DISPERSE TECH

Jacketed Tanks and Thermal Shock

Published : 03/04/2015 09:24:00
Categories : Technical

Jacketed tanks/reactors are common place in the chemical industry. Many batch operations in the chemical industry require both heating and cooling at different times in the process. Rapid changes in temperature of the heat transfer media can thermally shock the equipment. Typically, thermal shocking is defined as changing the cooling or heating media at the jacket inlet more than 25 F per minute. Thermal shock can be avoided by tempering the heat transfer media and providing proper venting. Tempering is easiest achieved when a common heat transfer media is used for both heating and cooling. A Temperature Control Unit (TCU) can be used to adjust the temperature of the heat transfer media at a rate that does not pose risk of thermal shock.

While TCU are the simplest means of controlling temperature and protecting equipment many companies still insist on using different media for heating and cooling. Many times this includes steam heat and water cooling. If this MUST be done some minimum precautions should be taken.

1. **HEATING to COOLING:** When changing from steam heating to cooling water one of the following procedures should be followed:
   A. Forced Tempering
   - Vent steam out of jacket and drain condensate.
   - Allow jacket cool down naturally or use compressed air to blow-down the jacket from top to bottom achieve correct temperatures.
   - Close vents and slowly introduce hot water at correct temperature to jacket.
   - Increase flow rate to process conditions and decrease water temperature at a rate less than 25 F per minute.

   B. Natural Tempering
   - Vent steam out of jackets and completely drain all condensate.
   - Allow jacket to cool down naturally to correct temperature.
   - Close vents and introduce cooling water.
2. **COOLING TO HEATING:** When changing from cooling water to steam heating one of the following procedures should be followed:
   A. Forced Tempering
   - Raise circulating water temperature in jacket at a rate less than 25 F per minute until desired steam temperature is reached.
   - Vent jackets and completely drain out water.
   - Close vents and slowly introduce steam into jacket.

   B. Natural Tempering
   - Vent and drain water out of jackets.
   - Let jacket warm up naturally to correct temperature.
   - Slowly introduce steam into jackets at a reduced pressure and/or flow rate (temperature) until desired steam temperature is reached.

As with any manual process, there are risks associated with this.

https://www.dispersetech.com/blog/jacketed-tanks-and-thermal-shock-n11