Cooling unions from Practice to Principle and back.
Or
How not to damage a cooling union

Ian

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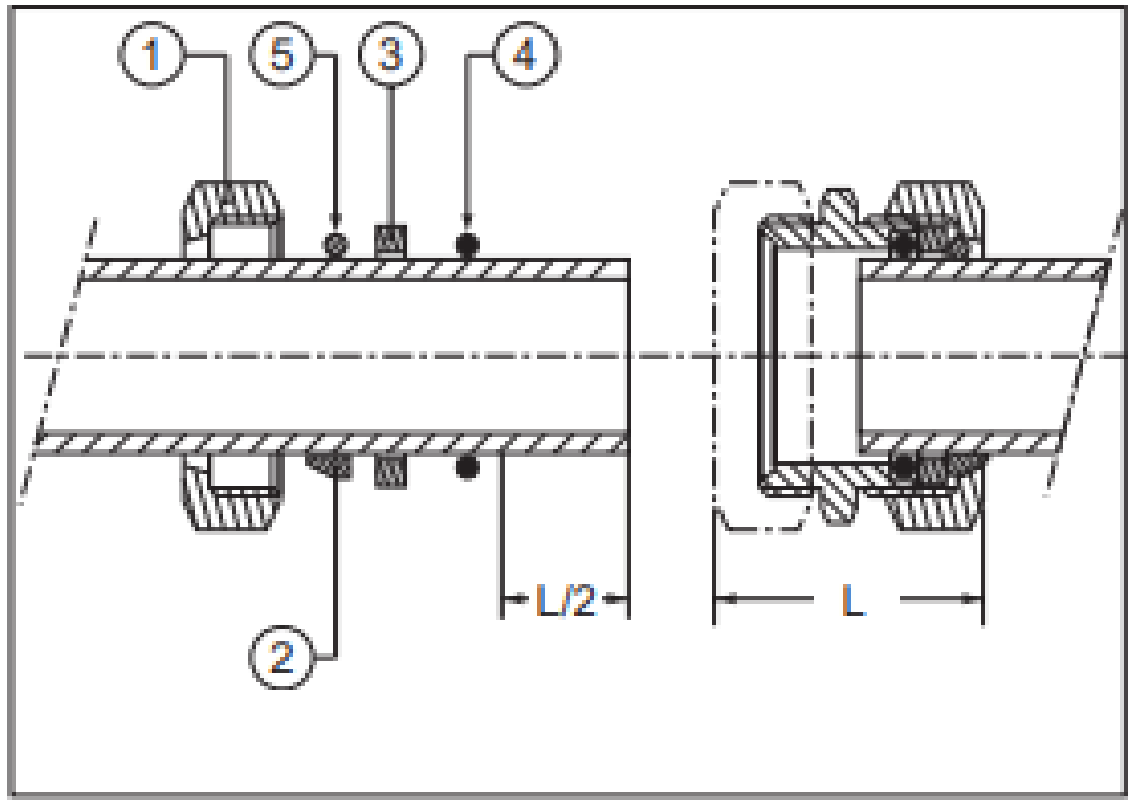
The fluid union has similarities in conception to an electrical connector, namely the conduction of the medium and the mechanical retention (strain relief) of the supply conduit .

Both must be met.

In this case a leak tight joint AND a clamp sufficient to secure the pipe in the union against the pressure of the fluid (water).

VEBEO union from CERN gas group
Using Oring (4) and clamp (2)
The o-ring is directly on the pipe



- nut reference ①
- split tapered ring or round-ring reference ②
- washer reference ③
- o-ring reference ④

So what is special about the O ring seal technology

Figure 6-1.

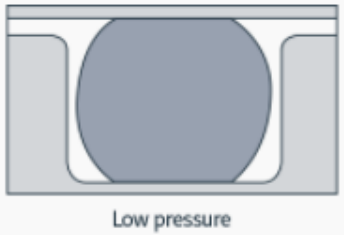


Figure 6-2.

