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### About Designing an Explosion Proof Flare System Technical Paper

**Mojtaba Habibi**

Process Engineer at Wood Group

Dears,

Following to publishing Designing an Explosion Proof Flare System technical paper at [www.chemwork.org](http://www.chemwork.org) on 2013 April the 30th I would like to discuss about following issues:

1. If flare network design is based on explosion case with minimum design pressure of 7 barg (as an alternative to flare network with lower design pressure+purge gas injection+consideration of water seal drum) then do still we need to inject purge gas to flare network?
2. How about detonation case? I read at some resources that the resultant pressure due to detonation case can be higher than explosion case.

Best,  
Mojtaba

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**S M Kumar**

Process Design Consultant

Hello Mojtaba: Still active.

S M

Almost one year ago, we discussed the same or similar topic <http://lnkd.in/tNjmK>.

Couple of old references and API section 7.3.2.4 of API 521 suggest a minimum design gauge pressure of 345 kPa (50 psi) in subsonic flare or low-pressure service that usually operates in refineries in the range of 0 to 34 kPag (0 to 5 psig), to withhold deflagration based on stoichiometric hydrocarbon-air mixtures that can produce peak explosion pressures on the order of seven to eight times the absolute operating pressure. This got extended to 150 psig (1050 kPag) for HP Flare systems wherein the operating pressure may range from 10-25 psig.

If you read my response to that query "One is design and the other is operational. One can not replace the other". Just because you design a system for a potential scenario without purge, you don't stop purging. You don't want bang-bang now and then. Layers of protection. Just because a vessel is designed to 15 bar, you don't remove its PCV that maintains the desired operating pressure. Clear?

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**Mojtaba Habibi**

Process Engineer at Wood Group

Dear Mr.Kumar,

Mojtaba

Nice to read your valuable viewpoints after a while. Many thanks for your time and help.

I reviewed your points at other query and fully understand your idea. For this special case (purge gas injection into flare network), I am thinking from cost saving perspective this can be attractive

to stop purging of fuel gas or nitrogen provided that flare system is explosion proof.

Let me know your idea..

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**S M Kumar**

Process Design Consultant

Mojtaba: Please read the last message again.

S M

Just because you design a system for a potential scenario without purge, you don't stop purging.

Just because you have PSV, you don't remove the PAHH or PCV

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**Saeid Rahimi Mofrad**

Senior Specialty Process Engineer at Fluor

Top Contributor

Injection of purge gas is the minimum you can do to prevent the ingress of air into the flare/vent system. The question about minimum design pressure of flare system was raised when some of the operation companies decided to eliminate the liquid (mainly water) seal drum from the relief path due to some operational problems (mainly corrosion). Therefore the alternative of increasing the design pressure of flare system was introduced. I mean they still purge the flare system with or without water seal drum.

Beside this, there are facilities at which purge gas (nitrogen in particular) is not available. For example I am working on an unmanned offshore platform where the vent system does not have any continuous purge. It is only purged when the platform is manned.

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**Arun kumar**

Senior Process Engineer at Saipem

Arun

Mojtaba H if you intention is to reduce cost, why don't you ... check the availability of other inert gases which can be purged. like a exhaust stream .. which can be routed through it, however it would require some extra equipments like a cooler and additional instrumentation... It's a novel way .. but you will have to clearly check, the gas purged.

More over i totally Agree to SM Kumar Advise, To add to that 7 barg design pressure can also withstand vaccum created in the system. for this reason we state 7 barg.

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**Saeid Rahimi Mofrad**

Senior Specialty Process Engineer at Fluor

Top Contributor

Mojtaba,

This is about the second part of your question. The detonation can create very high local pressure (differential pressure or shock wave) within a short time, strong enough to permanently displace the pipes, damage the instruments and flare KOD internals. Read more about detonation in NFPA 68 and 69. As far as I understand flare system meets the detonation requirements.

7.0 barg design pressure ensure the mechanical integrity of the system but having detonation (even deflagration) wont be a damage free event. Therefore, it should not be allowed to happen every because of saving purge gas. In short, for flare systems without liquid seal drums, the minimum design pressure of 7.0 barg and continuous injection of purge gas at appropriate rate is essential.

you can use purge gas reduction seals to reduce the purge gas requirement.

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