



***T & I Limited***

Tea processing machinery  
from plucking to packing

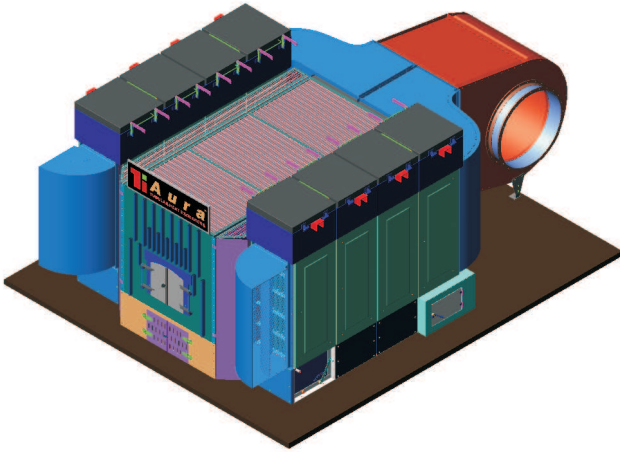
*Aura* *Aura*

***Aura***™

TUBULAR HEAT EXCHANGER



# The First Energy Efficient Stainless Steel Tubular Heat Exchanger



## The Aura principle

In Aura the flue gases drawn by an induced draught created over the grate by the ID fan and chimney, pass through 2 sets of Special Alloy vertical tube banks and 3 sets of mild steel vertical tube banks placed on either side of the grate, before being let out. Ambient fresh air drawn from the front of the heater by the dryer fan absorbs heat from tube banks prior to its entry into the drying chamber.

## Construction

- The construction of the AURA is radically different from conventional heaters.
- Except for fire bars, none of the components are made of cast iron.
- Moreover, unlike conventional heaters with horizontal CI/MS tubes, the AURA has vertical tubes of S.S. for the 1st & 2nd pass and M.S. for 3rd, 4th & 5th pass.
- The arches in the combustion zone are refractory-lined to ensure minimum radiation losses and high combustion efficiency.
- Fully insulated with ceramic wool to ensure minimum heat loss. High efficiency ID fan.

The Aura is the first energy efficient Special alloy vertical tube bank air heater, specifically designed for hot air generation at the lowest possible operational & maintenance costs. Characterized by high heat transfer rates & unique styling, the heater is compact, easy to clean and fully fabricated, thus reducing the dependence on castings.

The Aura has evolved out of T&I's ceaseless quest for perfection without diluting its commitment to provide value-for-money products.

## Features

Aura is a multi-tubular heater specially designed with vertical tube banks. The salient feature of this heater is that tube banks are mounted vertically on either side of the grate and flue passes 5 times in these tube banks either vertically upwards or downwards. The process air passes these tube banks on either sides of the grate.

**Tube banks:** AURA heaters are fitted with specially designed tube banks instead of individual tubes. Tubes are welded at one end and free at the other end so that they are allowed to expand while in operation. The first 2 sets of tube banks are made of special grade Stainless Steel (SS) having better heat transfer rate, corrosion/wear resistance and balance 3 sets of tube banks are made of mild steel. (M.S).

**Combustion chamber:** Combustion chamber is built with special grade refractory bricks instead of cast iron arch bars.

**Draft system:** AURA is designed to handle both forced draft and induced draft. Again forced draft is divided into primary air & secondary air where primary air aids in maximum combustion and secondary air improves the combustion further.

