

Detailed Specifications of Global/Open Tender Notice No: 10/2014

S. NO	TENDER NO.	BRIEF DETAILS OF ITEM(S)	PAGE NOS.
1.	17(956)14-PB/ T-66	Setting up of Exhaust Facility for two sets of Diffusion Furnaces in Solar Energy Clean Room Complex (SECRC)	2-7

Technical Specification for Exhaust Facility for two set of Diffusion Furnaces

(1) Scope

Setting up of exhaust facility for two sets of diffusion furnaces (M/s Tempress, Model TS 8603) housed in silicon processing area of class 1000 in Solar Energy Clean Room Complex that includes the followings :

- 1.1 Design of exhaust system based on data provided at #2 below. Brief calculations of design should be submitted for technical evaluation. Vendor should get the design of the exhaust system vetted by professionals in the area.
- 1.2 Supply of materials as per the design layout prepared.
- 1.3 Complete installation, testing and commissioning of the exhaust system.
- 1.4 Provision for detailed process and instrumentation design (PID).
- 1.5 Blower capacity and quality matching to exhaust design for semiconductor laboratory should be provided.
- 1.6 Design of damper valves as per norms for semiconductor exhaust should be provided.
- 1.7 All necessary schematic/layout of the location of the furnaces in the clean rooms, placement of scrubber, dry pump and end connections are given in **Sheet - I**.

(2) Design of Exhaust Facility

The exhaust system for two sets of diffusion furnaces (Tempress, TS8603) should be designed to meet the necessary mouth pressure and total flow for the various process lines (end connection). The toxic and non toxic lines will run separately.

SN	Details of diffusion furnaces for which exhaust required				Specifications of exhaust facilities required for different processes			Remarks
	Equipment/ Tool Name	Nature	Line No	Tool End Connection	Mouth Pressure	Estimated total Flow	Damper requirement	
				mm	Pa	CFM		
2.1	Diffusion Furnace 1	Non Toxic	1	127 mm	200-250	225	Yes	
		Non Toxic	2	127 mm	200-250	130	Yes	
		Non Toxic	3	203.2 mm	200-250	400	Yes	
		Non Toxic	4	203.2 mm	200-250	400	Yes	
		Non Toxic	5	127 mm	200-250	200	Yes	
		Toxic/ contaminated	6	101.6 mm	>250	75	Yes	
		Toxic	7	125 mm	>250	25	-	(*)
2.2	Diffusion Furnace 2	Non Toxic	1	127 mm	200-250	225	Yes	
		Non Toxic	2	203.2 mm	200-250	130	Yes	
		Non Toxic	3	203.2 mm	200-250	400	Yes	
		Non Toxic	4	203.2 mm	200-250	400	Yes	
		Non Toxic	5	127 mm	200-250	200	Yes	
		Toxic/ contaminated	6	101.6 mm	>250	75	Yes	
		Toxic	7	125 mm	>250	25	-	(*)
	Dry pump	Toxic	8	KF 40		300	--	(*)
		Ventilation (non-toxic)	9	105 mm			--	

(*) These lines are being created separately by the supplier of the scrubber.

- 2.3 The duct material, and various other components, accessories, equipment used to fabricate the exhaust system should be as per details given in *Sheet-II*.
- 2.4 The design should have provision of 15 % extra capacity (blower and piping) to take care of any over loading.

(3) Non-Toxic Ducting

- 3.1 All the duct lines of the non-toxic exhaust will be made of SS 304.
- 3.2 All non-toxic lines of the two furnaces (Line # 1-5 in Furnace-1 & Line # 1-5 and ventilation line of the dry pump in Furnace-2) should be joined together first separately and finally combined together to a higher diameter header duct.
- 3.3 Damper compatible with piping material on each line should be provided to maintain the required pressure and flow.
- 3.4 A suitable capacity, chemically resistant and fire/blast proof blower should be connected at the end of header for exhaust purpose. Vendor should decide the capacity of the blowers according to their design to meet the specification given in # 2.1 & 2.2.

