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Double solenoid valves in shutdown systems

Karthikeyan Balan

Process Safety and Risk Management Consultant -Chemical Process Industries

I have come across a modification done in house by some companies to solve the problem of solenoid valve failure and false trip. The modification is as follows: Let us say there is a shutdown valve connected to a trip system. Due to frequent problems with a single solenoid valve that causes spurious trips by cutting off instrument air to the shutdown valve, dual solenoids in series are provided. I would like to know if this is an accepted design practice. Thanks.

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7 comments



Azhar

Azhar Ali

Process Professional at Aker Engineering Malaysia

Yes, we've implemented double solenoid valve for the blowdown valves in the offshore platform in Malaysian waters as requested by our client Newfield (USA). This is to solve that problem.

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Karthikeyan

Karthikeyan Balan

Process Safety and Risk Management Consultant -Chemical Process Industries

Thanks, Azhar!

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Saeid Rahimi Mofrad

Senior Specialty Process Engineer at Fluor

SOLENOID VALVE FAILURE ON DEMAND: Two solenoid valves (XV) on the air supply line to blowdown valve are in SERIES and to make sure that BDV opens on demand (depressuring command). In this case, if one XV fails to cut the air, the other one does the job (causing the FO BDV to open).

SOLENOID VALVE FAILURE IN OPERATION: The application Balan is talking about is different because the failure of XV during normal operation has resulted in an unwanted closure of the shutdown valve (SDV). In this case, two XV's in PARALLEL may be required so that if one XV fails (closes), the other one can supply air to the FC SDV (to keep it open).

Am I right? Balan can you please confirm...

The BDV configuration is quite common but I have not seen the SDV with the mentioned arrangement so far.

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Azhar

Azhar Ali

Process Professional at Aker Engineering Malaysia

Oh yeah, I forgot to mention also that selected critical SDVs are also using this "dual coil / solenoid" type solenoid valve. They are the production separators inlet and crude outlet, and gas/crude export launchers to pipeline.
Thanks Saeid for pointing that out.

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Amarnath

Amarnath S
Senior Process Engineer

Based on UOP specification, double solenoid valves are added for the SDVs after conducting SIL study. If the SIL level is specified as 2, UOP suggests to provide two solenoid valves. For critical loops, that causes trip of an heater, where SDV in the fuel gas line is classified as SIL 2 category. These SDVs are provided with two solenoid valves.

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Karthikeyan

Karthikeyan Balan
Process Safety and Risk Management Consultant -Chemical Process Industries

Gentlemen,
Thank you for your comments. Saied, thank you for pointing out the error in my statement. You are right by saying it is for "SOLENOID VALVE FAILURE IN OPERATION": (two XV's in PARALLEL).

My question is there another alternative to prevent these spurious trips?
Thanks once again

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Azhar

Azhar Ali
Process Professional at Aker Engineering Malaysia

Balan / Saeid,
The "dual coil" or "dual solenoid" type solenoid valve (XV) that we implemented was actually a single XV fitted with dual coil (one valve with two [or dual] coil type). Since one of these solenoid/coil can fail/burnt-out (due to continuously always being energized 365days a year), the other coil/solenoid will still hold the valve (XV) open to maintain continuous air supply to keep the SDV open.

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