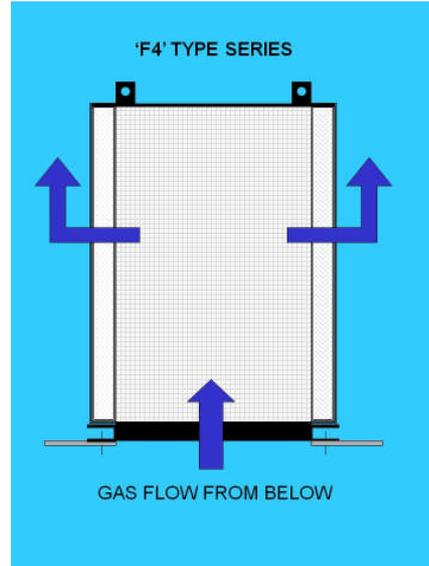
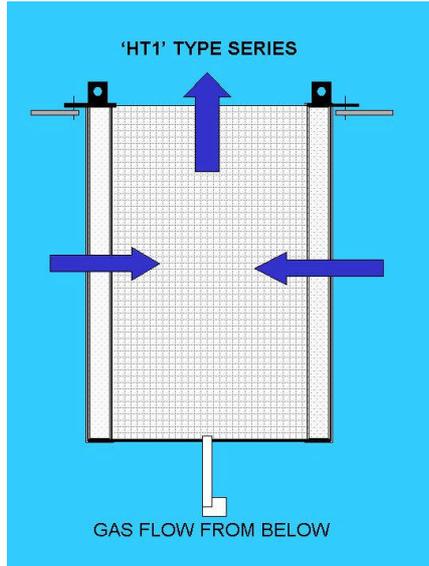


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Candle Filters : Hanging or Standing – Sulphuric Acid Service

The question is often asked – which is better, standing or hanging type candles ?

Here are a few comparison points and key factors to consider, for and against.

	STANDING 'F' TYPE	HANGING 'HT' TYPE
Filter Cost	Equal	Equal
Gas flow	Inside to Outside	Outside to Inside
Advantage	Gas volume / speed can be higher than hanging type as normally exit velocity from filters is lower than hanging type. So can be used for high efficiency or high velocity operation.	Easy to see exits from individual filters, so helps to troubleshoot problems and identify individual filter failures or flange / gasket leaks
Limitation	Difficult to troubleshoot problems as no individual filter exit is seen to identify failures.	As gas goes from lower velocity to higher velocity as it enters the filter, and to highest velocity as it exits the top hole, this type of filter can only be used for high efficiency operation, not high velocity

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	STANDING 'F' TYPE	HANGING 'HT' TYPE
Drainage	From outer surface onto tubesheet ; from tubesheet via some draintubes & hydraulic seal pots down into tower or horizontally out of tower	From inner surface to bottom of filter ; from bottom of filter via individual draintube & hydraulic seal pot down into tower
Advantages	For metallurgical plants where NOx can contaminate the H2SO4, it is easy to separate most of the NOx contaminated acid directly from the tubesheet out of the tower to protect acid quality	
Disadvantages	Acid and sulphate sludge that collects on the tubesheet can increase the risk and rate of corrosion.	All / More drainpots need to be filled with acid at start up to prevent by-pass. NOx case drainage collector piping can be fitted, but more complicated than standing type system
Tower Design	Same Diameter	Same Diameter
Advantage	Tower height can be less, as no extra height needed for draintubes or filter removal access For brick lined towers, brick lining needs only to reach to tubesheet at bottom of filters	
Disadvantage		For brick lined towers, brick lining is more as it needs to reach to tubesheet at top of filters

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	STANDING 'F' TYPE	HANGING 'HT' TYPE
Maintenance		
Advantages	Filters can be installed via top manway(s).	Bolting done from above, so easy and no acid dropping on you from above
Disadvantages	Bolting done from below (except some cases where there is room to move between high velocity filters) so acid drops on you from above as you work above your head	Best method of filter access is to remove tower top (cut & re-weld), but this should not be regular need.
Operation & Reliability		
Advantages	High efficiency operation equal	High efficiency operation equal Weight of filter hanging through tubesheet hole keeps filter very stable, so gasket / flange seal is most reliable.
Disadvantages	As towers vibrate, standing filters sway / move, so they can bend and flex the gasket seal, higher risk of leak by-pass	