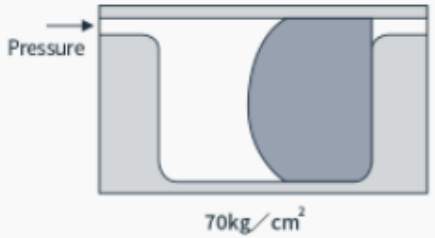
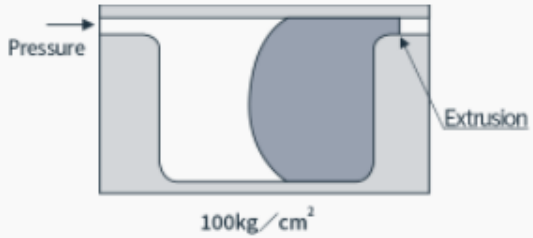
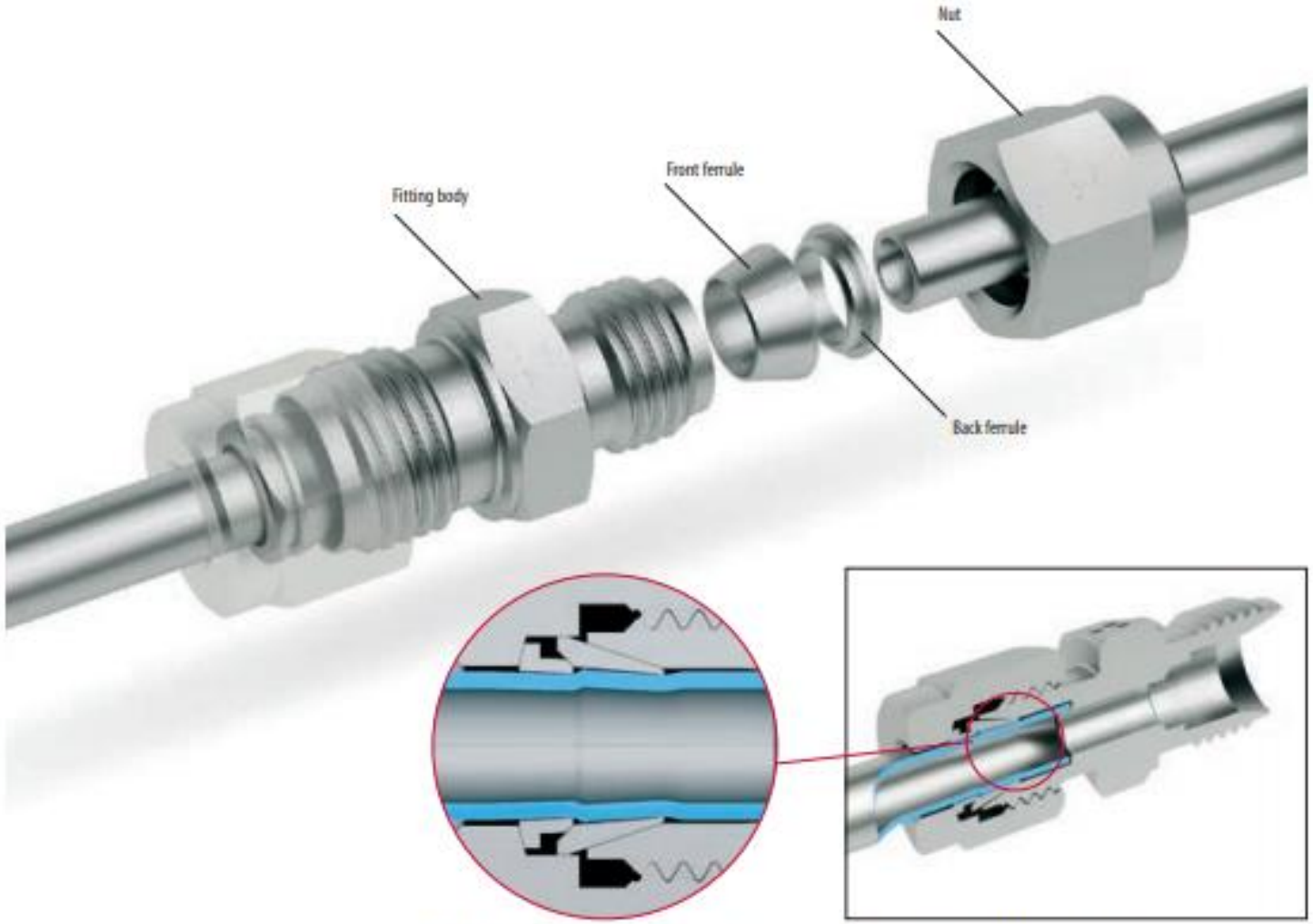


Figure 6-3.



