULATIVE TIME IN WEEKS FROM LOI/PO DATE	REMARKS IF ANY
1.	Submission of Drawings/ Documents as per list furnished in section-4.	6	6	
2.	Approval of documents from BHEL/ Customer	4	10	

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### 3.5.0 OPERATION & MAINTENANCE (O&M) MANUAL :

Operation and Maintenance manuals shall be specifically complied for the project by the bidders. The draft O&M manual shall be submitted within 20 weeks after award of contract. The O&M manual shall contain the following information:

- a. Description of the system and equipment with design particulars.
- b. Instruction for erection.
- c. Instruction for operation, maintenance and repair.
- d. Recommended inspection practices and inspection schedule.
- e. Ordering information for all replaceable parts.
- f. Recommendation for type of lubricants and frequency of lubrication.

### 4.0 Inspection & Testing

All the equipments shall be inspected prior to dispatch in line with relevant IS, approved GTP/ drawing and technical specification, BHEL/ customer approved QAP.

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## SECTION-2 EQUIPMENT SPECIFICATION

### 1.0.0 General Design and Constructional Requirements :

- i. All the equipment shall be capable of withstanding the stresses, which may be experienced during normal operation and test.
- ii. All the equipment shall be designed to permit inter-changeability of parts and ease of access during inspection, maintenance, installation and repair of various parts.
- iii. All parts subject to substantial temperature changes shall be designed and supported such as permit free expansion or contraction without resulting in leakage, harmful distortion, misalignment or play.


### 2.0.0 Equipment Specification :

2.1.0 Lot air distribution system shall be consisting of galvanized steel sheet ducting, supply air diffusers, return air grilles, dampers, complete with supports and aluminium frame work for mounting diffusers / grilles.

2.2.0 Volume Control Dampers shall be placed in the ducts. Outlet of all the package units shall be collected in a common plenum chamber through flexible canvass connection and Volume Control Dampers.

### 2.3.0 Supply and Exhaust Air Diffusers :

Square construction for mounting in false ceilings. Air vanes in lamella form for air distribution to all sides. Made from powder coated extruded aluminum with agreed finish, Connection boxes in air-foiled construction made of galvanized sheet metal with built-in throttling device and connecting piece

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Ceiling diffusers shall be of the adjustable eyelash deflection blade type and shall have an opposed blade damper located at the rear. The diffuser shall be fixed to the ductwork by a purpose-made sub-frame assembly.

#### **2.4.0 Fire Dampers :**

To shut off fire section in air-conditioning plants, fire dampers with fire rating of 90 minutes designed as per UL-555 and approved by CBRI. The chamber housing shall be made of Galvanized sheet metal lamellas made of special insulating material, lamella bearings in stainless steel respective brass sleeves, serving and control elements arranged on the outside such as levers, and 'position indicators, manual release, notching arrangement, inspection door, thermal release by melting solder at 72 deg. C. Fusible Link should be UL Stamped.

Thickness of frame and louvers of diffusers and volume control dampers shall be minimum 18G G.I and 20G G.I respectively.

**SECTION – 3**  
**PROJECT DETAILS AND GENERAL SPECIFICATIONS**

SL.NO.	DESCRIPTION	
<b>1.</b>	<b>PROJECT INFORMATION</b>	
	a) Customer	APGENCO
	b) Consultant	Desein Consulting Engineers, New Delhi
	b) Projects	1x600MW RayalseemaTPP, Stage-IV, Unit#6-400/220kV Switchyard
	c) Project locations	The project site is located in VV Reddy nagar, Karamala, about 30KM west-south of Proddatur & 20KM from Yerraguntla. Nearest Rail head is Muddanur, which is approx. 10 kM from Site. Site is approximately 480KM from Hyderabad and 350KM from Chennai.

Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions:

<b>2.</b>	<b>SITE CONDITIONS</b>	
i.	Maximum Ambient air temp. (max.)	40.3 °C
ii.	Minimum Ambient air temp. (max.) °C	19.1 °C
iii.	<b>Design ambient temperature</b>	<b>50 °C</b>
iv.	Altitude above MSL	Less Than 1000m
v.	Basic wind speed	39m/s
vi.	Seismic acceleration	Zone-III As per IS-1893
vii.	Average Rainfall	742.8 mm
viii.	Humidity	Max: 49-74%, Min: 35-60%

### 3. Auxiliary Supply

Normal Voltage	Variation in Voltage	Frequency in Hz	Phase/Wire	Neutral Connection
415 Volts	± 10%	50 ± 5%	3 phsae/4 wire	Solidly earthed
240 Volts	± 10%	50 ± 5%	1 phase/2 wire	Solidly earthed
220 Volts	190V to 240V	DC	---	Isolated 2 wire system (ungrounded)

Combined variation of voltage and frequency shall be limited to ± 10%.

