PRODUCTION OF ELECTROWELDED MESH COATED WITH PVC

1. DESCRIPTION OF THE PLANT FOR THE PRODUCTION OF ELECTROWELDED MESH COATED WITH PVC

The plant consists of the following basic components:

Line for loading, reel-off and storage of welded mesh

It consists of a structure (picture 1) on which the roll is placed to allow its reel-off; to facilitate the operations of the roll loading, the structure is also equipped with a waiting point in which the roll is placed while the reel-off of the previous one is completed; a maximum diameter of 1200 mm roll can fit in the structure . The loading operation must be carried out with a suitable lifting equipment (cranes or a pallet truck); loading operations are manual, as well as the junction of two rolls and this must be made with the aid of special clip devices. The line is completed by a storage area (picture 2) in order to facilitate the operator in charge of the loading and the junction of the rolls.

Device for the net stretching

This device (picture 3) stretches the net so that it can maintain the correct position while entering the various sections of the line; the stretching intensity can be adapted to the different mesh types (regarding to the diameter of the wire used and the width of the net and of the mesh).

Bath for the pretreatment with primer

The first phase of the cycle of the mesh coating is constituted by the immersion of the mesh into an aqueous solution of primer; to this purpose there is a bath (picture 4), that has got a roller under which the net slides.

Preheating furnace

This furnace (picture 5) is used to preheat the mesh; here the use of radiant tubes is much quicker and it needs less room in comparison to the use of hot air. The furnace is linked to a natural draught chimney. The control system of the temperature is completely automatic through a PID controller. Each radiant tube has got its own ignition system and flame detection . The radiant tubes are provided with a recovery system to allow energy saving as the combustion air is preheated by the exhaust emissions before their ejection. Moreover, using radiant tubes, inside the furnace you can’t find exhaust emissions because they are channeled into a special separate collector connected to the chimney.

Fluidized bed tank

The fluidized bed tank (picture 6) is completely made of stainless steel: it is the heart of the system for the coating of the net. Before entering the bed, the air required for the fluidization of the bed (given by a specific electric fan unit) passes through a cooling and dehumidification terminal in order to maintain the bed at the right temperature; the tank is equipped with special valves for regulating the flow of fluid in order to allow its adaptation to different working conditions. For the right level of PVC powder, the tank is equipped with an automatic hopper load system controlled by a level sensor.

Dust collection system

The system is composed of a hood of suitable dimensions placed in correspondence to the fluidized bed tank; it is linked through a flange (diameter of 250 mm) to a dust separation system that will guarantee a suction of 3000 m3/ h with air at room temperature.

Oven for the polymerization of PVC

The polymerization oven (picture 7) is made with the same characteristics of the preheating one: here are produced fumes coming from the process of melting and polymerization of PVC. These fumes have to be treated before being discharged into the atmosphere by means of an appropriate facility.

Mesh cooling unit

This device (picture 7) provides for the cooling of the mesh by means of sprays of water; in this section of the plant the PVC coating must reach the suitable temperature to undergo the subsequent manipulations without being damaged. The water used for cooling comes from a closed circuit system (also used to cool the walls of the bed tank, heated by the two furnaces contiguous to it). The circuit is equipped with its own pump unit, two collecting tanks and an evaporative tower apt to maintain water at the proper temperature. Therefore you must provide only for the water that is evaporated. In correspondence to the unit for the cooling of the mesh there is a hood for the capture of the fumes that are produced in the sintering furnace; the hood is equipped with a connecting flange (diameter of 450 mm); the device for the treatment of the fumes will guarantee a suction rate of 10,000 nm3 / h with a fume maximum temperature of 70 ° C at the inlet flange. This device will guarantee the abatement, within the limits of the law, both of the phthalate vapors and of the acid vapors, exhaled during the process of PVC polymerization.

Net towing unit

This device (picture 8) is equipped with rubber rollers for towing the net; in this way the net gets along the plant ; the speed of the line is controlled by regulating the speed of this part.

Unit for mesh cutting

When reached the set length (picture 9), the net is automatically cut off by a pneumatically operated guillotine; this unit is equipped with a system to place the net automatically into the mandrel for winding.

Device for mesh winding

The winding unit (picture 10) is composed of a mandrel whose shaft (with a diameter of 130 mm)is a part of the previous unit. When the mesh roll has reached the set length , the mesh is automatically cut off after allowing the operator to perform the stapling of the roll before its discharge . The discharge of the roll takes place through the central opening of the shaft, so that the roll, fallen on the floor, can be stored by the operator.

Wrapping device

Here (pictures 11-12) each single roll is wrapped by a plastic film.

Plant for fumes suction and depuration and dust suction

The plant has got a waving bed tower in which, with the automatic addition of soda, chlorine is removed from the fumes, and, using the cooling effect of water, phthalates are condensed. Before the use of the tower a cyclone is expected to eliminate most of the dust in order to reduce the drains. Between the hoods and the cyclone is provided a fire damper. There are, in addition, a water treatment plant and an evaporative tower, which can cool the water when needed.

Electrical panel and electrical system on board

The line is equipped with a main electrical panel (picture 10) where there are all the equipments required for the control of the process; a pushbutton for local control is placed at the winder to allow to the operator to carry out all needed operations.

All the electrical equipment is made in accordance with the regulations "CEI"; the voltage of the main power supply is three-phase 380V - 50 Hz; the auxiliary and control system is supplied with 24 V. DC. Automation is done by PLC.

2. FEATURES OF WORKABLE PRODUCTS

The plant is able to perform the continuous coating of galvanized electrowelded mesh with the following characteristics:

• Minimum height of the mesh: 800 mm

• Maximum height of the mesh: 2000 mm

• Diameter of wires of the mesh: from 1.0 mm to 3.0 mm

• Type of steel: mild steel

• Features of the mesh to be treated: the mesh must be packed in big rolls; the maximum expected diameter of the roll must be 1200 mm (using a 1.90 mm wire the average roll will have a net length of approximately 300 m)

Plant performance

The plant is able to work at speeds between 4.0 and 9.0 m/minute, the

applicable speed is linked to the following factors:

• Type of mesh (wire diameter, mesh, width)

• Required coating thickness

Referring to the most widespread type of mesh , that is: • 50x75mm mesh • height: 1,50 m • roll of finished product length: 25m• galvanized wire diameter: 1.90 mm • coating thickness: 0.30 mm , the proposed plant is able to guarantee a working speed up to 6.5m/minute.

3. PLANT TECHNICAL DATA

Power supply:

• Power supply: 380 V - 50 Hz three-phase • Installed power: 60 kw

Natural gas supply:

• Required an availability of supply of about 40 Nm3 / h at a pressure of 600mm

Compressed air supply:

• Delivery pressure: 6-8 bar • Capacity: 80 Nm3 / h

Water supply:

• Pressure: 2 bar • Capacity: 3 m3 / h

• Maximum temperature: 25 ° C

Dimensions:

• Maximum length: 48 m

• Maximum width: 7 m

• Maximum height: 5,40 m

Pictures

picture 1

picture 2

picture 3

picture 4

picture 5

picture 6

picture 7

picture 8

picture 9

picture 10

picture 11

picture 12

Plant for fumes suction and depuration and dust suction

GAS