



Polybed™ PSA Systems for Cold Weather Service

Gas Processing

Cold weather service is defined as temperatures below -29°C (-20°F). For PSA units that operate in environments below -29°C , UOP takes the following considerations into account during design, fabrication, and commissioning.

Protection of the PSA valve and piping skid

Polybed PSA units are designed with either an exposed or sheltered valve skid. If a valve skid is to be operated in cold weather, UOP advocates the following features to ensure proper operation of the PSA unit:

- Heat tracing and insulation
- Special piping, flanges, and valve materials
- Heated individual enclosures for instrumentation

If the valve skid is housed in a heated enclosure or building, UOP will design the valve skid with standard materials and instrumentation. A sheltered valve skid also enhances system reliability and facilitates maintenance. Personnel can work in a controlled environment and do not need to remove the protective insulation.

Protection of the adsorber vessels

Since adsorber vessels are seldom enclosed, the vessels will require insulation in addition to the following metallurgical considerations:

Polybed PSA Systems for cold weather service:

- Are custom engineered
- Are designed for maximum reliability under harsh environment
- Are the result of proven technology and know-how
- Have been in commercial operation for decades

For temperatures

- Down to -40°C , UOP designs the unit with standard plate materials (SA-516 grade 70 carbon steel) with impact testing. Similarly, forging and fitting materials are appropriately upgraded to suit the temperature.



- Below -40°C , UOP designs the unit using standard materials qualified with proper impact testing and heat tracing.

For adsorber vessels that will operate in environments below -40°C and will only be insulated, a warm-up procedure will be required prior to start-up of the unit.

Additional heat tracing & insulation

In order to prevent condensation and freezing of any vapors in the feed, the feed line and bottom of the adsorber vessels are usually heat traced and insulated.

Protection of the surge tank

Polybed PSA designs require heat tracing and insulation of the lower head of the surge tank as well as impact testing for temperatures down to and below -40°C .

Instrumentation

If the valve skid is located in a heated enclosure, UOP provides standard instrumentation.

If the valve skid is located outdoors, UOP uses instrumentation certified for cold weather service or instrumentation installed in individually heated enclosures, or both.

Safe start-up

A PSA unit in a cold weather environment requires a special start-up sequence. UOP has developed proven and safe techniques for such service.

These start-up procedures establish a vessel temperature set point that is monitored with thermocouples. Above the set point, the unit start-up uses the standard procedure. Below the set point, a procedure to preheat the unit to the temperature set point is required. Depending on several variables, the preheat step may use feed gas or heated nitrogen.

Commercial experience

UOP has supplied over 50 PSA units for cold weather service during the past two decades for a cumulative operating experience of over 400 years. The majority of valve skids are not installed in heated enclosures. Several units originally had their valve skids outdoors, but enclosures were added after the first harsh winter.

Coldest design temperature

The coldest ambient temperature of an operating Polybed PSA unit is -51°C.

For more information

For more information, contact your local UOP representative or our Des Plaines sales office:

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<i>Country</i>	<i>Units in Cold Weather Service</i>	<i>No Shelter Provided</i>	<i>Shelter Provided for</i>	
			<i>Skid</i>	<i>Skid and Vessels</i>
Canada	19		18	1
US	8	6	2	
FSU	5	5		
Europe	<u>21</u>	<u>21</u>		
Total	53	32	20	1

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