**5. DOCUMENTS TO BE SUBMITTED ALONGWITH OFFER**

- 1) Drawings.
- 2) Guaranteed Technical Particulars
- 3) Type Test Reports
- 4) Manufacturing Quality Plan

**6. DOCUMENTATION SCHEDULE AT CONTRACT STAGE**

<b>A : For &amp; After Approval</b>	Soft copies as per clause no. 5 in 1 set
<b>B : For Approval</b>	Hard copies as per clause no. 5 in 12 sets
<b>B : After Approval</b>	Bound sets of Approved Hard copies and Installation, Operation & Maintenance manual and all as built drawings in 20 sets
	3 Set of Computer CD-ROMs (with unbreakable CD Covers) containing all as-built drawings in Auto-Cad version 2006 or later with 2D and 3D drawings, Instruction Manual and GTP.

**7. Title block:** Title block shall be forwarded to successful bidder after placement of order.

**8.** All outdoor enclosures shall provide a degree of protection of not less than IP 55 as per IS-13947 & colour shade of RAL 7032 and one enclosures of each type shall be tested for the same or evidence of testing shall be furnished in lieu of type testing.

**9. Quality plan:**

BHEL or APGENCO approved QP shall be followed.


**10. Type Test reports:**

Bidder shall submit valid type test reports (as per relevant IEC/IS Standard) of the tests carried out within last five years from the date of bid opening.. The report should have been conducted on identical or similar equipment/ components to those offered. In case type test reports are more than 5 years old OR the reports of type tests are found to be technically unacceptable, the type test shall be conducted without cost and delivery implication to BHEL/APGENCO.

**11. INSPECTION, TESTING AND INSPECTION CERTIFICATE**

Inspection testing shall be done as per customer specification and inspection plan.

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**SECTION 4**  
**LIST OF DOCUMENTS & DATASHEETS**

**GUARANTEED TECHNICAL PARTICULARS**

The Sample GTP for Dampers & Diffusers required is Annexed herewith.

The list furnished here is tentative and additional documents may be required during detailed engineering.

<b>List of Data Sheets</b>		
<b>S.No.</b>	<b>Item Description</b>	<b>BHEL's doc. no.</b>
01.	TDS for grills/diffuser	TB-DS-344-553-039
02.	TDS for Fire Damper	TB-DS-344-553-045
03.	TDS for Volume Control Damper	TB-DS-344-553-046
04.	TDS for Non Return Damper for Package AC Outlet	TB-DS-344-553-047
<b>List of Other documents</b>		
01.	O & M Manual	
02.	Catalogue , if any.	

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<b>GUARANTEED TECHNICAL PARTICULARS</b>		
<b>SI No</b>	<b>Description /Details</b>	<b>Vendor Confirmation</b>
	<b>Fire Dampers, Supply &amp; Return Air Diffusers, Volume control damper &amp; Non Return Damper</b>	
<b>A</b>	<b>Fire Damper</b>	
1	Make and Model	
2	Type	
3	Size of Damper	
4	Material of construction	
5	Pressure drop across the damper	
6	Total weight	
7	Any other information	
<b>B</b>	<b>Supply/ Return Air Diffusers</b>	
1	Make and Model:	
2	Size of Diffusers	
3	Material of construction	
4	Material for collar Damper ( for Supply air diffuser)	
<b>C</b>	<b>Volume Control Damper</b>	
1	Make and Model:	
2	Size of Damper.	
3	Material of construction	
4	Pressure drop across the damper	
5	Total weight	
<b>D</b>	<b>Non Return Damper for Package AC Outlet</b>	
1	Make and Model	
2	Type	
3	Size of Damper	
4	Material of construction	
5	Pressure drop across the damper	
6	Total weight	
7	Any other information	

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## **SECTION- 5 ENCLOSURES TO SPECIFICATION**

### **SCHEDULES TO BE FILLED UP BY THE BIDDER**

Schedule 1    **Format of Schedule of Deviations**

Schedule 2    **Format of Details of contact persons (technical & commercial)**

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## **SCHEDULE-1**

### **SCHEDULE OF TECHNICAL DEVIATION**

The following are the deviations / variations / exceptions from the specification:

<b>Section</b>	<b>Clause No./ Page No.</b>	<b>Statement of deviation/ Variations/Exceptions</b>
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- 1) In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract is deemed to be in compliance with the specification.
- 2) If there is NIL deviation, even then the format to be filled as **NIL DEVIATION**
- 3) Continuation sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

Place \_\_\_\_\_ Signature of the authorized representative of Bidder

Name -----

Date \_\_\_\_\_ Designation-----

Company seal-----

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## **SCHEDULE-2**

### **DETAILS OF CONTACT PERSON BOTH TECHNICAL AND COMMERCIAL**

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Name

Address for correspondence

Phone No.

Fax No.

Email

Place

Signature of the authorized representative of Bidder

Date

Name-----

Designation-----

Company seal -----

**Note:** Continuation sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.