The union becomes more leak tight the more the pressure difference increases. Tightening the union does not improve the sealing only the pressure as the o-ring is squeezed into the gap, as shown above.

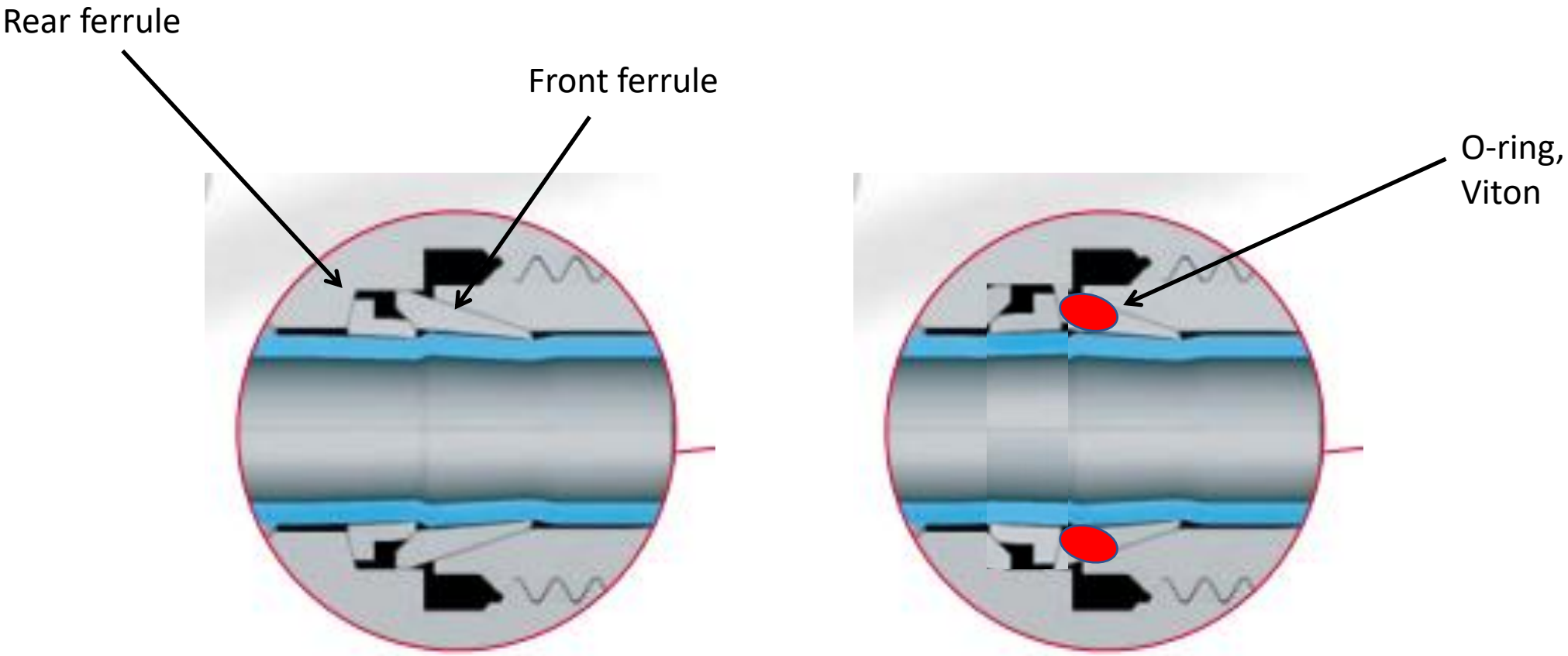
Double ferrule union Swagelok or Sagana, shown here



Tightening the nut exerts radial compression around the tube in two places creating an exceptional grip – able to withstand very high working pressure – and vibration.

Easy to install: just insert the tube and tighten

Integrate the Vebeo technology into the Sagana/Swagelok union



1st Turn the back ferrule around to provide a “flat” pressure plate to the o-ring.
2nd Exchange the front ferrule for the o-ring.
3rd Tighten by finger.

What was done .

