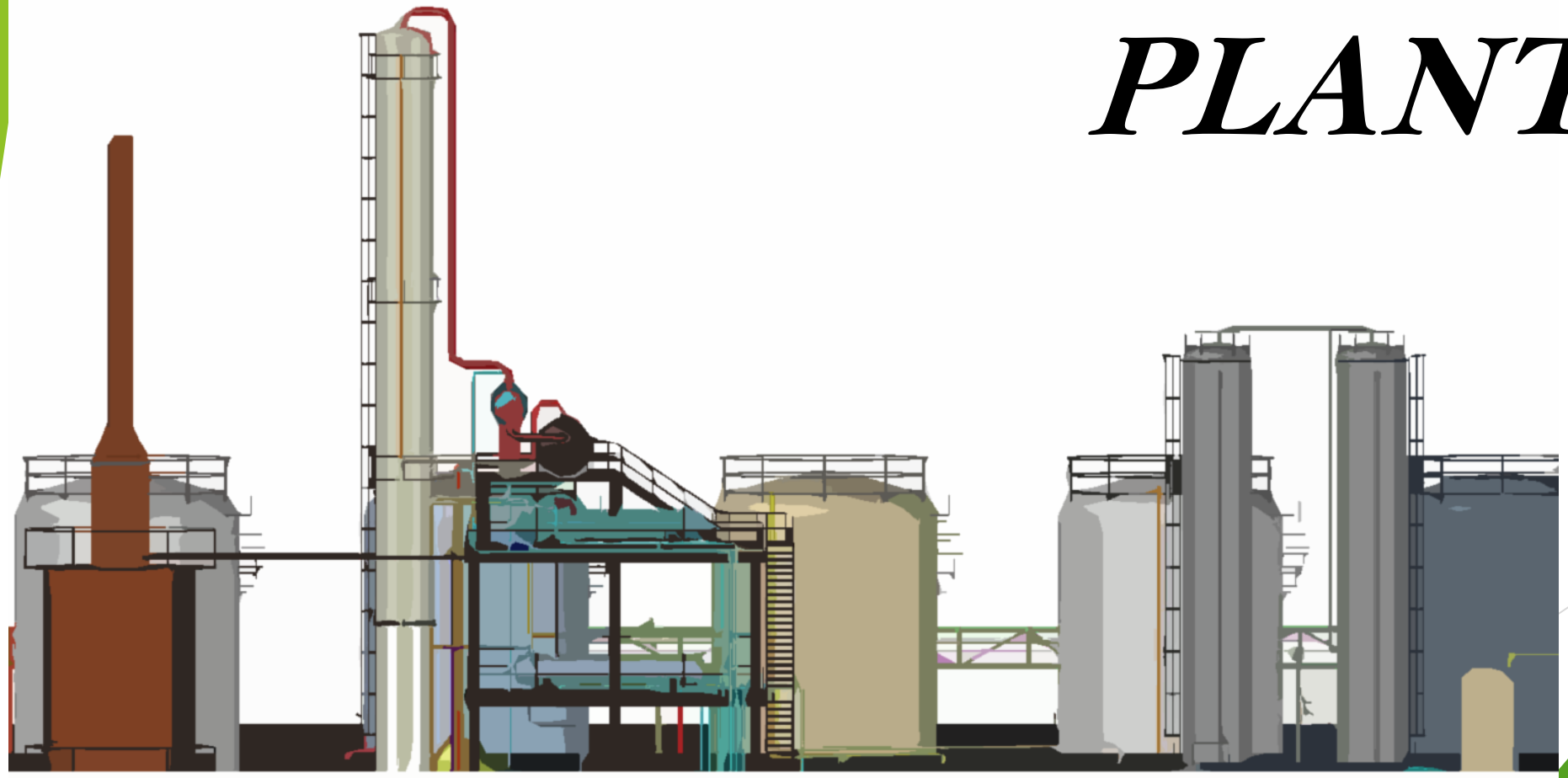
# VDU UNIT AND ASPHALT OXIDATION PLANT



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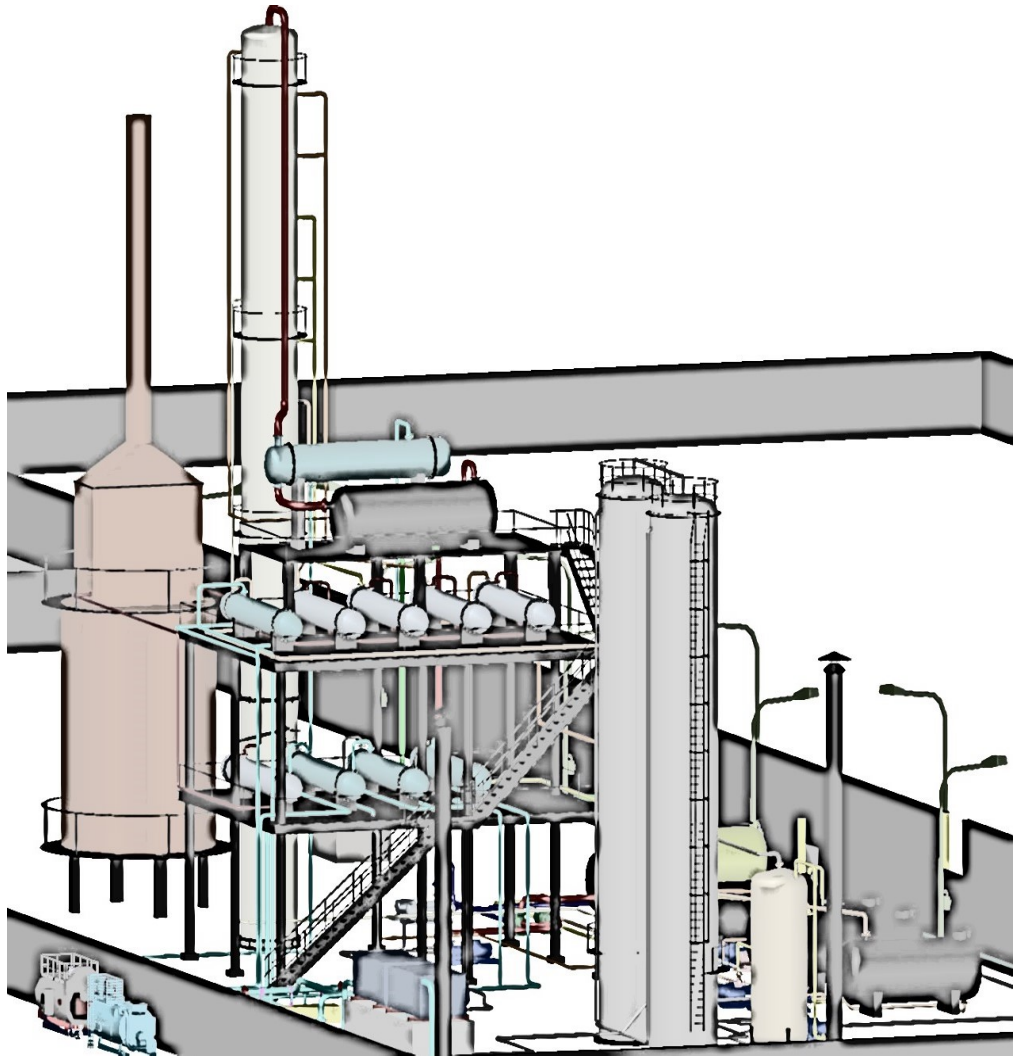
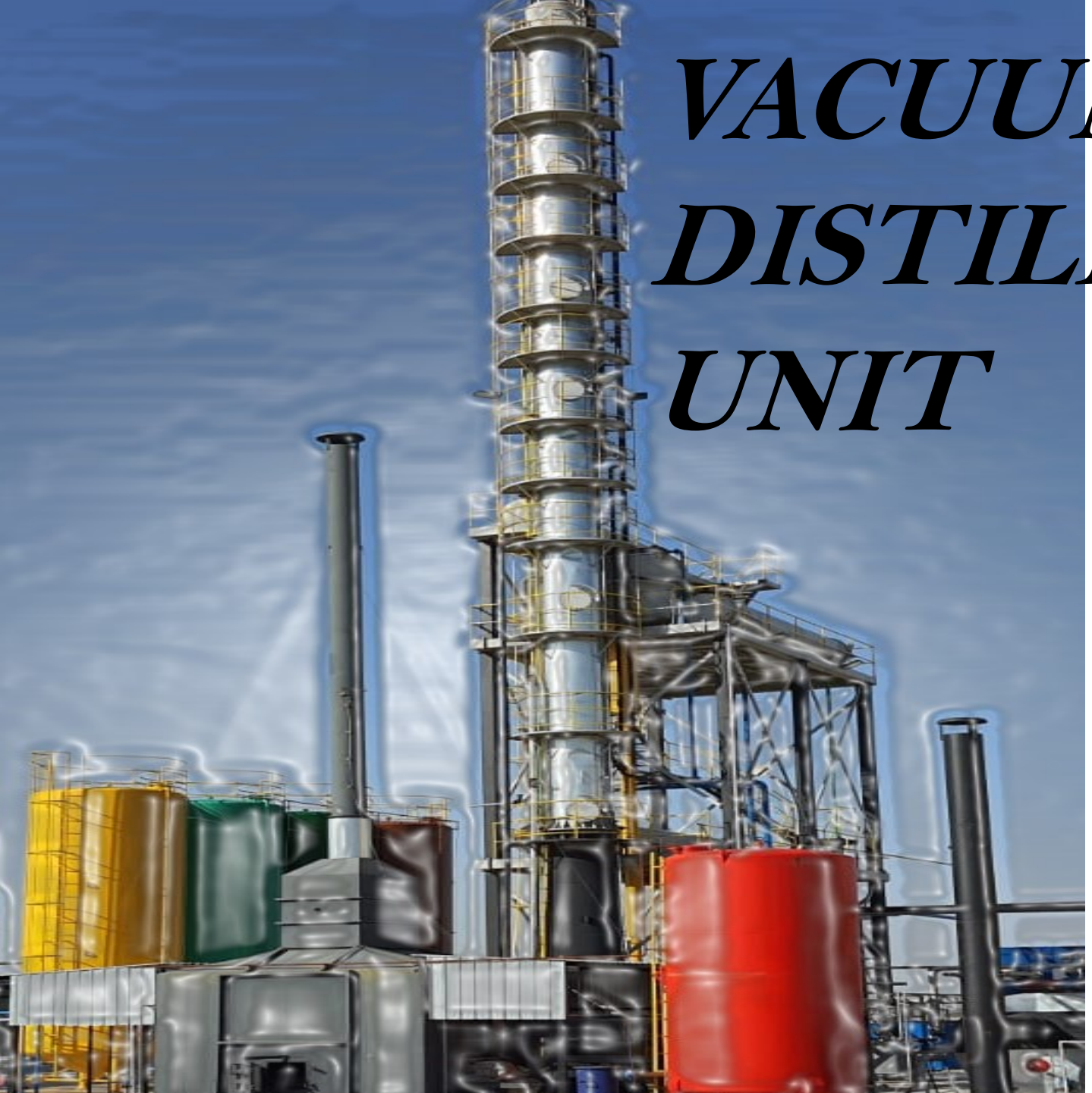


