PENFLEX

ENGINEERING BULLETIN #130

Considerations for Duplex or Steam Jacketed Hoses

End users sometimes have requirements to maintain a media at an elevated or cryogenic temperature while also needing the flexibility and corrosion resistance of a flexible metal hose. To achieve this dual-purpose hose a Duplex or Jacketed Assembly is an option to consider.

A jacketed assembly is a hose within a hose where internal media temperatures are controlled by an intermediate layer with a heat or cooling feature. Often steam is used as a heating agent, hence the term “Steam Jacketed Hose,” but the heat could come from a number of sources. In addition, the same concept can be used to cool down or isolate an internal media, such as is the case in a vacuum jacketed hose.

Whether steam jacketed hoses are used to conduct media needing to be kept hot or cold during transfer, or in instances where containment of media within the inner hose is critical, additional testing and analysis may be in order if external pressure exceeds internal pressure.

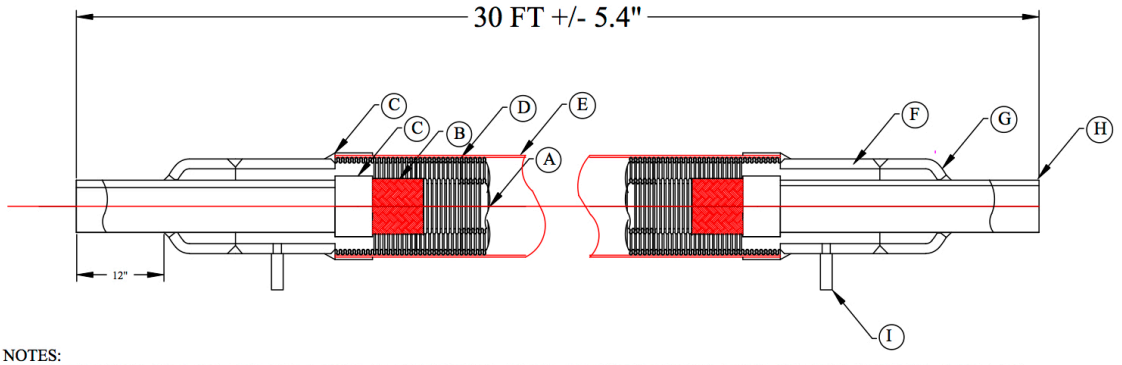
The consequence of building an assembly with such a difference in pressures as outlined above could result in buckling of the inner hose. This could then lead to failure. With this in mind, we would recommend designers avoid a scenario where the pressure of the outer hose exceeds that of the inner hose.

Beyond concerns around buckling, if the inner hose has a higher internal pressure, how can one be sure it will elongate to ensure the braid in which it’s encapsulated goes into tension, critical for it to perform its function as a pressure vessel?

If the pressure of the inner hose should exceed that of the outer hose, couldn’t the outer hose be stronger structurally so that the force needed to elongate it will be higher than the force exerted on it by the internal pressure of the inner hose?

A critical assumption for any catalog pressure rating for braided metal hose is that the hose must be able to elongate enough to put the external braid wires into tension. This will not happen if there is net external pressure.

See drawing below that demonstrates the standard design concepts of a duplex assembly.



NOTES:

1. 1-1/4" OUTER HOSE IS CATALOG-RATED AT 1776 PSI MWP AT 70F. MAINTAIN BEND RADIUS GREATER THAN 10". CATALOG INSTALLATION INSTRUCTIONS APPLY.

2. METAL HOSE ASSEMBLY FABRICATED USING DIRECT FITTING ATTACHMENT METHOD IN ACCORDANCE WITH NAHAD CORRUGATED METAL HOSE ASSEMBLY SPECIFICATIONS. HYDROSTATIC LEAK TEST AT 2664 PSI.

3. DRAWING NOT SHOWN TO SCALE.

COMPONENT	DESCRIPTION	
A: Corrugated hose	Penflex 816-008: 1/2" 316L heavy corrugated hose	1/2" inner - 1-1/4" outer Jacketed Hose Assembly
B: 2 layers of SS braid	Penflex 1SHB-008 304 braided braid 24 x 7 x .020- 2 layers	
C: SS braid ferrule	304 band-type retainer ring each end	DATE
D: Corrugated hose	Penflex 816-020: 1-1/4" 316L corrugated hose	
E: 2 layers of SS braid	Penflex 1SHB-020 304 braided braid 48 x 6 x .025	
F: SS pipe	1-1/4" sched 40 pipe 316 Stainless steel	
G: SS pipe fitting	1-1/4" sched 40 pipe cap 316 Stainless steel	
H: SS tube	1/2" tube (.065 wall) 316L Stainless steel- (flared as req'd hose end)	
I: SS fitting	1/2" Sched 40 316 SS male NPT port	

Please contact us at sales@penflex.com if you have further interest in this topic.