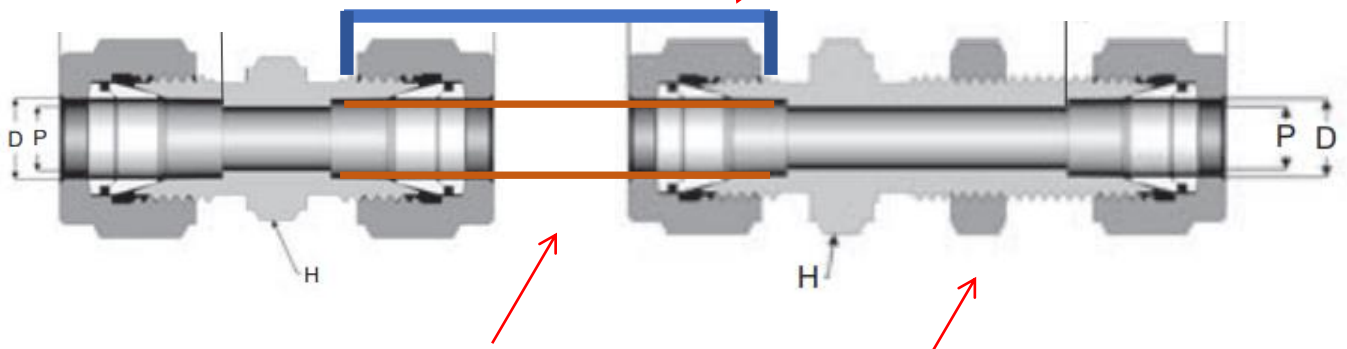
A standard Sagana union, I did not have a Swagelok, was used for the trial

The pieces were exchanged as described above

The assembly was connected to an Argon bottle and the pressure increased incrementally until the pipe began to move out of the union between 8 – 10 Bar.

Possible solution for the pipe creeping out from the union

Applied pressure



Conclusions

The union is operable for water cooling of FEBs.

The unions are not damaged as the nut is finger tight on the outside of the union body and the o-ring is an elastomer (Viton) that will not damage the inner sealing surface of the union.

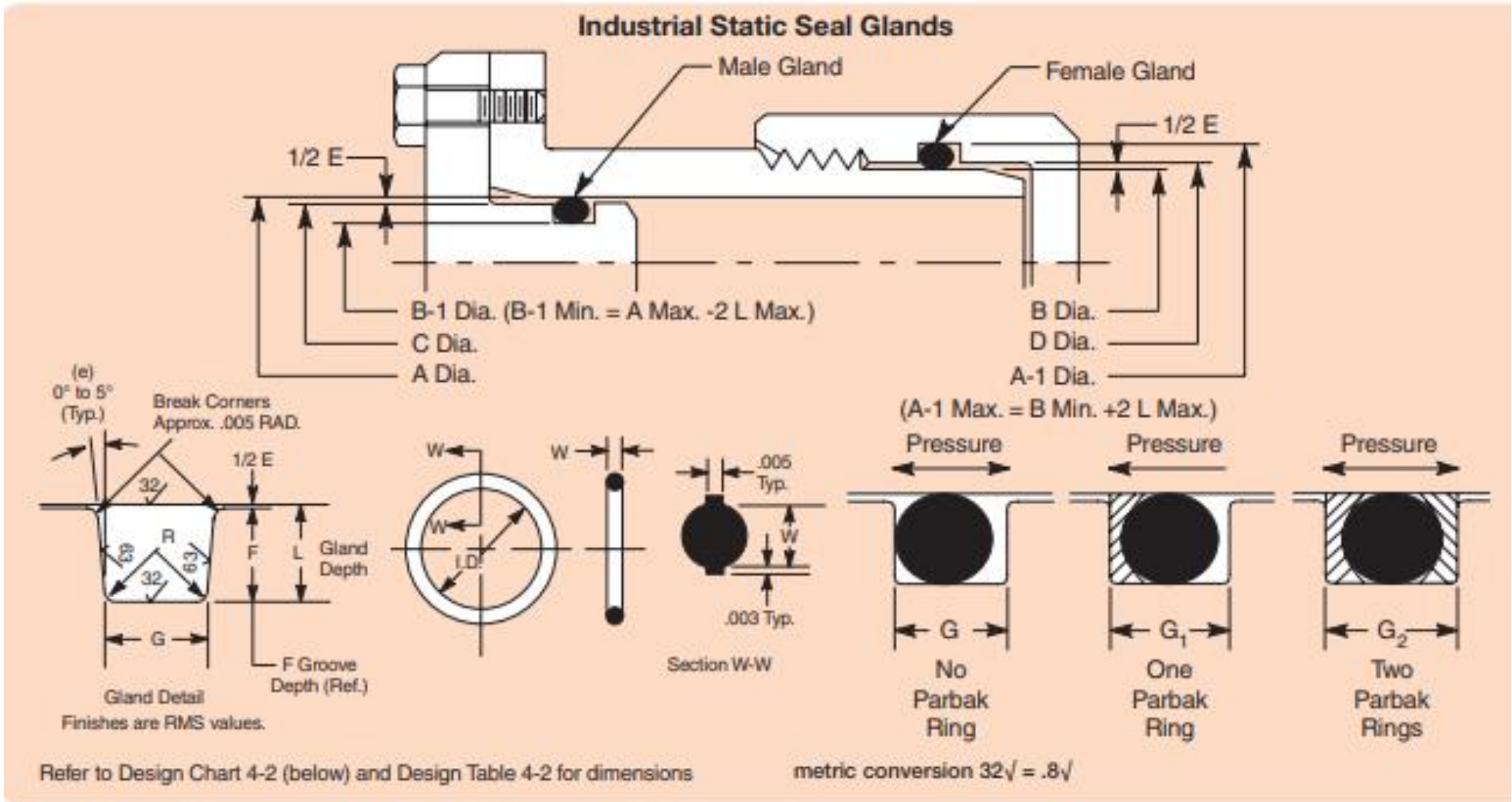
The brass nut should be changed for stainless steal to avoid wearwhen frequently used.