OUR PROJECT IS OCCURED IN TWO PARTS
THESE PARTS AS FOLLOWS ;

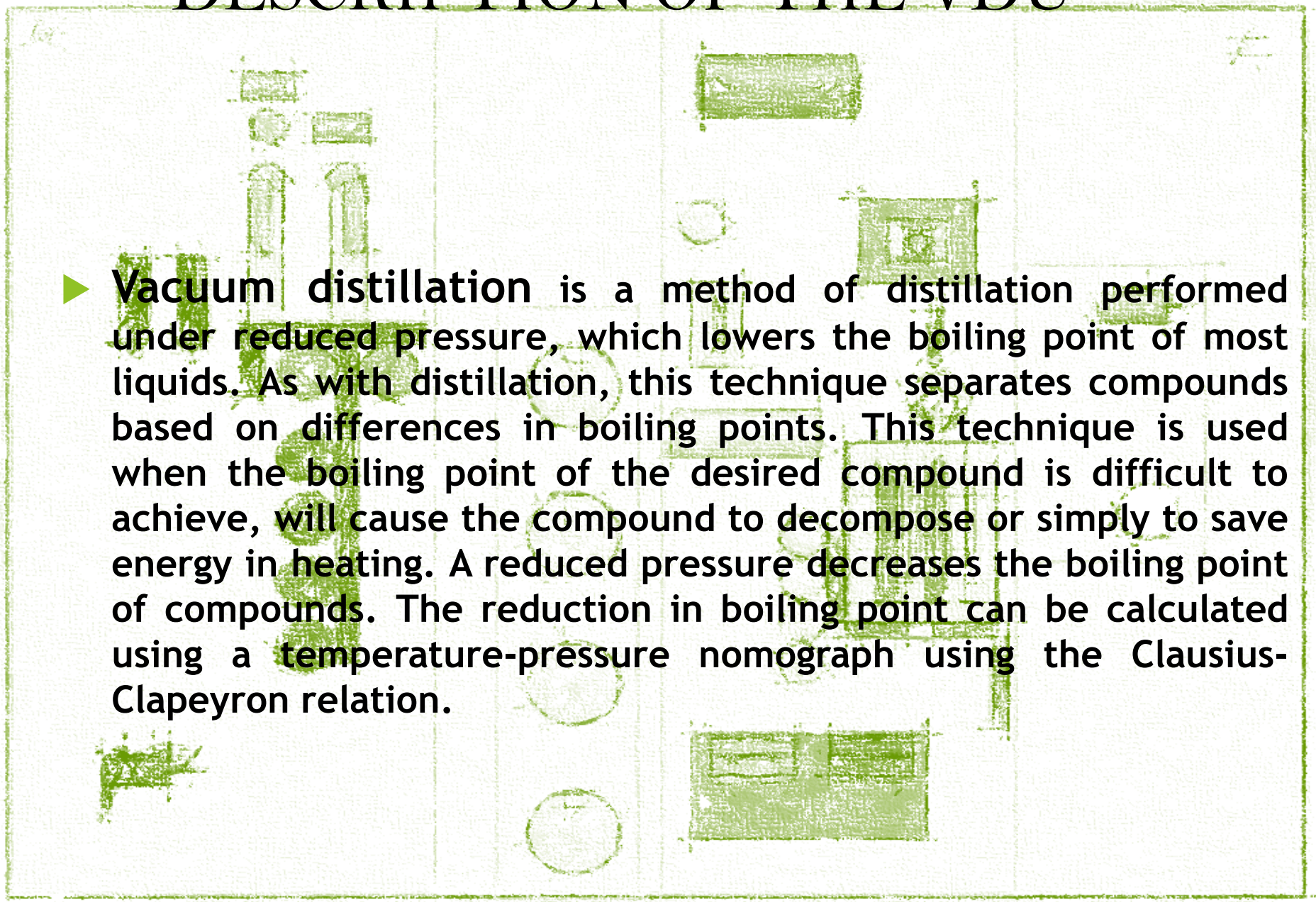
1) VDU (VACUUM DISTILLATION UNIT
2) ASPHALT OXIDATION UNIT

