



THE ENERGY AND RESOURCES INSTITUTE

=====

Thermal Desorption Unit in Kuwait

=====

CONTACT US AT:
Email: tgn@teri.res.in
WEB SITE: [www. Teriin.org](http://www.Teriin.org)



COMPONENTS OF THERMAL DESORPTION UNIT

- **FEED BIN**
 - It is a trapezium shaped rectangular, open top metal bin with a grizzly on top.
 - This equipment receives contaminated material.
 - This grizzly disallows large rocks or metal pieces to pass through.
 - Maximum capacity of this feed bin is 30 tonnes per hour.

- **WEIGH CONVEYOR**
 - Contaminated material drops from inside the feed bin on to the weigh conveyor and travels to the feed auger.
 - Weight of contaminated material passing over this belt is continuously recorded and graphs are created inside the control room.
 - Maximum capacity of this conveyor is 40 tonnes per hour.

- **FEED AUGER**
 - It's a screw conveyor, which rotates continuously so that contaminated materials falling on to this auger travel towards and inside the desorber drums for thermal treatment.

- **DESORBER**
 - The Indirect Thermal Desorption Unit (TDU) has a triple-shell desorber.
 - The three shells (drums) are of 9', 6' and 3' in diameter.
 - Maximum capacity of the desorber is 25 tonnes per hour.

- **SOIL CONDITIONER AND BAG HOUSE**
 - Hot and treated material is sprinkled with water to bring down the temperature (from 350°C to about 93°C) inside the soil conditioner before being discharged onto the material stacker conveyor.
 - Maximum capacity of the soil conditioner is 30 tonnes per hour.
 - A bag house is attached on top of the soil conditioner to capture and return soil dust carried out of the soil conditioner with the steam created when water is sprinkled on treated and hot soil.
 - Max capacity of the bag house is 2,500 ACFM.

- **MATERIAL STACK CONVEYOR**
 - Treated materials leaving the soil conditioner fall on material stacker conveyor for placement on piles.
 - Maximum capacity of the conveyor is 25 tonnes per hour.

CONTACT US AT:

Email: tgn@teri.res.in

WEB SITE: [www. Teriin.org](http://www.Teriin.org)



- **DRY CYCLONE**
 - The dry cyclone strips dust particles from the gas stream exiting from the desorber.
 - Dry cyclone allows gases to exit from the top of the unit and remediated fines from the bottom of the unit. It works on the principle of cyclonic separation.
 - Maximum capacity of dry cyclone is 5,000 ACFM.
- **HYDRO CYCLONE**
 - The hydro cyclone condenses water and oil vapours into liquid form.
 - Maximum capacity of hydro cyclone is 5,000 ACFM.
- **VEBTURI SCRUBBER**
 - Venturi Scrubber's function is to strip gas stream completely off dust particles.
 - It's a wet scrubber with a variable throat venturi located before the acid gas scrubber.
 - By the method of reduction in the cross sectional area of the Venturi throat, where water is injected at 50 psig, water and dust are removed from the gas stream.
 - Maximum capacity of Venturi Scrubber is 5,000 ACFM.
- **SLINGER TANK**
 - Slinger Separator is located immediately after venturi scrubber. This separator receives gas stream, oil-water mixture and dust particles from venturi scrubber.
 - Oil-Water mixture with some dust particles is separated from the gas stream by cyclonic action and sent to the collection tank for ultimate separation by tri-canter centrifuge.
 - Capacity of this tank is 1,000 US gallons.
- **ACID GAS SCRUBBER**
 - Gases from the venturi scrubber are pulled into the acid gas scrubber with a downward flow of water and an upward flow of gases.
 - Gases come in contact with the wet packing within the scrubber and this interaction with water reduces sulphur from the gas stream.
 - The maximum capacity of acid gas scrubber is 5,000 ACFM.
- **ID FAN**
 - The fan pulls gas stream through the desorber, dry cyclone, hydro cyclone, venturi scrubber and the acid gas scrubber.
 - It then pushes with positive pressure the gas stream into the oxidizer and out of the oxidizer stack.
 - The I.D. fan air volume and correlated negative/positive pressure can be increased or decreased by a variable speed controller in the control house.
 - Capacity of I.D. fan is 600 ACFM @ 38" of water column with a 100 per cent VFD controller.

CONTACT US AT:
Email: tgn@teri.res.in
WEB SITE: www. Teriin.org



- **OXIDIZER**
 - The oxidizer increases gas flow temperature from approximately 60°C to 950°C in order to combust or oxidize hydrocarbons and form typical by-products of combustion.
 - The maximum capacity of the oxidizer is 7,000 ACFM.

- **SHELL AND TUBE HEAT EXCHANGER**
 - The heat exchanger receives hot water exiting hydro cyclone and venturi scrubber and cools this stream.
 - Relatively cool water from cooling tower is used for cooling hot water entering this heat exchanger.
 - Cooled water is then sent back to hydro cyclone and venturi scrubber.
 - Maximum capacity of S & T Heat Exchanger is 300 US gallons per minute.

- **COOLING TOWER**
 - The cooling tower cools water by evaporation.
 - Fresh and relatively hot water from heat exchanger is sent to cooling tower for cooling and cooled water from here is then sent back to the heat exchanger.
 - Maximum capacity is 653 gallons per minute with 15°C of temperature reduction.

- **COLLECTION TANK**
 - This tank receives a mixture of oil, water and dust particles. Some settling occurs in this tank and clear water is sent to the condensed water tank. Oil, water, and dust particles mixture is sent to the tri-canter centrifuge for separation.
 - Capacity of this tank is 4,200 US gallons.

- **TRICANT CENTRIFUGE(THREE PHASE SEPARATING CENTRIFUGE)**
 - Condensed liquid which comprises of oil, water, and sludge (slurry) is sent from the collection tank to the centrifuge.
 - It is a solid bowl centrifuge that continuously separates two liquids and one solid. The slurry is discharged over an adjustable weir plate under free flow. The weir plate adjustment is necessary for optimum segregation of oil, water, and sludge.
 - The centrifuge has a feed capacity of 30-35 m³ gallons per hour.

- **CONDENSED WATER TANK**
 - Condensed water from collection tank is sent to this tank and thereby recycled.
 - Capacity of this tank is 10,000 US gallons.

- **CEM SYSTEM**

Continuous Emission Monitoring System. This monitor online pollution of the equipment.

CONTACT US AT:
Email: tgn@teri.res.in
WEB SITE: www. Teriin.org

PART II 9.0' DIAMETER DRYER PLANT PICTURE



CONTACT US AT:
Email: tgn@teri.res.in
WEB SITE: [www. Teriin.org](http://www.Teriin.org)

OVERALL VIEW OF INDIRECT TDU - 2



OVERALL VIEW OF INDIRECT TDU - 3



OXIDIZER AND BURNER UNIT

