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BHARAT HEAVY ELECTRICALS LIMITED, JHANSI
(WORKS ENGG. & SERVICES DEPTT.)

VAPOR PHASE PLANT- 2117/2118

The vapour phase drying plants 2117 & 2118 are twin plants for processing of power transformers having common control system and vapour-phasing system with interlinked vacuum generation system. The existing vessels cubicle shaped chambers are suitable to withstand 0.1 mbar vacuum. The door and chamber are connected using Machined flanges (with grooves for O-Ring) on chamber and matching flanges on the door. The chamber has thermal insulation of mineral fibre / wool covered with aluminium sheet suitable to avoid heat loss. Suitable connections to connect other assemblies are provided. The following specification of the existing chambers has been applicable.

- Shape : Cuboid
- Size : 7 M X 4.5 M X 5 M (each vessel)
- Loading : Front Loading
- Door Clamping : Hydraulic
- Door sliding : Hydraulic

The transformers are processed for total moisture removal under vacuum, steam heating and vapour phasing. The vessel is fitted with a steam heating system and vacuum pump sets having following capacities:

TEMPERATURE: 105 -125 DEG. CEN.
VACUUM : 1000 to 0.1 mBAR.

A. DETAILS OF EXISTING SYSTEM.

The vapour phasing drying plants are controlled by the old control system (manual system) consisting of following:

1. Vacuum chambers
2. Vacuum pumping units
3. Steam heating systems.
4. Chilled water circulation system.
5. Compressed air system.
6. Aeration system with air drier.
7. Vapour phasing system through solvent.
8. Solvent heating system.
9. Solvent condensate collection system.
10. Evaporator and condensation tank vacuum generation unit.

All operation and control of vapour phasing drying plants are being done manually through control desk located at the control panel.

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B. DETAILS OF EXISTING PROCESS CYCLE.

VAPOUR PHASE PROCESS CYCLE

Vessel No. 2117/2118

Stage P1/P2

Plant standard: JS0690098,Rev09

Process sequence and critical parameters

1. Preparation/Setting up

- .
- Leakage air pump started.
- Evaporator and condensation system evacuation started.
Evaporator evacuated to 50 torr max and condensation system 30 torr max.
- Heating of solvent in evaporator to 130+-4°C
- Partial Opening of bypass valve between evaporator and condensor
- Solvent vapor pressure > 60 torr
- Return of condensate from collecting tank to evaporator by condensate pump.
- Vacuum Pumps both Started.
- Evacuation of Vacuum vessel starts
- Booster Starts at 200 torr.
- When Vacuum Achieved 7 mbar or 5 torr next cycle (Heating up) Started

2. Heating Up&Drying

- Solvent Vapour inlet valve opens admitting vapor in the vessel. Heating of job Started by solvent vapour.
- The Condenser and the condensate collecting tanks are maintained vacuum at 15-20torr Automatically with help of leakage air pump.
- Vapour returns starts when job temp. reaches 80 degree centigrade and vapour pressure raises to 30-35 torr in the vessel.
- Job temp. reaches at 105-125 Degree centigrade.

- Continuous 6 reading of job temp. of around 105-125 degree centigrade taken at interval of one hour.
- Vessel and door heating by steam continues from heating &Drying cycle till termination of the process.
- Next cycle (pressure reduction) Starts.

3. Pressure Reduction

- Evaporator Heating switched off .
- Vapour inlet of solvent in vessel stopped through closing of valve .
- Reduce vessel pressure up to less then 25 torr by air leakage pump .
- This phase must be terminated when the extraction of solvent condensate stop.
- Nest cycle (Fine vaccum) Starts .

4. Fine Vacuum

- Vacuum Pumps both Started.
- Evacuation of Vacuum vessel starts
- Booster Starts at 50 torr.
- The vaccum cycle should be stopped when the vessel vaccum achieved 0.2 torr max. and rate of condensed water for six consecutive measurements taken at an interval of one hour shall be 30 ML. and job temp. around at 105-125 degree centigrade.

5. Aeration

- After completion of Fine vacuum process, Aeration is to be done manually via dryer, when job needs to be taken out..

Conventional Process

Vessel No. 2117/2118

Stage P1/P2/P3

Cycle

1- Heating Cycle

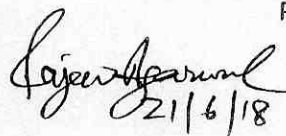
- Job Heating started by steam with the help of steam controlled valve Automatically.
- Job Temp. reaches 105 (+ -) 5 degree centigrade.
- 6 consecutive reading of job temp. around 105 (+ -) 5 taken then vaccum cycle started .

2- Vaccum Cycle

- Vaccum Pump started .
- Booster Start at 50 torr vaccum.
- The vaccum cycle should be stopped when the vessel vaccum achieved 0.2 torr max. and rate of condensed water for six consecutive measurements taken at an interval of one hour shall be 30 ML. and job temp. around at 105(+ -) 5 degree centigrade.

3- Aeration

- After completion of Fine vacuum process, Aeration is to be done manually via dryer, when job needs to be taken out..


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