THE WORKING PROCEDURE AND
THE EQUIPMENT LIST IS EXPLAINED NEXT PAGES



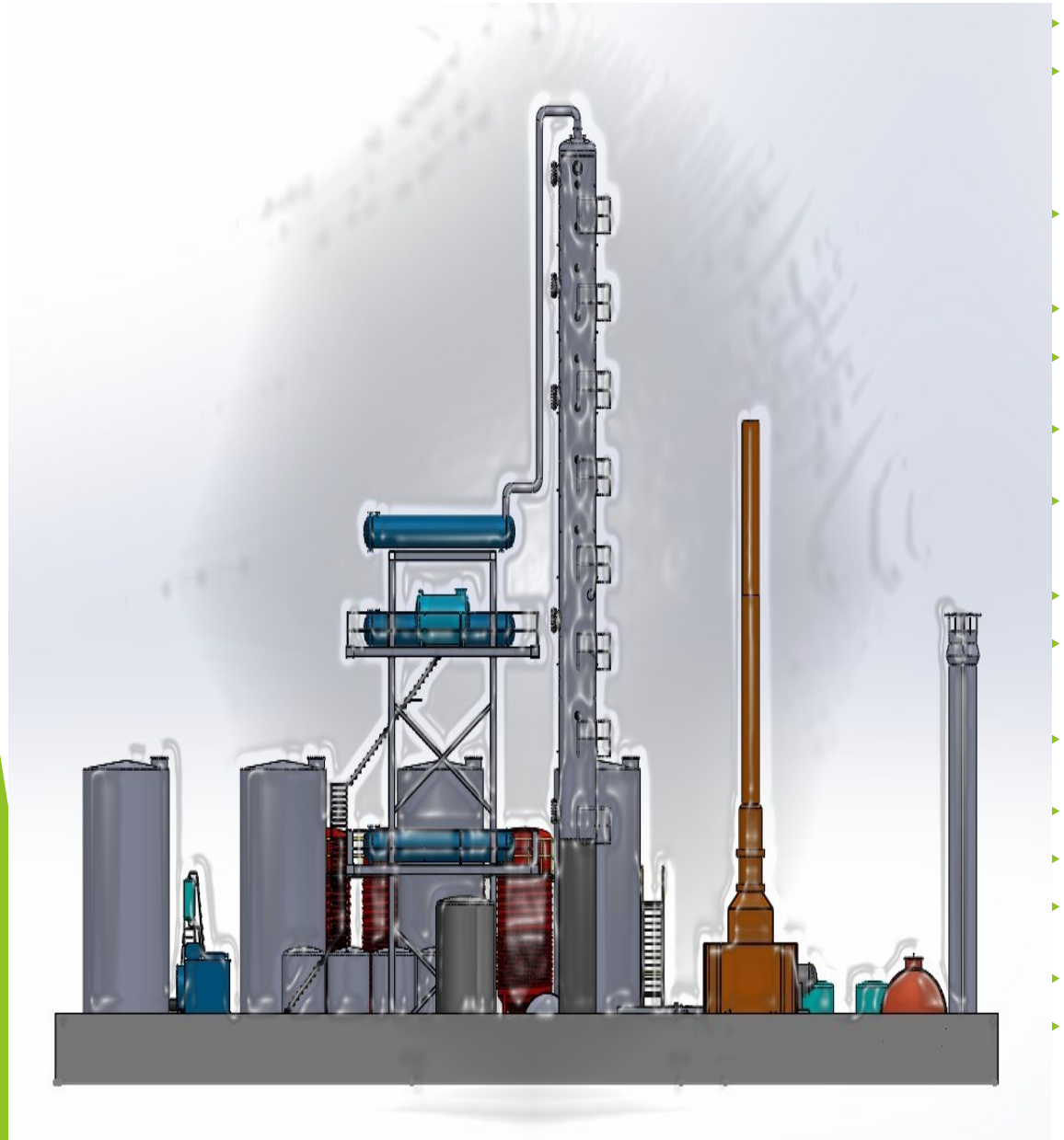
# VACUUM DISTILLATION UNIT

# DESCRIPTION OF THE VDU



- **Vacuum distillation** is a method of distillation performed under reduced pressure, which lowers the boiling point of most liquids. As with distillation, this technique separates compounds based on differences in boiling points. This technique is used when the boiling point of the desired compound is difficult to achieve, will cause the compound to decompose or simply to save energy in heating. A reduced pressure decreases the boiling point of compounds. The reduction in boiling point can be calculated using a temperature-pressure nomograph using the Clausius-Clapeyron relation.

# DESCRIPTION OF THE VDU



- **Operation of the Vacuum Distillation Unit**
- The primary material (f. oil) is pumped from the storage tanks by the worker's pumps into the unit. Vacuum distillation The primary material passes through the heat exchangers to raise the temperature between 175-202 ° C and then enters the oven where the temperature rises to 395 ° C and enters To the tower distillation vacuum
- The distillation process is performed using pressure which can be as high as 8 cm Hg, or 1.5 Bb per square inch, well below the atmospheric pressure of 14.7 pounds per square inch or about 1/10 of atmospheric pressure
- **The tower is divided into three parts**
- 1-DEPARTMENT: The light materials left by the distillation waste are removed by boiling water vapor and contain 4 trays
- Retail section: Vaporization and condensation of evaporative vapors containing 22 tray 2-
- 3-The evaporation zone: the entry area, the primary material where the light material rises to the top of the tower, and the heavy materials descend to the bottom of the tower
- **Products of distillation tower**
- 1-LVGO: 120 degrees in diameter and withdrawn from Chinese No. 23, which is cooled by water cooler and then into the separating pot and then divided into two parts
- A- quantity of the product is pumped to China 26 and you to regulate the temperature above the tower and called the process of recycling
- B-residual amount is pumped into the storage tanks produced
- 2- Light oil side product
- 3-The degree of 240 ° C pulls from 18 Chinese then sends refrigerated watermark where the amount of storage tanks is pumped product
- Side product heavy oil
- At a temperature of 280 ° C and pulls out of the Chinese 9 of the then sends refrigerated watermark where the amount of storage tanks are pumped product

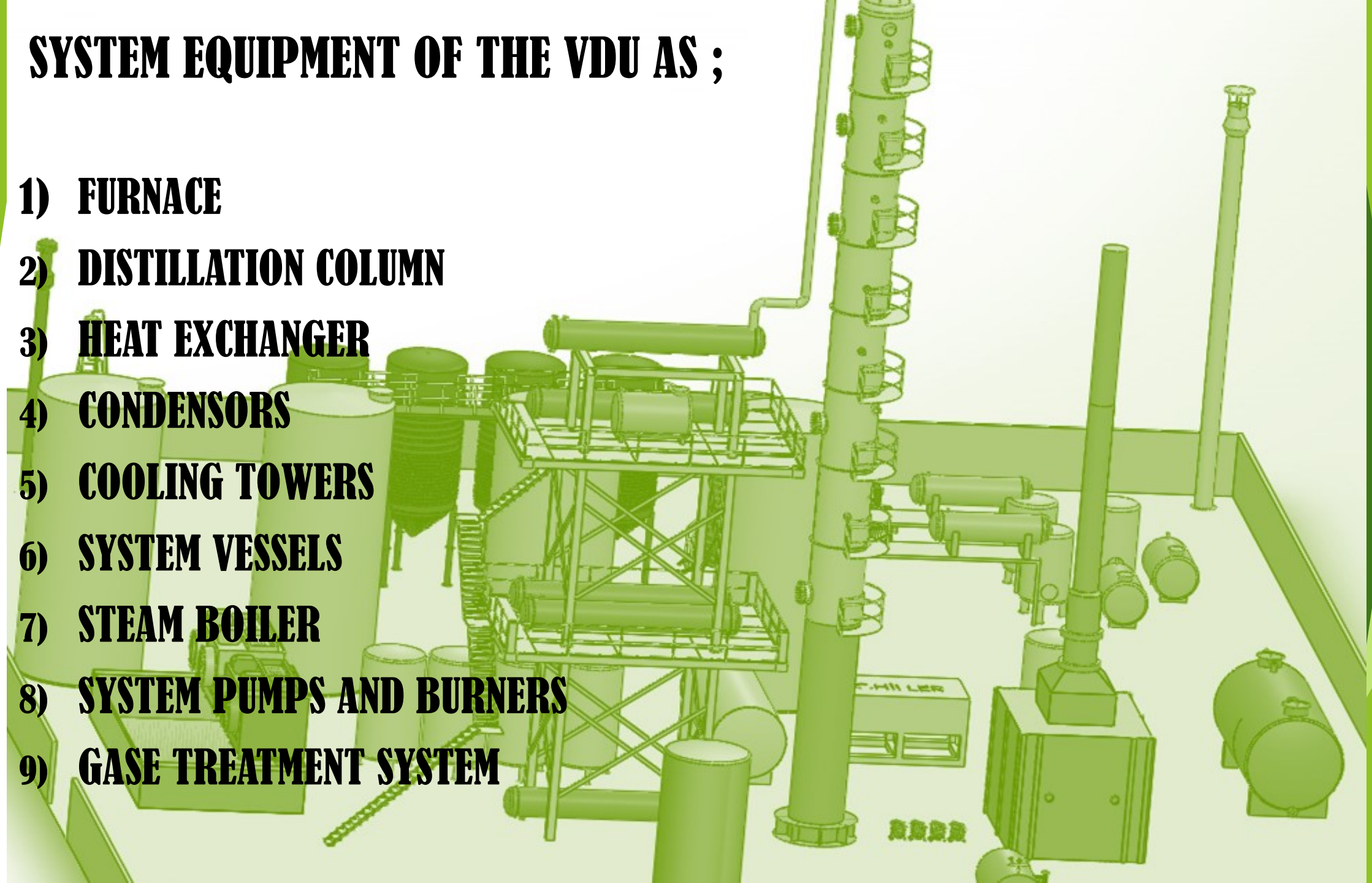
# RCR AND SYSTEM PRODUCTS SPECIFICATIONS

| Feedstock | | Atmospheric Residue |
|---|---|---|
| Density (15.56 C), g/cm3 | | 0.943 |
| Viscosity @50 C, cst | | 60 |
| Freezing Point, C | | 21 |
| CCR, m% | | 7.5 Max |
| Sulfur, m% | | 3.5-4.0 |
| ASTM D1160 | 5% | 350 |
| | 10% | 375 |
| | 30% | 439 |
| | 50% | 511 |
| | 70% | 584 |
| | 90% | |