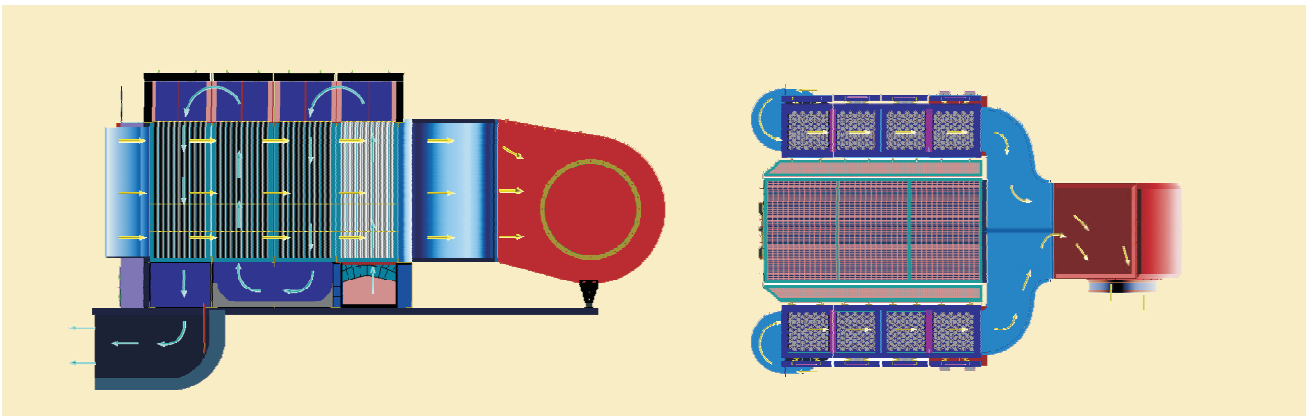
**Mechanical stocking (optional):** AURA heaters can be fitted with mechanical (chain gate)

**Stokers for uniform feed of coal.** This helps to maintain the temperature as well as reduce coal consumption.

**Better heat transfer:** Vertical design of tube banks further improves the heat transfer rate since soot & scale formation is less.

## Characteristics of the Aura Heater

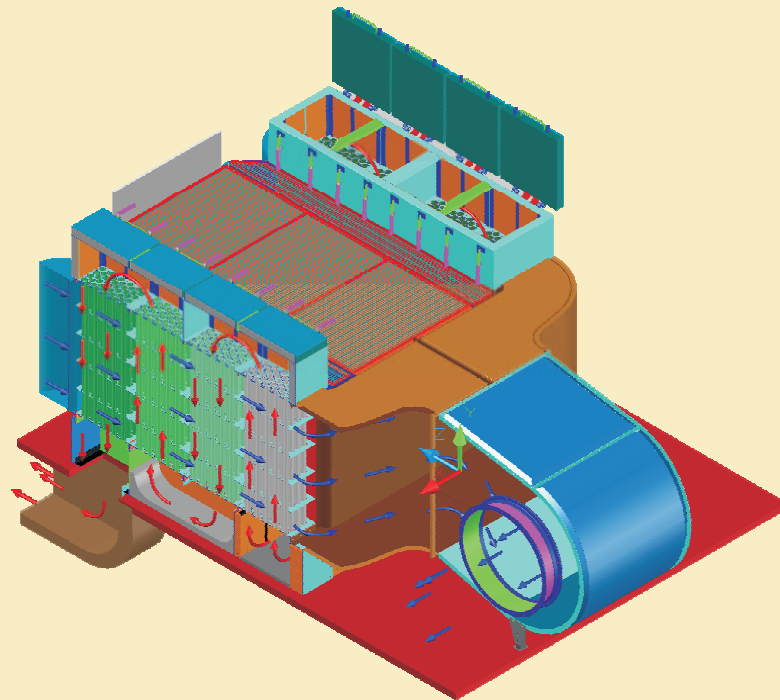
- Up to 40% lesser space requirement than old Casting-type heaters, makes the Aura fit easily where other heaters are difficult to accommodate.
- High Efficiency of 80% against 50% of older design heaters, reduces fuel consumption by up to 30%.
- The Aura takes only 20 minutes to reach operational temperature. This substantially reduces the cycle time and fuel required to start-up the drying process.
- Suitable for all types of dryers normally used in the Tea Industry, from 250kgs. to 600kgs. per hour.
- High heat withstanding capability, heat transfer efficiency and strength of Stainless Steel Tube Bank in the first pass, results in reduction of fuel requirement and events damage of tubes.
- Vertical Tube design reduces chances of scaling and soot formation inside the tubes, resulting in lower maintenance requirements and prevents blockade in tubes.
- Single pass for cold air ensures minimum pressure loss. Load on Dryer hot air fan is reduced considerably.
- Negligible possibility of corrosion of tubes caused due to condensation of water vapour present in solid fuels such as firewood and coal.
- Fully fabricated design eliminates need for cast iron, thereby making on-site repairs easier.
- Capable of being fired with almost all types of Solid Fuels, Gas, Furnace Oil, etc.
- Only 12 joints on each side of the arch area compared with over 60 joints in the casting-type heaters.
- Gaps between joints are sealed using high quality packing material (Cera-paper), thereby almost eliminating chances of smoke leakages.
- Fully Insulated Casing using Mineral Wool increases heat retention within the heater and reduces radiation losses. This results in increase of Thermal efficiency and reduction in the environment temperature.
- High Heat resistant and high enduring Ceramic packing material is used for sealing all joints between parts. No Asbestos or other health-affecting material is used, thereby conforming to FDA norms and HACCP requirements.
- High Heat resistant, heavy-duty refractory material for lower maintenance costs and increased longevity.
- Electrical Control Panel with built-in Digital Temperature Indicators, coupled to audible alarm. The alarm is automatically activated in case the temperature inside the heater crosses the pre-set lower or upper limits.



