

Unistat® 530w

Unistat® 530w cooling a 50-litre Chemglass un-insulated glass jacketed reactor from 20 °C to T_{min}

Requirement

The Unistat 530w is the most powerful of the Unistat 500 range. Powerful at high temperatures, this case study looks at how well the Unistat 530w cools a 50-litre reactor to its low-est possible temperature.

Method

The reactor was filled with 34.5 litre of M90.055.03 as a thermal load. The stirrer was set to 100 rpm and the control set to "Process". The results were recorded using the Huber "SpyLight" software. The HTF (heat transfer fluid) used was DW-Therm (-90...200 °C).

Results

It can be seen from the graphic how quickly the jacket ramps creating a wide difference in temperature between the jacket and process in the initial cool down phase reaching asymptote at -55 °C after 1 hour. The corresponding minimum reaction mass temperature was -53 °C. The test was stopped after approximately 2-hours and the process heated back to 20 °C.

The heat-up rate demonstrates the remarkable level of control with the jacket ramping to 122 °C to pull the process back towards 20 °C.

As the process temperature approaches the target temperature the jacket rapidly cools to approximately 23 °C to bring the process to 20 °C in approximately 40 minutes with no overshoot.

Setup details

Unistat® 530w and Chemglass 50-litre reactor

- Temperature range: -55...250 °C
- Cooling power:
 - 7 kW @ 250 °C
 - 19 kW @ 200 °C
 - 21 kW @ 100 °C
 - 16 kW @ 0 °C
 - 9 kW @ -20°C
 - 3 kW @ -40 °C
- Heating power: 12 kW
- Hoses: M38x1.5, 2x2 m; (# 6657)
- HTF: M90.055.03 (#6259)
- Reactor: 50-litre glass reactor
- Reactor contents: 34.5 litre M90.055.03 (#6259)
- Reactor stirrer speed: 80 rpm
- Control: process