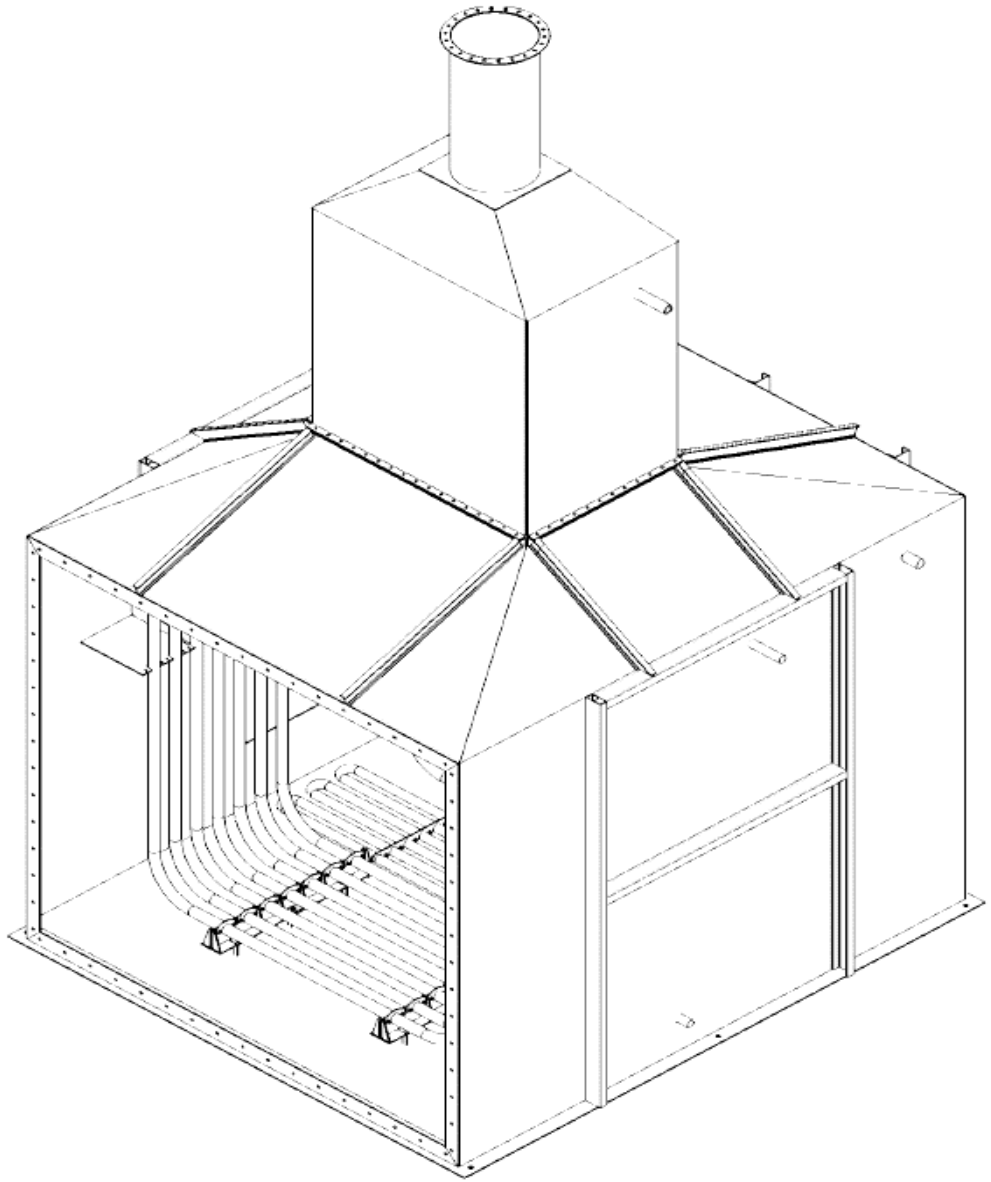
| property | unit | LVGO | LLO | HLO | VR |
|---|---|---|---|---|---|
| SPECIFIC GRAVITY | - | 0.8721 | 0.9165 | 0.9378 | 1.0098 |
| FLASH POINT temperature | C | 129 | 200 | 223 | 300> |
| DISTILLATOIN CURVE TYPE ASTM | | D86 | D1160 | D1160 | D1160 |

# SYSTEM EQUIPMENT OF THE VDU AS ;

1) FURNACE
2) DISTILLATION COLUMN
3) HEAT EXCHANGER
4) CONDENSORS
5) COOLING TOWERS
6) SYSTEM VESSELS
7) STEAM BOILER
8) SYSTEM PUMPS AND BURNERS
9) GASE TREATMENT SYSTEM



# FURNACE



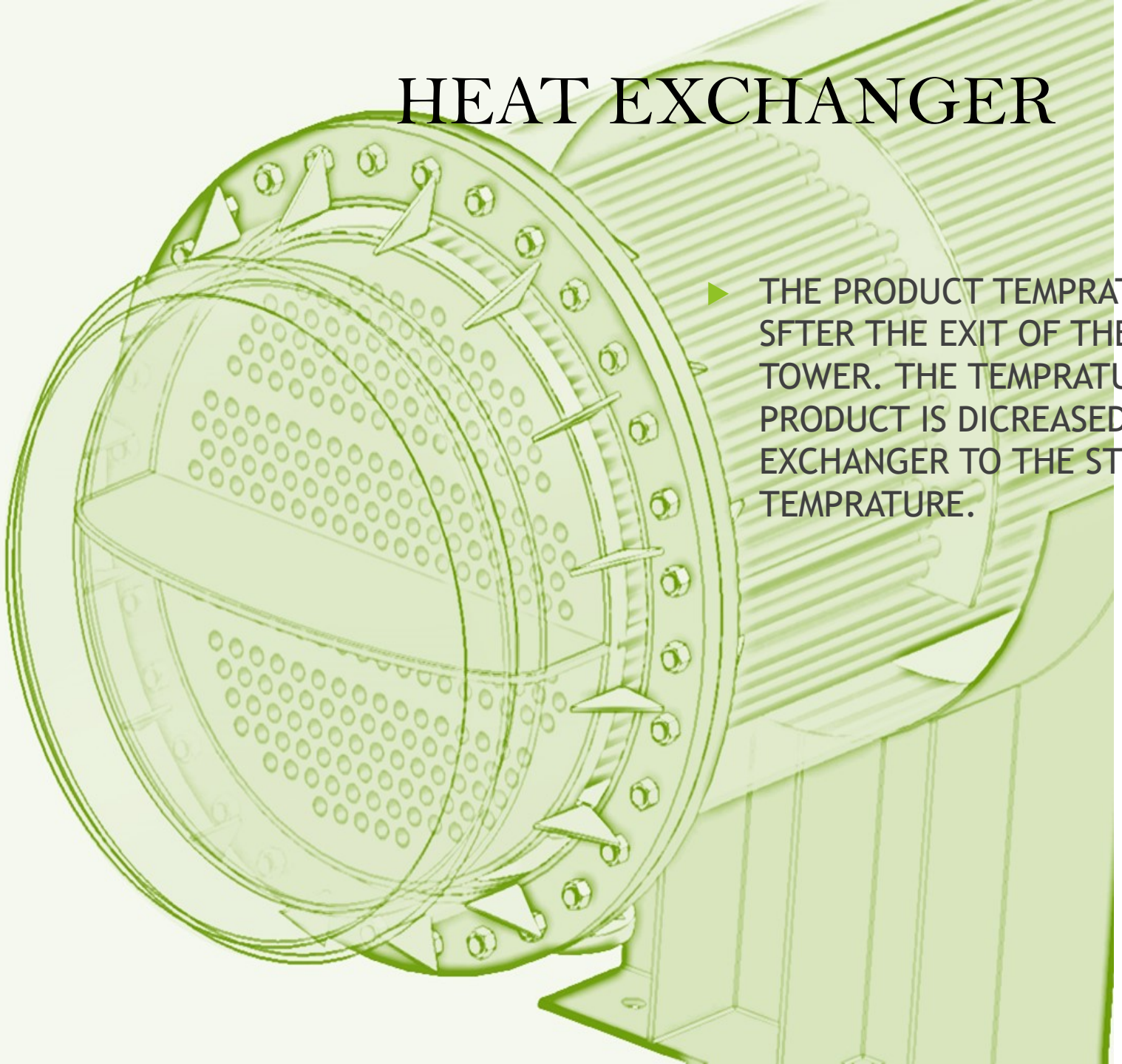
FURNACE IS USED TO HEATING THE RCR UP TO OPERATION TEMPRATURE

THE OPERATION TEMPRATYRE IS CHANGED BETWEEN 395-420°C.