## SAVINGS IN AURA-1250 HEATER COMPARED TO 'CM' TYPE HEATER

1.	Average Output/hour	:	260 Kgs/hr
2.	Average Inlet Dhool moisture	:	70%
3.	No. of working hours/day	:	12 Hours
4.	No. of working days in a year	:	220 Days
5.	Average Coal cost/Kg	:	Rs.3.15 (Margetta Coal)
6.	Average coal consumption/Kg of Made Tea	:	0.55 Kgs
7.	Conventional 'CM' type heater efficiency	:	55%
8.	AURA-12 Vertical Tube bank heater efficiency	:	70%
			Avg. Coal cons. x heater ('CM' type)
	Coal Consumption/kg of made tea at 70%	=	-----
		=	AURA heater efficiency
		=	(0.55 x 0.55) / 0.70
		=	0.43 Kgs/kg of made tea
	Coal saving/kg of made tea with AURA-12 heater	=	Coal.Cons('CM' type) - Coal Cons(AURA)
		=	0.55 - 0.43
		=	0.12 Kg/kg of made type
	Total coal saving in year	=	Coal saving/kg of MT x Avg. Output/hr
		=	X working hr/day x No. working day/year
		=	0.12 x 260 x 12 x 220
		=	82,368 Kgs/year
	Total saving/year on account of Coal	=	Total coal Saved x coal cost
		=	82,368 Kgs x Rs.3.15
		=	Rs.2,59,460

TECHNICAL DETAILS			
MODEL	AURA VT SUPER (1000)	AURA VT MAJOR (1250)	AURA VT JUMBO (2000)
GRATE AREA	1.00 Sq. Mtr.	1.25 Sq. Mtr.	2.10 Sq. Mtr.
NO.of Tube Banks	1 S.S. + 3 M.S.	1 S.S. + 3 M.S.	1 S.S. + 3 M.S.
EFFICIENCY	80%	80%	80%
COAL BURNING CAPACITY	175 Kgs/hr.	220 Kgs/hr.	370 Kgs/hr.
AVERAGE COAL CONSUMPTION	90 - 120 Kgs/hr.	130 - 150 Kgs/hr.	180 - 210 Kgs/hr.
FIREWOOD BURNING CAPACITY	0.8 yd <sup>3</sup> /hr.	1 yd <sup>3</sup> /hr.	1.6 yd <sup>3</sup> /hr.
HEAT GENERATION CAPACITY	962,500 KCal/hr	1,210,000 K Cal./hr	2,035,000 Kcal./hr
HEAT AVAILABLE FOR DRYER	770,000 Kcal./hr 20007 CFM @ 140°C	968,000 Kcal./hr 25151 CFM @ 140°C	1,628,000 Kcal./hr 42300 CFM @ 140°C
OVERALL DIMENSIONS (Length x Width x Height)	5712 x 4156 x 2576 mm	6340 x 4156 x 2576 mm	7525 x 5060 x 2676 mm



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