(4) Toxic Ducting

- 4.1 Line # 6 of both furnaces (refer #2.1 &2.2), exhaust outlet of the scrubber (Make: Pure Air systems/Ebara, USA), ventilation line of scrubber cabinet and exhaust line of gas cabinets must be connected to the main header toxic ducting using SS 304 duct.
- 4.2 The scrubber exhaust outlet (4 inch dia.) rate of 120 CFM should be maintained by using suitable damper.
- 4.3 The ventilation of the scrubber cabinet (KF 50) is required at a rate of 150 CFM.
- 4.4 A flow of 400 CFM should be maintained for exhaust line from gas cabinets for silane and ammonia cylinders (200 CFM for each).
- 4.5 Each toxic line should be provided with suitable damper compatible with piping material to control and maintain the required pressure and flow.
- 4.6 A suitable capacity, chemically resistant and fire/blast proof blower should be connected at the end of header to suction and exhaust the unwanted gas/air. Vendor should decide the capacity of the blowers according to their design to meet the specifications required in each toxic line as per point nos. 4.1 to 4.4.
- 4.7 Provision should be made on the main toxic header line at two places with four inch diameter opening with proper flange and sealed with proper blinds.

(5) Scrubber Housing

- 5.1 At present scrubber is housed in the corridor in front of toilets in Clean Rooms Complex. A room is to be made by erecting a brick wall to isolate the scrubber from the rest of the area. This wall should have a air tight 6'X 2.5' door and a sealed glass window of size 2.5'X1.5'.
- 5.2 The scrubber room should be evacuated by using a suitable fan connected at the end of PVC exhaust ducting (6 inch diameter) which will run through AHU room.

(6) Power requirement, Control system & Safety Features

- 6.1 Electrical power will be provided by NPL as per Indian Standards (3- ϕ : 415 \pm 10 % V, 50 \pm 5 % Hz, and / or 1- ϕ : 230 \pm 10 % V, 50 \pm 5 % Hz) and vendor should design the system accordingly.
- 6.2 Necessary electrical cabling from main electrical sub-station of the CR complex to the exhaust system, Switch boards, MCB's, MCCB's to be provided.
- 6.3 The control and monitoring display/user Interface of the exhaust system should be installed near the furnaces (tool) in the clean rooms.
- 6.4 Protections interlocks, power shut off as per international safety standards.
- 6.5 Exhaust facility must have provision for an extra blower for redundancy to take care of failure of the main blower both for toxic and non-toxic exhausts.

- 6.6 All safety features should be included like leak tight piping, electrical leakage, welding quality etc.
- 6.7 Testing procedures like pressurization etc should also be mentioned for acceptance of the system.

(7) Other Essential requirements

- 7.1 Vendors should have experience and demonstrate capability to design safe and robust Exhaust System.
- 7.2 Vendors should design the exhaust system in such a way that minimum numbers of openings (holes) should be required in the clean rooms.
- 7.3 Vendors should have experience in working inside clean room of class 1000 or better for exhaust work.
- 7.4 Vendors must have successfully completed similar projects in nature for customers in semiconductor manufacturing, nanotechnology and photovoltaic cells. List of customers, projects done with contact address, phone number, e-mail etc., for necessary site visit to any of the projects mentioned in your reference may be conducted at our discretion.
- 7.5 Vendors must visit the site before submitting the tender for a proper design and estimation of the material requirement. In case of assumptions, bidder will be responsible.
- 7.6 Training of two persons during installation at NPL, Delhi.
- 7.7 Quantity and rate of the materials should be quoted separately. Payment will be on actual length basis and vendors should quote all piping on running meter basis with minimum quantity.

(8) Warranty

- 8.1 Two years warranty on complete exhaust system from the date of installation/commissioning.