# DISTILLATION COLUMN

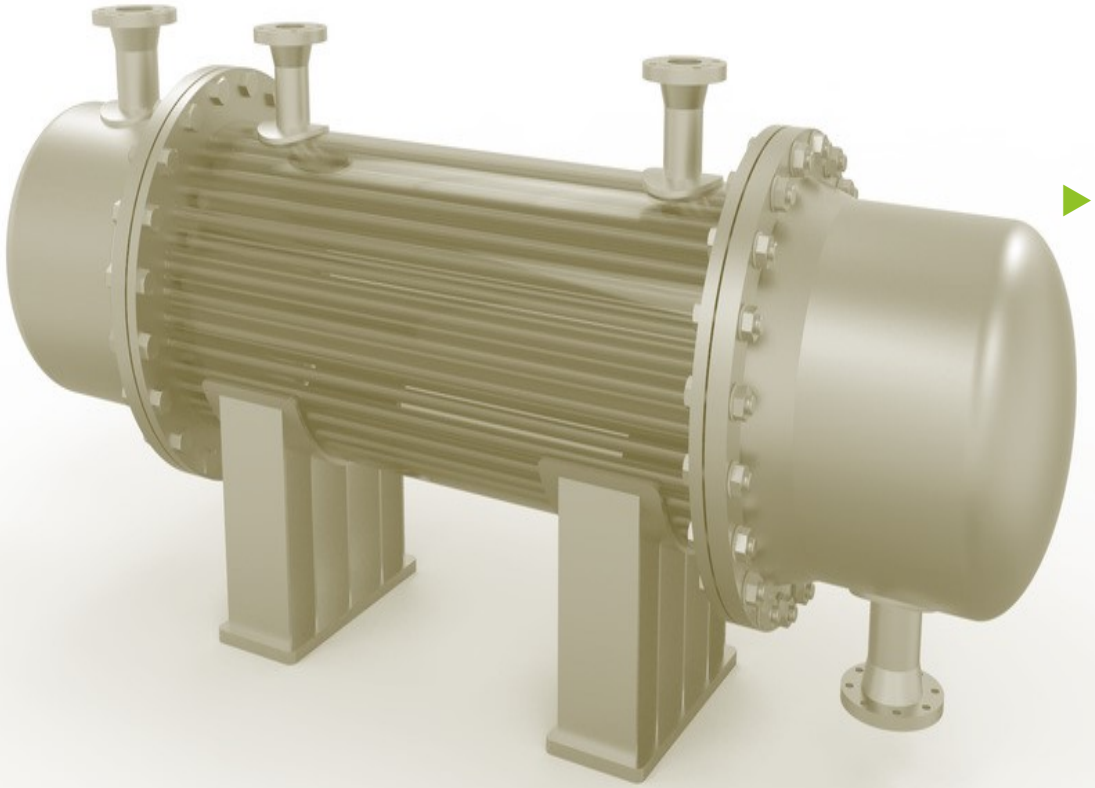
- THE HEATED MATERIAL IS TRANFERED TO THE DISTILLATION TOWER. TOWER HAS THREE MAIN EXIT.
  - BOTTOM EXIT (FOR VR)
  - SIDE EXITS (HLO/LLO)
  - TOP EXIT (HGO)

# HEAT EXCHANGER



- THE PRODUCT TEMPRATURE IS VERY HIGH SFTER THE EXIT OF THE DISTILLATION TOWER. THE TEMPRATURE OF THE PRODUCT IS DICREASED BY HEAT EXCHANGER TO THE STORAGE TEMPRATURE.

# CONDENSORS

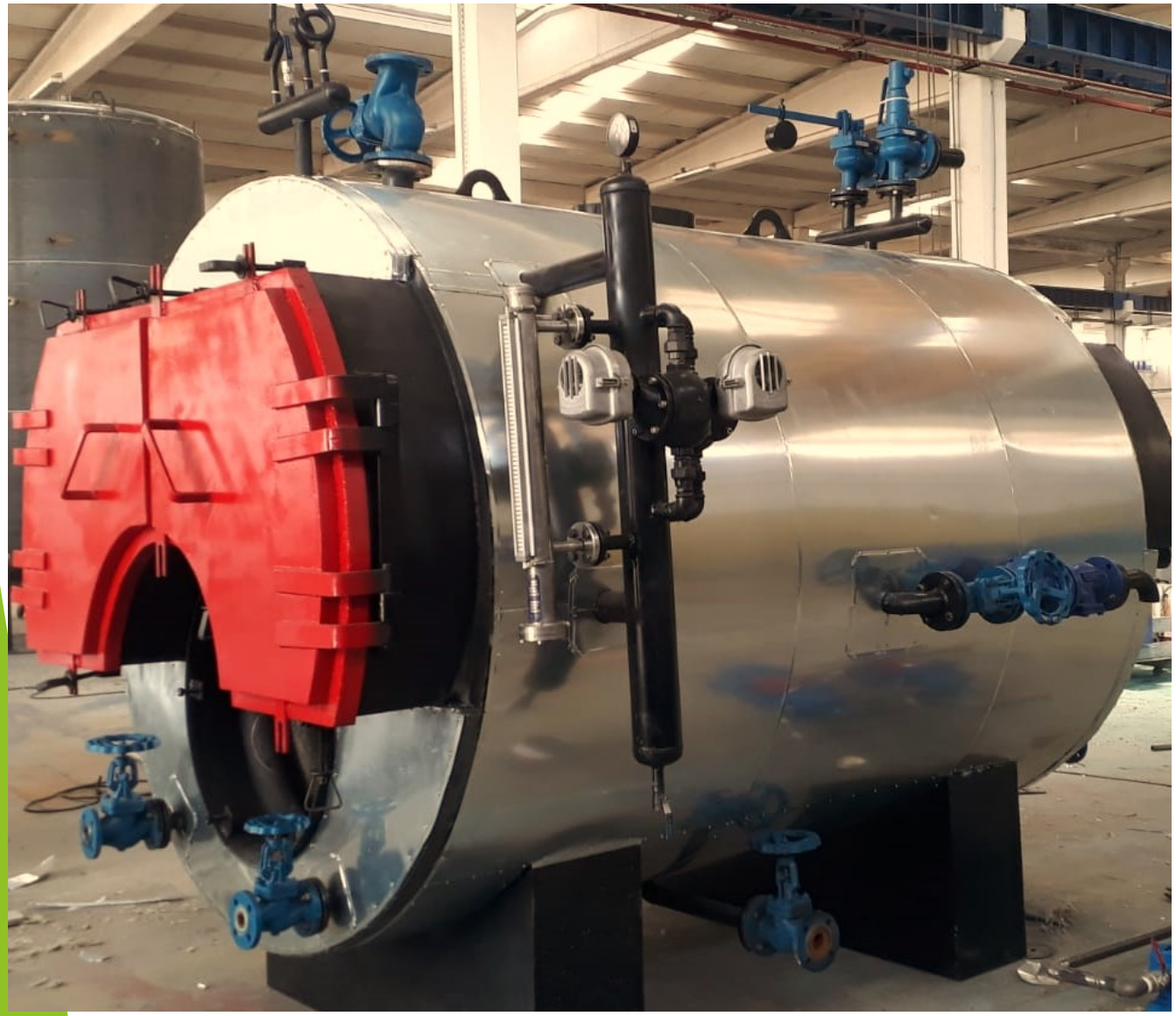


- THE HGO EXITS TO THE DISTILLATION COLUMN IN THE GASE FORM. CONDENSOR IS USED TO TRANSFORM THE HGO IN LIQUED FORM

# COOLING TOWERS

- AT THE CONDENSOR THE WATER USED AS COOLING LIQUID. THIS WATER IS COOLED BY THIS COOLING TOWER

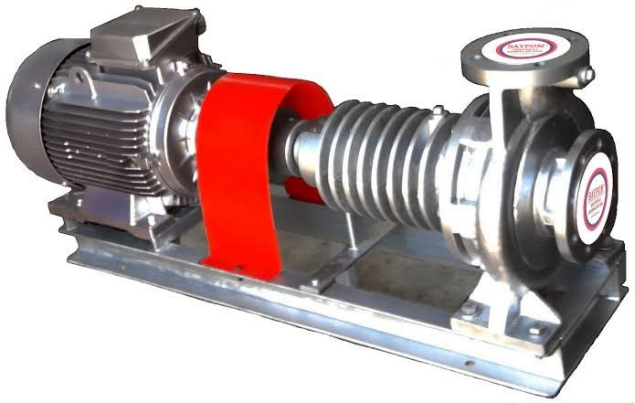
# STEAM BOILER



- STEAM BOILER IS USED TO CREATE THE SYSTEM STEAM. THIS STEAM IS USED IN THE OPERATION AS SUPERSTEAM. ALSO STEAM IS USED TO CLEANING AND HEATING PROCESS IN THE SYSTEM