The clamp to exert the reaction force necessary to oppose the water pressure, a small mechanical job.

The leak tightness was not checked but could readily be done up to 20 Bar.

Additional info.

https://www.parker.com/Literature/O-Ring%20Division%20Literature/ORD%205700.pdf



http://www.rotarex-gmbh.de/documents/ROTAREX_Klemmringe_2012.pdf

'ABC forgets' documentary whic | Revolutionary Air Conditioner! - | Ian Crotty - Outlook Web App | ROTAREX_Klemmringe_2012.pdf

Not secure | www.rotarex-gmbh.de/documents/ROTAREX_Klemmringe_2012.pdf

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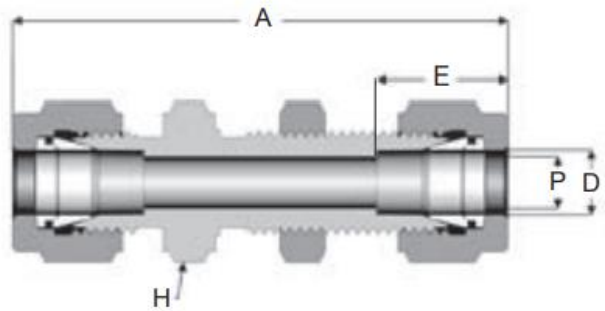
15 of 68 Draw Highlight Erase

8mm pipe size
½" UNF body thread

APPLICATION

Join tubes of the same dimension through a wall panel.

Special requirements on request



TUBE SIZE - METRIC (mm)

D	Reference	A	E	H	P	B'Head Hole Drill Size	Max. B'Head Thickness
3	UCS* 3	51,3	12,9	12	2,4	8,3	12,7
4	UCS* 4	53,6	13,7	14	3,2	9,8	12,7
6	UCS* 6	57,7	15,3	17	4,8	11,5	10,3
8	UCS* 8	61,0	16,2	17	6,4	13,1	11,1
10	UCS* 10	63,7	17,2	19	7,9	16,3	11,1

TUBE SIZE - FRACTIONAL (inch)

D	Reference	A	E	H (mm)	P	B'Head Hole Drill Size	Max. B'Head Thickness
1/8"	UCS* 1/8	2.02	0.51	12	3/32"	21/64"	1/2"
3/16"	UCS* 3/16	2.11	0.54	14	1/8"	25/64"	1/2"
1/4"	UCS* 1/4	2.27	0.60	17	3/16"	29/64"	17/32"
5/16"	UCS* 5/16	2.40	0.64	17	1/4"	33/64"	9/16"
3/8"	UCS* 3/8	2.45	0.68	19	9/32"	37/64"	9/16"

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Of course, our high quality products are the reason so many world renowned companies work with us. But that is not the only reason.