(9) Optional

- 9.1 Vendors should quote the pressure magnehelic flow meter for each end connections (line) as optional items.
- 9.2 AMC for 3 years after warranty should be quoted separately.
- 9.3 Vendors should include any other component / accessories (not included in the tender) required for their system to meet the ultimate scope of the tender and should be quoted separately.

Important Note

- 1. Any clarification may be sought from the purchase department before the submission of the bid.
- 2. For site visit please contact:

<p>1. Dr. S.K. Srivastava Room No. 51 A CSIR-National Physical Laboratory Dr. K.S. Krishnan Road New Delhi-110012 Tel. +91-11-45608617 E-mail: srivassk@nplindia.org</p>	<p>2. Dr. Sushil Kumar Semiconductor Building CSIR-National Physical Laboratory Dr. K.S. Krishnan Road New Delhi-110012 Tel. +91-11-45608650 E-mail: skumar@nplindia.org</p>
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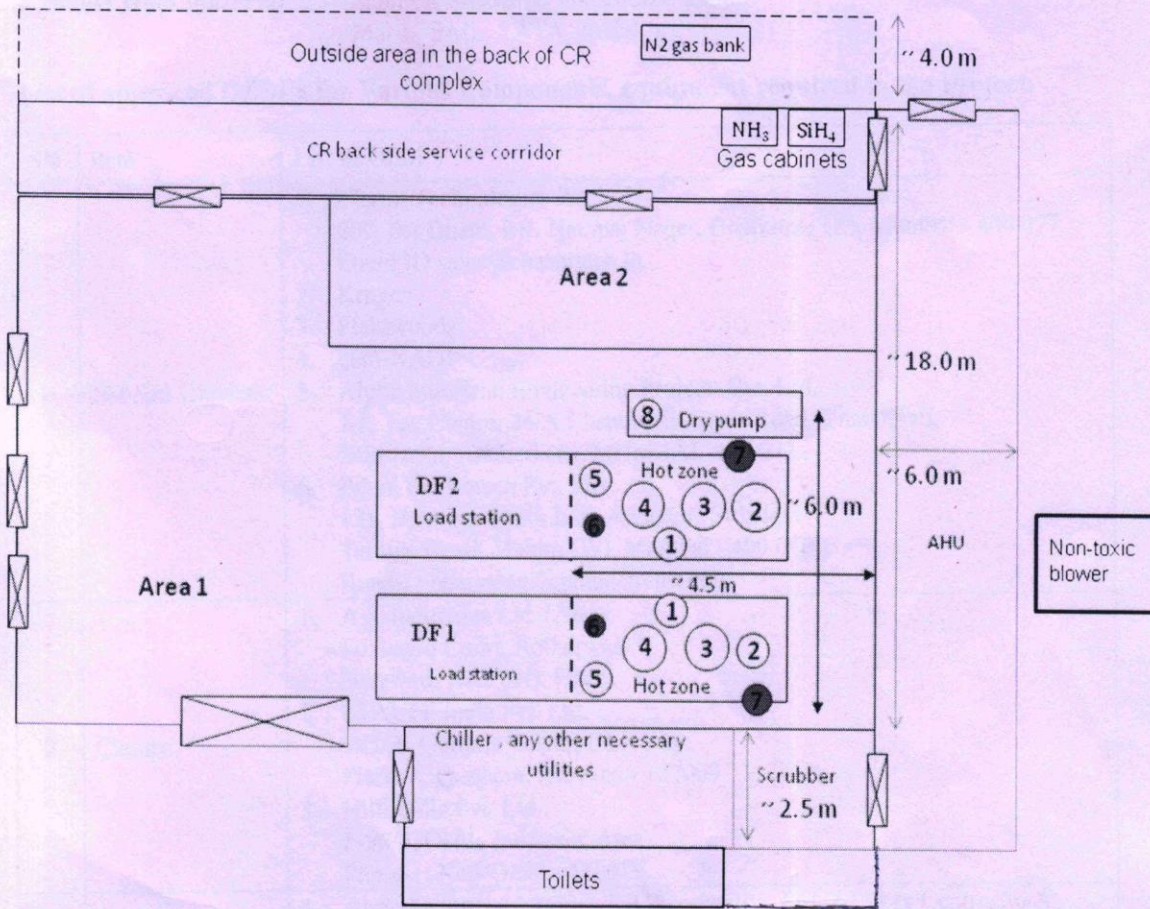