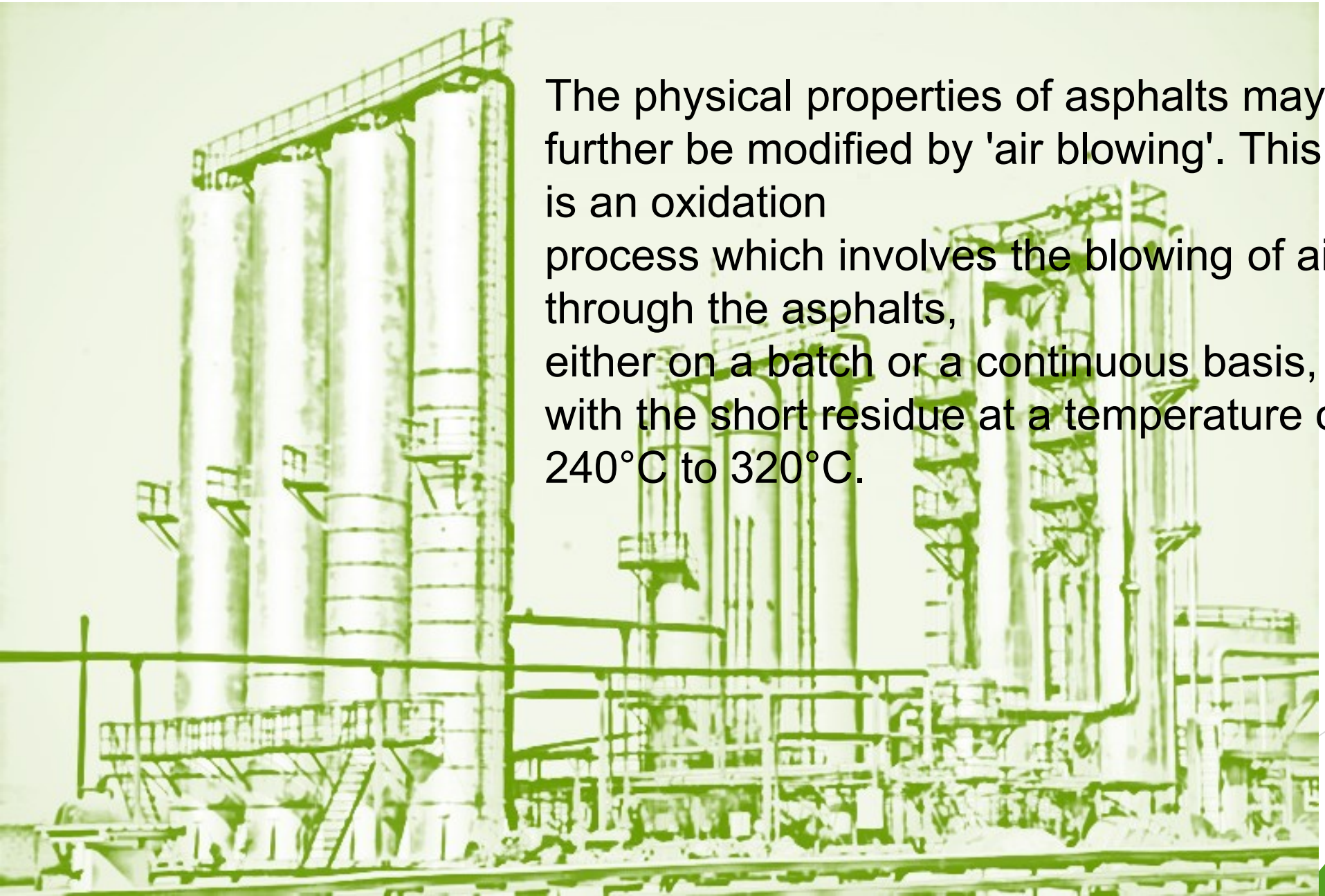
# SYSTEM PUMPS AND BURNERS

- IN THE SYSTEM A LOT OF KIND PUMPS IS USED.
  - VACUUM PUMP-VACUUM BUSTER PUMP
  - GEAR PUMP
  - HOT OIL PUMP
  - CENTRIFUGAL PUMP



# ASPHALT OXIDATION PLANT

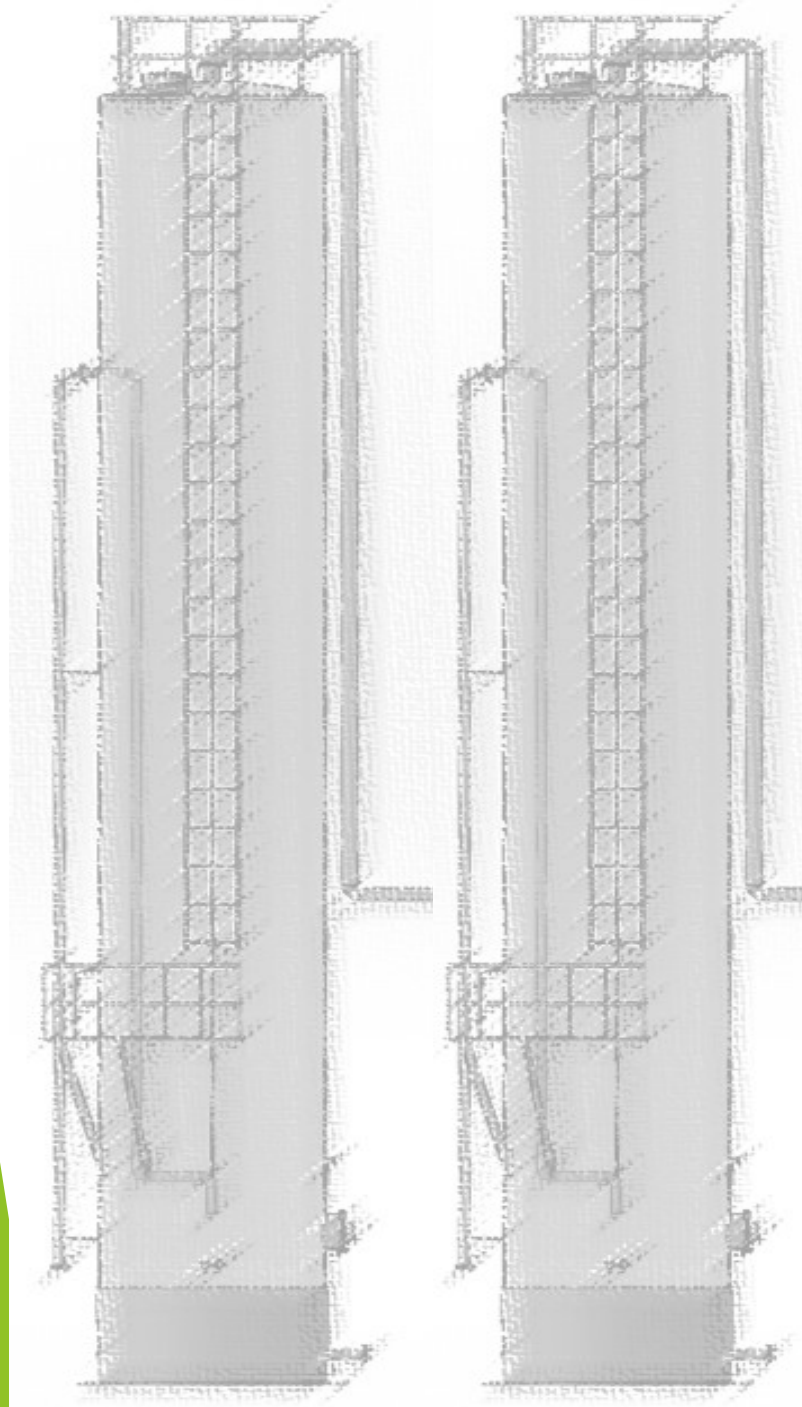
# WHAT IS THE ASPHALT OXIDATION



The physical properties of asphalts may further be modified by 'air blowing'. This is an oxidation
process which involves the blowing of air through the asphalts,
either on a batch or a continuous basis, with the short residue at a temperature of 240°C to 320°C.

