



### Features

- Demonstration of evaporation in a double-wall pipe evaporator made of glass
- Operation with harmless, special low boiling point liquid

During the generation of vapour, the medium that is to evaporate runs through different flow forms dependent on the heat transfer area. The medium flows into a tube evaporator as a single-phase fluid and exits the tube evaporator as single-phase superheated vapour. In practice, the water vapour generated in big systems is used e.g. for heating plants or machine drives. To design steam generators, it is important to have knowledge of the evaporation process with the boiling crises in order to ensure reliable operation. Boiling crises are caused by a sudden deterioration of the heat transfer, whereby the high heat flux density leads to a dangerous increase in the wall temperature.

Tesca Evaporation Process experimental unit can be used to examine and visualise the evaporation process in its various flow forms. This is done by heating evaporating liquid, in a tube evaporator made of glass. Compared with water, this liquid has the advantage that its boiling point is at 36,7°C (1013hPa), whereby the entire evaporation process takes place at much lower temperatures and a lower heating power. The pressure can be varied via the cooling circuit. Negative pressure (vacuum) can be generated by a water jet pump in the cooling circuit. The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

### Specifications

- Visualization of evaporation in a tube evaporator
- Heating and cooling medium: water
- Tube evaporator made of double-wall glass
- Heating circuit with heater, pump and expansion vessel
- Safety valve protects against overpressure in the system
- Cooling circuit with water jet pump to generate negative pressure (vacuum)
- Evaporation circuit with CFC-free evaporating liquid

### Technical Specifications

- Heater: power rating: 2kW; temperature range: 5...80°C
- Heating and cooling medium: water

Note: Specifications are subject to change.

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- Pump: 3 stages; max. flow rate: 1,9m<sup>3</sup>/h; max. head: 1,5m
- Power consumption: 58W
- Tube evaporator: length: 1050mm; inner diameter: 16mm; outer diameter: 24mm
- Condenser: coiled tube made of copper

#### Measuring ranges

- Pressure: -1...1,5bar relative
- Temperature: 0...100°C

#### Experiments

##### • Observation of typical forms of evaporation

- Single phase liquid flow
- Sub-cooled boiling
- Slug flow
- Annular flow
- Film boiling
- Dispersed flow
- Single phase vapour flow
- Wet steam

#### Effect on the evaporation process by

- Flow rate
- Temperature
- Pressure

#### Requirement in Laboratory:

- 230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase
- Water connection: 500mbar; min. 320L/h; drain

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