Figure: Schematic top view layout for furnaces in silicon PV processing lab. Not to the scale

Exhaust Duct material : Stainless Steel 304, Thickness – 2 mm
 Make : SAIL, TATA, Jindal

List of approved OEM's for Various Components, equipment required in the Project:

SN	Item	List of OEM's
1.	Exhaust Blowers	<ol style="list-style-type: none"> 1. Chasm Technologies Pvt Ltd 207, Sai Dham, BR. Nathpai Nagar, Ghatkopar (E), Mumbai - 400 077 Email ID sales@chasmttech.in 2. Kruger 3. Flaktwoods 4. ebm-NADI 5. Alpha Industrial Engineering Projects Pvt. Ltd. J-5, Tex Centre, 26/A Chandivali Farms Road, Chandivali, Saki Naka, Andheri (E), MUMBAI -400 072 6. Pilani Envirotech Pvt. Ltd. 121, Hammer Smith Indj. Area, Off Sitladevi Temple Road, Mahim (W), Mumbai - 400 016 E-mail : bharatbagi@pilanienviro.com
2	Clamps	<ol style="list-style-type: none"> 1. A K Industries Ltd (AKI) Foxwood Court, Rotherwas Hereford. HR2 6JQ, UK 2. STAUFF India Pvt. Ltd. 905-A, Galleria Tower, DLF City, Phase-4, Gurgaon, Haryana - 122009 3. Hilti India Pvt. Ltd. F-90/4, Okhla Industrial Area Phase-1, New Delhi - 110019
3	Exhaust Material	<ol style="list-style-type: none"> 1. Alpha Industrial Engineering Projects Pvt. Ltd. J-5, Tex Centre, 26/A Chandivali Farms Road, Chandivali, Saki Naka, Andheri (E), MUMBAI - 400 072 2. A K Industries Ltd (AKI) Foxwood Court, Rotherwas, Hereford. HR2 6JQ, UK 3. SAIL 4. TATA
4	Dampers	<ol style="list-style-type: none"> 1. Alpha Industrial Engineering Projects Pvt. Ltd. J-5, Tex Centre, 26/A Chandivali Farms Road, Chandivali, Saki Naka, Andheri (E), MUMBAI - 400 072 2. A K Industries Ltd (AKI) Foxwood Court, Rotherwas, Hereford. HR2 6JQ, UK 3. S. R. Engineering Works, 34, Pashupati Bhattacharyya Road, Kolkata – 700041 4. Caryaire Group A-10, Sector 59, NOIDA - 201 301 (U.P) India Email sales@caryaire.com 5. Honeywell 6. Siemens 7. Flakt woods
5	Strut Channels	<ol style="list-style-type: none"> 1. Divine Unistrut 2. Unistrat 3. Channel system

	<ul style="list-style-type: none"> 4. DKNV Engineering Private Limited B/ 302, Dhiraj Sneha, 3rd Floor, 30th Road, Mumbai, Maharashtra 400050 5. Riddhim Siddhim Steel (India) Pvt. Ltd. RSSIPL Mulund (East) Mumbai Maharashtra 400081 India 6. SUPREME & CO. PVT. LTD. 53, Justice Chandra Madhav Road, Kolkata – 700020 7. Steel India Marketing, Plot # 67, Flat #. 204, Sai Sadan Apartment, Bhagyanagar Colony, Kukatpally, Hyderabad - 500072
Magnehelic gauges	<ul style="list-style-type: none"> 1. Castle 2. Audco 3. Advance 4. AlfaLaval 5. Dwyer 6. Terra universal
