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## PSV connection at the pump discharge line highest point

**Amir Mofidi**
**Sr. Process Engineer at Wintershall**

In a project that I am currently working high pressure pumps will be used to inject the deaerated water to a gas producing well. There has been some discussion about two below points in the project team that I would like to ask for the group members to share their ideas.

1) Due to some piping constraints, the discharge PSV connection can not be made at the highest point in the pump discharge. I am wondering if connecting the PSV to the highest point of the line is must or it can be compromised.

2) Before start-up of the pump, the system shall be flushed with nitrogen in order to remove any oxygen from the system. Thereby, after start-up, there will some vapor trapping in the highest point. Now the question is that do we need to vent this trapped vapor (nitrogen), if we want to drain the system after shut-down. If so, can we consider a vent valve connection at the highest point?

Thanks



Comments

9 comments

Mojtaba

**Mojtaba Habibi**
**Process Engineer at Wood Group**
**Top Contributor**

Dear Amir,

Which type of pump is this? Please provide more data about pump flow rate and head and also PSV set pressure and governing case.

For your second point as you know based on API standard every pump needs vent connection unless the pump is self venting. For self venting pump the high point vent connection should be provided at discharge side.

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jery pugel

**jery pugel ST.**
**Mechanical Engineer at PT. Ell**

I do agree with Mr. Habibi.,, PSV will be install according to pressure rating so we need to know the pressure at that point.

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Amir

**Amir Mofidi**
**Sr. Process Engineer at Wintershall**

Mojtaba, thanks for your input. The pump is a piston type pump with a discharge pressure of about 550 barg.

Regarding the vent at high point, I always had the impression that it is only required for hydro test. For what other reasons the vent at point might be used? and in which API it has been mentioned?

Thanks,

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Mojtaba

**Mojtaba Habibi**
**Process Engineer at Wood Group**
**Top Contributor**

Dear Amir,

As per section 5.4.3.10 of API 610:

" All pumps shall be provided with vent and drain connections, except that vent connections may be omitted if the pumps is made self-venting by the arrangement of the nozzles. As a guide, a pump is considered self-venting if the nozzle arrangement and the casing configuration permit sufficient venting of gases from the first-stage impeller and volute area to prevent loss of prime during the starting sequence"

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Amir

**Amir Mofidi**
**Sr. Process Engineer at Wintershall**

Thanks again Mojtaba for your feedback.

Do you have any idea about the necessity of installing the PSV in the discharge line at high point?

Thanks

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Mojtaba

**Mojtaba Habibi**
**Process Engineer at Wood Group**
**Top Contributor**

Dear Amir,

My 2 cents:

If you can not resolve piping constrains, then you can go ahead and provide low point drain at PSV discharge line and check the effect of back pressure due to liquid head at discharge (for your case because of high injection pressure I expect there should not be any problem with back pressure issue)

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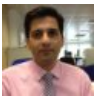

**Saeid Rahimi Mofrad**
**Senior Specialty Process Engineer at Fluor**

'1) I don t see why the relief valve should be at high point. The correct location for a relief valve at the discharge of the reciprocating pump is very close to the pump discharge nozzle (upstream of all discharge isolation valves). This is because the relief valve is to protect the system against Blocked Outlet and inadvertent closure of any valve at discharge can be cause over-pressure.

In general putting the relief valve at high point is a common piping practice (not a process requirement) because relief valves discharging to flare header should be anyway above the flare header, so taking the connection from the piping high point (or a point closed to the place where relief valve is installed) will reduce the length of relief valve inlet line (to save few meters of pipe).

2) You need high point vent at the pump suction line (if there is any high point) and pump casing if the pump is not self venting. A high point vent should be provided at pump discharge line, if there is any high point before discharge isolation valve. But, the small amount of nitrogen on the discharge pipe (beyond the pump isolation valve) should not create any problem.

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Fiethamelekot Emun Temeliso likes this

Amir

**Amir Mofidi**
**Sr. Process Engineer at Wintershall**

Saeid,
Thanks.

Yes indeed, the only requirement for PSV at pump discharge is that it should be installed before any means of blockage in the line. It was also a strange request from our client to install the PSV at high point.

Mojtaba,

The specified design code for our pumps is API-647. I did not find any statements in this API with regard to vent requirements.

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**Saeid Rahimi Mofrad**

**Senior Specialty Process Engineer at Fluor**

For a reciprocating pump, it makes sense not to see any casing vent requirement in the respective API. There is no high point in the pump casing where the gas can be accumulated.

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