

## What is Oxidized Bitumen?

Bitumens used in a wide variety of 'industrial' applications including roofing, flooring, pipe-coating etc. They are produced by passing air through soft bitumen/flux mixtures under controlled temperature conditions. British Standard grades (BS 3690) are normally designated by two numbers representing the mid-points of their softening point and penetration ranges.

### How to produce Oxidized Bitumen (Blown Bitumen)?

#### Production process:

1. Bitumen heating to 265-270 °C
2. Transferring melted bitumen to blowing towers
3. Blowing air to bitumen
4. Cooling melted bitumen with water
5. Packing

#### The procedures of producing bitumen are as follows:

1. Continuous blowing procedure
2. Discontinuous blowing procedure

These two procedures are done by other two procedures named catalysis and anticatalysis .

Catalysis means adding some chemical material during the process In order to decrease blowing reaction time.

For the following reasons:

- ◆ Ease and simplicity in changing blowing condition and have production with different grades as a result.
- ◆ Ease in generating the unit.
- ◆ Ease in technology and also low expense in investment.

The discontinuous producing procedure is chosen.

#### Technical point and operating conditions are as follows:

- ◆ The blowing should be done from the bottom of blowing tanker. The reaction between bitumen and air is calorific .If the heat produced during the mixture is high, the heat of reaction is controlled by water injection.
- ◆ Admixture of air and the volume of blowing air is two important variants in blowing process. In bitumen producing plant, bitumen 60/70 is usually got by blowing. In this case for making bitumen 90/15 or 85/25 distilled used oil or crude oil should be injected to the product according to the volume 20-25 % otherwise the fragility in bitumen lead to inferior production.
- ◆ Increasing the heating temperature, air injection amount, time and tower pressure increase the speed of production process reaction. The suitable temperature for production operation is 265-270°C which should be controlled not to be ascended since in high temperature and in 288°C intensity of reaction becomes more sever and incontrollable which lead to explosion in tower.
- ◆ The long time stay of bitumen in tower in any condition is not in favor of system and should be delivered to drum or empty tanker after being ready.

◆ If the liquid surface in blowing tower is low, not more than particular limit should be added to the system for the extra air gather in empty parts and lead to ignition nearly. And if the temperature is kept high, the inside heat of tower ascend fast and this issue cause inside explosion and endamage the system.

◆ Blowing tower is filled up to 70%. Air injection is done in 190-232°C. The final point of blowing is specified by sampling and testing of bitumen properties. Finally the temperature of product should be kept 150- 165 °C in order to have loading and packing capability.

### **The production process is as follows:**

The producing operation of oxidized bitumen mainly includes tank loading different steps, bitumen blowing, condenser external gases and packing. So in the beginning the loose bitumen shipped to the plant by tanker is transferred to the raw material store tanker. In order to transfer the bitumen easily to the blowing tower the burner is contrived at the bottom of the store tanker to heat them. It is necessary to say that if the blowing towers are empty, hot bitumen can be uploaded directly to them and blowing operation start.

Since the volume of bitumen increases as a result of blowing and it may overflow, the blowing tower is filled up to 70 %.

Air injection is usually done when the temperature of material reach to 190-230 °C.

For gradual heating and also pipes filling with the air is entered from the top of the tower and at the bottom the bitumen dispread monotonously in phase via nozzle then oxidation is done accordingly and the light molecule, volatile gases and steam are emitted from the top of the tower.

Blowing operation is done in temperature range 215-290°C but the suitable temperature is between 265 to 270°C. The needed heat is provided by burner contrived at the bottom of the tower. The bitumen reaction is calorific so in order to prevent the explosion danger resulted from temperature increasing, the temperature can be controlled by water injection, burner extinguisher and air amount reducing.

Blowing end point is usually signified by sampling from tower and bitumen properties testing. The blowing operation stops when oxidized bitumen reaches to specified properties. After this in order to fix the final point and depolymerization bitumen got in high temperature. It is necessary to be transferred to store after packing and presented to sale.

It is necessary to say that the produced gas and steam entered the condenser through the pipe fixed at the top of the blowing tower. In this stage the bad smelling gases and oily and volatile parts are separated from then transfer to sewage accompanied with water. Other unseparated gas parts is emitted from top of the condenser then transfer to furnace and burned there. After cooling the blowing oven and reaching them to 150-160°C, all the content of blowing oven which is hard bitumen is able to be loaded and packed. Because of the liquid height in blowing tower, oxidized bitumen is transferred by specific gravity and there is no need to use pump. Packing is done in two sections and in 220 liter drum and 35 kg carton. For fast operation (preventing from cooling & hardening) in every section several taps are fixed so that it can fill specific drum and carton with bitumen in same time.