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### Design pressure of Vacuum pump

**SUBATHRA (MIE)(AMIChemE)**  
Sr.Process Engineer

What is the Design pressure for Liquid Ring Vacuum pump and Ejectors in Water Injection system.

Design pressure is mentioned as 3.5 barg/FV and vendor is requesting for change of design pressure from 3.5 barg/FV to FV (for pump) and 1.0 barg/FV for ejector.

Pump and Ejectors are hydrotested at 2 barg .

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**Saeid R. Mofrad**  
Principal Process Engineer at Petrofac (P.E.)  
Top Contributor

It is hard to answer the question without knowing about actual system arrangement, location of SDV, design pressure of de-aerator, isolation valves between ejector and pump, and pump discharge to atm (if any).

There are lots of details to review and decide the correct design pressure. For example check if ejector motive gas can pressurize the system. Can vacuum pump discharge be blocked? Check project design criteria if there is any clause for low pressure systems? What is the vacuum pump seal water operating pressure and design pressure?

Vacuum pumps are usually liquid ring type. There is a liquid (usually water) sealing connection to the pump casing. The discharge of the vacuum pump is a mixture of liquid and gas. So, the static head of discharge line might be important in design pressure calculation.

I assume that:

- The de-aerator is designed for 3.5 barg with PSV connected to atm.
- There is SDV between de-aerator and vacuum system,
- There is no valve at the discharge of vacuum system to atm.
- Seal water operating pressure is much lesser than 1barg.

With these conditions, 1.0 barg/FV may be acceptable. However, the minimum design pressure I have seen so far for such system is 2.0barg/FV.

I don't think you can take credit of system being hydrotested at 2.0 barg to proof the integrity of the system. All process piping and vessels are hydrotested at 1.5 times of the design pressure but there is no mention of it as far as process safeguarding and overpressure protection is concerned.

Delete • December 11, 2012



Wilfredo

**Wilfredo Garcia**  
Process Specialist at Ecopetrol

Dear Subathra,

The minimum positive design pressure I have seen in all the projects I have worked is 50 psig. Obviously, this system have to be designed for FV too.