# DESCRIPTION OF THE BLOWING PROCESS

- After preheating, the short residue is introduced into the blowing column just below the normal liquid level. Air is blown through the bitumen by means of an air distributor located at the bottom of the column. The air is not only the reactant but also serves to agitate and mix the bitumen, thereby increasing the surface area and rate of reaction. Oxygen is consumed by the bitumen as the air ascends through the material. Steam and water are sprayed into the vapour space above the bitumen level, the former to suppress foaming and dilate the oxygen content of waste gases and the latter cools the vapours to prevent after-burning. The "blown" product flows from the bottom of the blowing column into a surge drum via an external draw-off line. In this way the minimum level of product in the blowing column is controlled

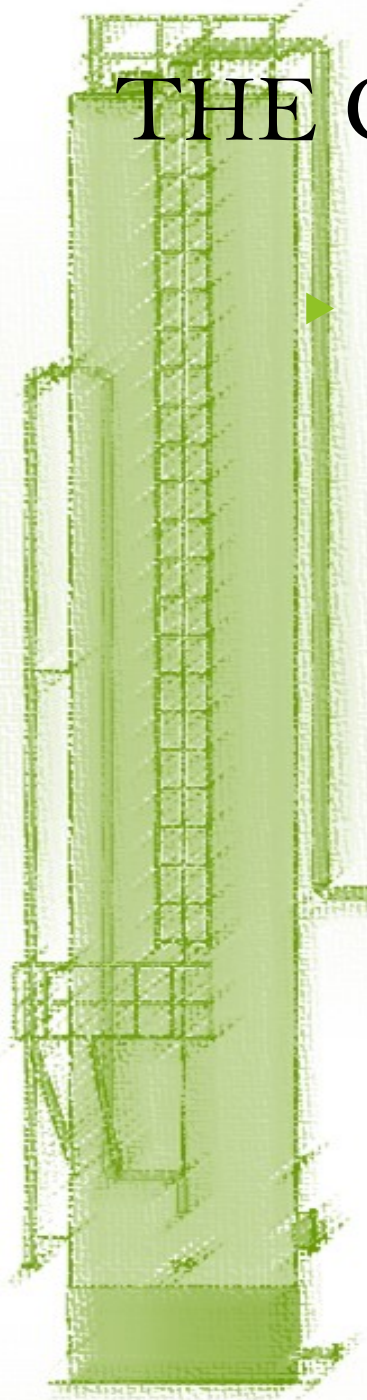


# DESCRIPTION OF THE BLOWING PROCESS

- Description of the blowing process ;

*the viscosity of the feedstock
* the temperature in the blowing column
* the residence time in the blowing column
* the origin of the crude oil used to manufacture the feedstock
* the air-to-feed ratio

# THE CHEMISTRY OF THE BLOWING PROCESS



- The aim of the blowing process is theformation of asphaltenes. Three phenomena can be identified:

* Reactions during which the size of the molecules increases; formation of esters is particularly important; they not only account for about 60% of the oxygen in blown bitumen but also link up two different molecules and thus contribute to the formation of material of higher molecular weight; this mechanism results in an increase in the asphaltene content and a change in the colloid-chemical constitution and rheological properties of the bitumen

* Reactions during which the size of the molecule is unchanged; formation of cyclic hydrocarbons by means of dehydrogenation with H2O as a side product

* Reactions during which the size of the molecule decreases; separation of side branches from the molecules with blown distillate produced as a side product.

# THE PROJECT THAT WILL BE APLLIED

- IN OUR SYSTEM WE WILL COLLECTED THE VR (IT MUST BE SUTIBLE TO PRODUCE ASPHALT) FROM LOCAL MARKETING AND WE WILL PRODUCED OXIDATED ASPHALT FROM THAT CRUDE MATERIAL.

OUR CRUDE AND PRODUCT MATERIAL SPESIFICATION WILL BE FOLLOWS;

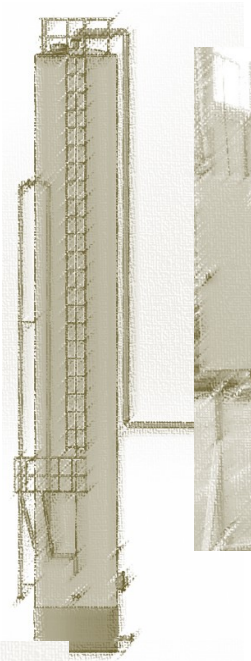
| PROPERTY | UNIT | VR |
|---|---|---|
| Specific Gravity | gr/cm$^{33}$ | 1.0098 |
| Flash Point | °C | >300 |
| Distillation Curve Type | ASTM | D1160 |

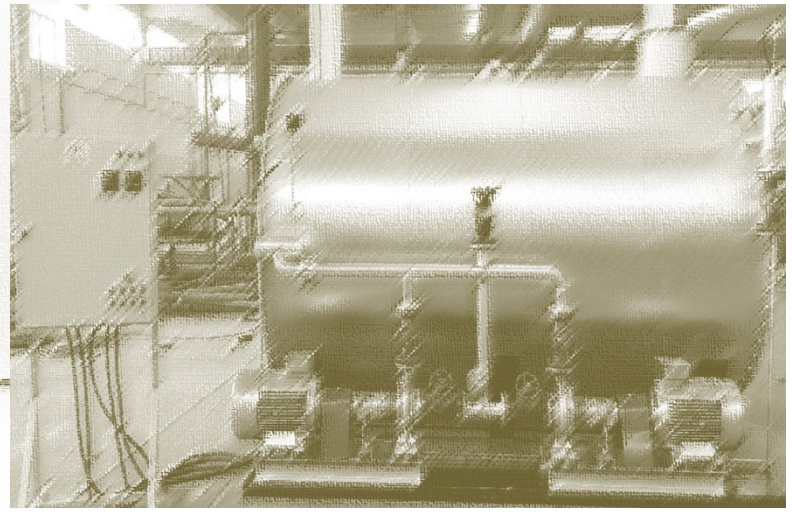
| | ASPHALT GRADE | ASPHALT GRADE |
|---|---|---|
| | 40-50 | 60-70 |
| Flash Point | 240 | 232 |
| Penetration 25dgc 100g 01 mm | 46.6 | 64.8 |
| Ductility 25 Dgc Mın | 100 | 100 |
| Dynamic Viscosity At 60 Dgc | 2000+/-400 | 4000+/-800 |
| Kinematıc Viscosity Cct At 135 Dgc Mın | 211 | 295 |

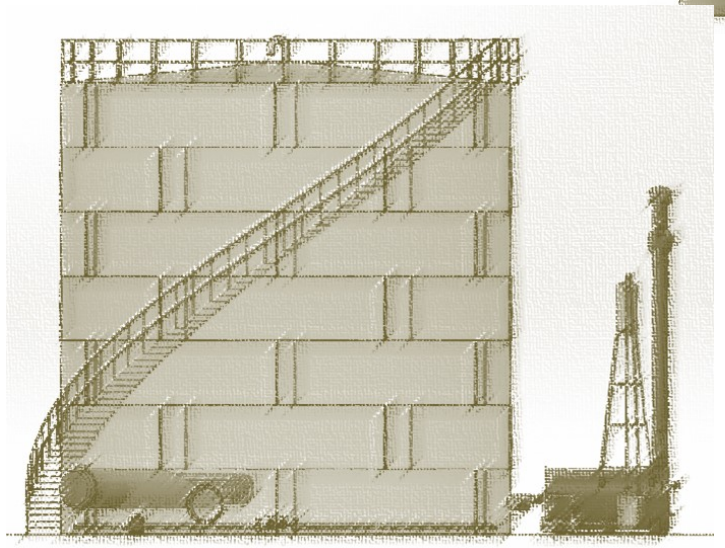
# SYSTEM EQUIPMENTS

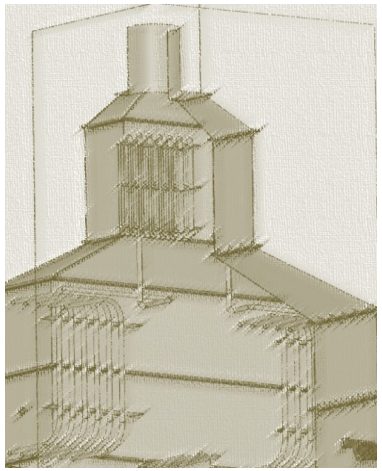
OUR SYSTEM INCLUDES THE FOLLOWING EQUIPMENT

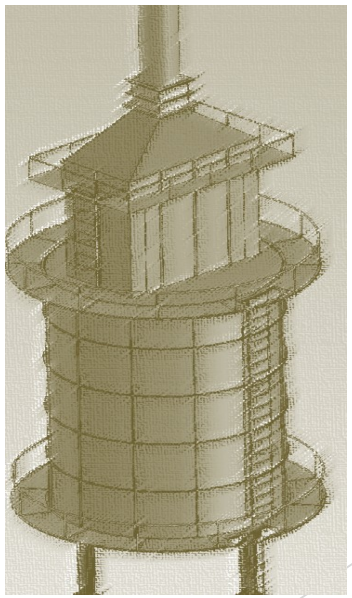
1) OXIDATION TOWER
2) OFF GASE TANK
3) THERMAL OIL BOILER
4) AIR COMPRESSORS
5) SYSTEM PUMPS
6) STORAGE TANKS