Founded in 1947, we have always listened to our customers. This has resulted in the development of a number of auxiliary services, such as:

- Tailored and comprehensive support
- Energy audits
- Sampling system optimization
- Mechanical efficiency programs
- Trainings

https://nederland.swagelok.com/en/double-ferrule-compression-fittings#

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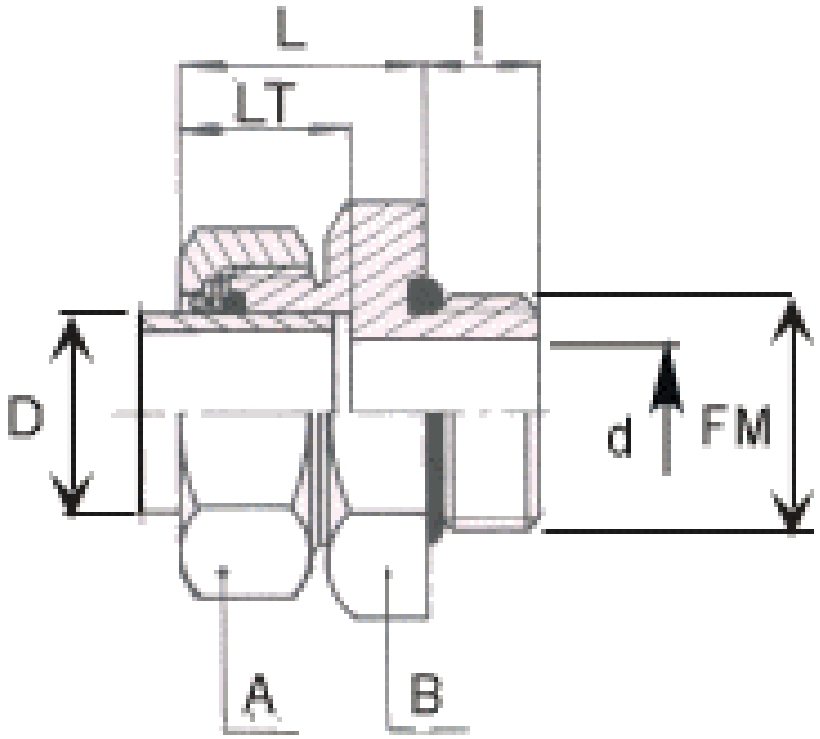
Read more or contact us to learn about our double ferrule compression fittings

Vebeo

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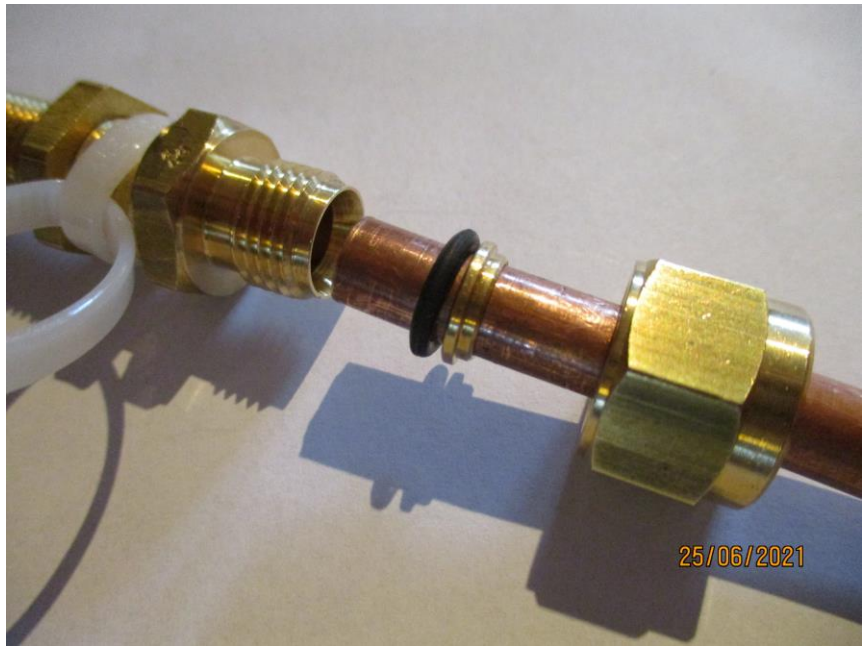
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