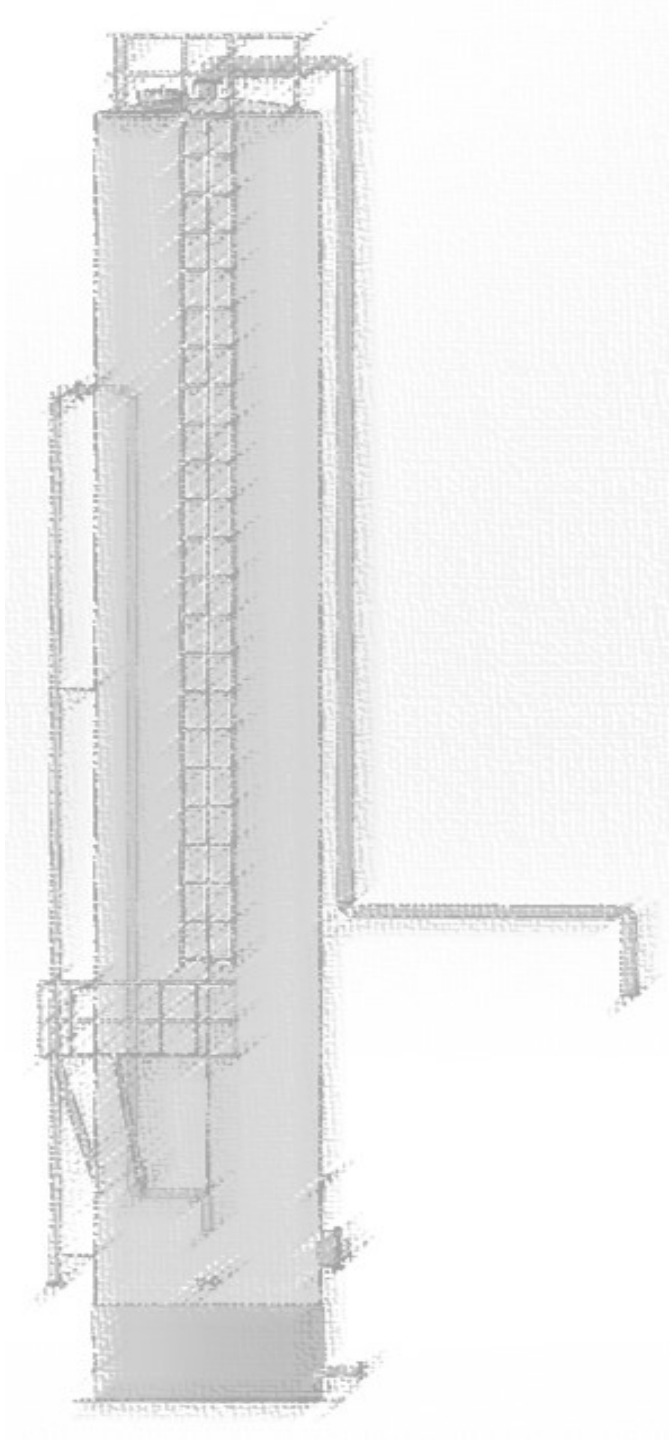








# OXIDATION TOWER



THE OXIDATION REACTION IS OCCURED IN THIS TOWER. TOWER IS MANUFACTURED FOR HIGH TEMPRATURE AND PRESSURE. WE HAVE THREE OXIDATION COLUMN IN THE SYSTEM AND EACH ONE CAPASITY IS EQUAL TO 50 $m^3$.

# OFF GASE TANK

- THIS EQUIPMENT IS USED TO COLLECTED OFF GASES AND SOME AMOUNT OF OIL AND WATER.
- THIS GASES IS BURNED IN A BURNING EQUIPMENT.
- OIL IS USED AS A FUEL FOR THERMAL OIL BOILER
- WATER IS SEND TO THE THREATMET UNIT

# THERMAL OIL BOILER

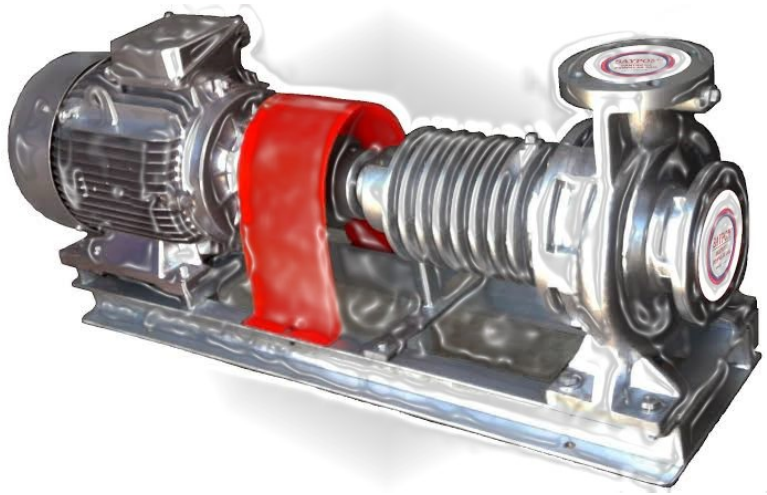

- THERMAL OIL BOILER SUPPLY THE HEAT THAT THE SYSTEM IS REQUIRED. WE CAN HEAT THE SYSTEM PIPES AND OXIDATION TOWER BY THERMAL OIL BOILER

# AIR COMPRESSOR

- AIR COMPRESSOR IS USED TO CREATED AIR WHICH IS USED FOR THE REACTION INSIDE THE OXIDATION TOWER. WE HAVE TWO AIR COMPRESSOR ONE OF THEM FOR STAND BY.

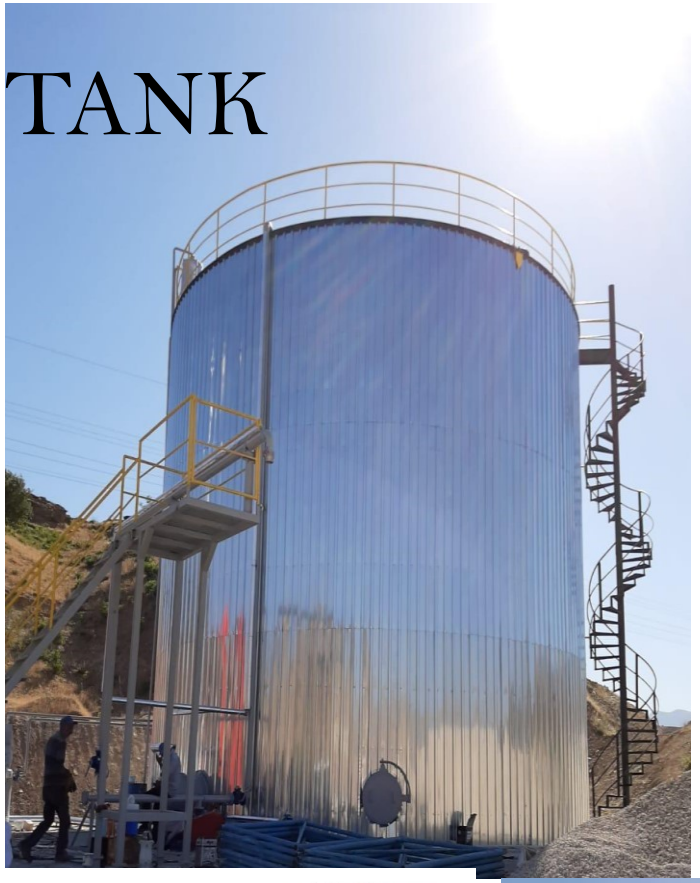
# SYSTEM PUMPS

IN THE SYSTEM WE USE JACKET TYPE GEAR PUMP TO TRANSFER THE ASPHALT AND VR. AND WE USE HOT OIL PUMP FOR TRANSFERING THE OFF GASE TANK MATERIAL



# STORAGE TANK

- IN THE SYSTEM WE HAVE CRUDE MATERIAL AND PRODUCT STORAGE TANKS. THESE TANKS HAVE HEATING COIL BECAUSE OF THE CHARACTERICITY OF THE CRUDE MATERIAL AND ASPHALT



# THANKS FOR YOUR ATTENTION

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