

# BEGG COUSLAND ENVIROTEC LTD.



## Filter Options Review by Tower – Sulphuric Acid Service

- All types of filters are a balance of efficiency / pressure loss / size (= surface area)
- Where a mesh pad type filter is offered ( demister or coalescer ), the pressure loss can be reduced if the filter diameter is increased, or the filter diameter can be reduced if the pressure loss can be increased. There is a limit to effective operating velocity, however
- Where a high velocity candle filter is offered ( G25 & G35 fibre type ), the filter length is standard. So pressure loss can be reduced if the number of filters is increased, or the number of filters can be reduced if the pressure loss can be increased. There is a limit to effective operating velocity, however.
- Where an intermediate or high or highest efficiency candle filter is offered ( B12, B14, B14W, C14W & TGW15 fibre types ), the filter length is generally variable. So pressure loss can be reduced if the number of filters is increased or if the length of the filters is increased. The number of filters can be reduced or the length of the filters can be reduced if the pressure loss can be increased. There are limits to effective operating velocity, however.
- If any of the operating performance guarantees offered are higher than you can allow, then we can redesign as mentioned above. If the filter size or number is more than you can allow, then we can redesign with a change in operating performance guarantees.

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## DRYING TOWER OPTIONS-

### NORMAL OPTIONS WHERE ALL OR MOST ACID COMES FROM DISTRIBUTOR

<b>FILTER TYPE</b>	<b>TYPICAL MEDIA SPEC.</b>	<b>TYPICAL VELOCITY ( M / SEC )</b>	<b>DESIGN PRESSURE LOSS (mmH2O)</b>	<b>EFFICIENCY BY SIZE RANGE</b>
<i>Heavy duty Demister</i>	<i>0.28 mm dia wire, &lt;98% f.v.</i>	<i>&gt; 2.0</i>	<i>20 - 100</i>	<i>100% &gt; 5 microns</i>
<i>Coalescer &amp; Demister</i>	<i>0.28 mm dia wire &amp; 'yarn' fibre, &lt;96% f.v.</i>	<i>2.0</i>	<i>100 – 120</i>	<i>100% &gt; 5 microns 98% &gt; 2 microns</i>
<i>High velocity Candle filter G35 Fibre</i>	<i>20 - 40 micron fibre</i>	<i>1.5</i>	<i>150 - 200</i>	<i>100% &gt; 3 microns &gt;80% &gt; 1 micron</i>
<i>High velocity Candle filter G25 Fibre</i>	<i>20 - 40 micron fibre</i>	<i>1.5</i>	<i>150 - 200</i>	<i>100% &gt; 3 microns 90% &gt; 1 micron 70% &gt; 0.75 micron</i>

### COMMENTS :

- The single stage, heavy duty demister is normally enough for good filtration performance, where there are low risks of small size mist ( < 3 microns ).  
Easy to wash.  
Lowest cost option.
- If some small size mist is present ( < 3 microns ), then a coalescing stage can be added, but price and pressure loss increase.  
Easy to wash.  
Medium cost option.
- If a lot of small size mist is present, then high velocity candle filters can be used for efficiency reasons, but highest cost and highest risk of blockage difficulty to wash well.
- If corrosion risk is high alternative Demister materials are Alloy 20, SX, Hostafion ETFE

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## 1<sup>ST</sup> ABSORBING TOWER OPTIONS –

### WHERE ACID COMES FROM DISTRIBUTOR & MUCH FINE MIST IS GENERATED

<u>FILTER TYPE</u>	<u>TYPICAL MEDIA SPEC.</u>	<u>TYPICAL VELOCITY ( M / SEC )</u>	<u>DESIGN PRESSURE LOSS (mmH2O)</u>	<u>EFFICIENCY BY SIZE RANGE</u>
'Intermediate' Candle filter <b>B12 Fibre</b>	10 - 20 micron fibre	0.4	100 -200	100% > 3 microns 95% > 1 micron 80% > 0.5 micron
High efficiency Candle filter <b>B14 Fibre</b>	8 -10 micron fibre	0.2	200 -250	100% > 3 microns 99% < 3 microns
Highest efficiency Candle filter <b>TGW15 Fibre</b> <b>B14W Fibre</b>	< 8 micron fibre	0.15	150 - 250	100% > 1 micron >98% < 1 micron
Highest efficiency Candle filter <b>C14W Fibre</b>	< 8 micron fibre	0.15	150 - 250	100% > 1 micron >98% < 1 micron

### COMMENTS :

- The filtration duty in the 1<sup>st</sup> Absorber is the most difficult , as there is a lot of submicron mist generated by absorption. If the efficiency is not high enough, the expensive heat exchanger downstream is corroded.
- The Intermediate efficiency B12 fibre candle filters are only enough for good filtration performance in some cases, where there are low risks of large quantities of sub-micron size mist.  
Medium velocity means low number of filters.  
Lowest cost option.
- The High efficiency B14 fibre candle filters are often enough for good filtration performance, where there are normal quantities of sub-micron size mist.  
High cost option.
- TGW15 and B14W fibre types are the Highest efficiency candle filter options , which gives the lowest possible exit mist level so maximum heat exchanger protection
- C14W has an equal high efficiency performance as B14W and TGW15, but is made of Carbon fibre and is used in applications where HF attacks glass fibre.
- Candle filters are normally supplied in 316L Stainless Steel structures .  
They can be supplied in hanging style or standing style, except for the B12, which is only available in standing style.

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## 2<sup>nd</sup> ABSORBING TOWER OPTIONS –

### WHERE ACID COMES FROM DISTRIBUTOR & SOME FINE MIST IS GENERATED

<u>FILTER TYPE</u>	<u>TYPICAL MEDIA SPEC.</u>	<u>TYPICAL VELOCITY ( M / SEC )</u>	<u>DESIGN PRESSURE LOSS (mmH2O)</u>	<u>EFFICIENCY BY SIZE RANGE</u>
High velocity Candle filter <b>G25 Fibre</b>	20 - 40 micron fibre	1.5	150 - 200	100% > 3 microns 90% > 1 micron 70% > 0.75 micron
'Intermediate' Candle filter <b>B12 Fibre</b>	10 - 20 micron fibre	0.4	100 -200	100% > 3 microns 95% > 1 micron 80% > 0.5 micron
High efficiency Candle filter <b>B14 Fibre</b>	8 -10 micron fibre	0.2	200 -250	100% > 3 microns 99% < 3 microns
Highest efficiency Candle filter <b>TGW15 Fibre</b> <b>B14W Fibre</b>	< 8 micron fibre	0.15	150 - 250	100% > 1 micron >98% < 1 micron
Highest efficiency Candle filter <b>C14W Fibre</b>	< 8 micron fibre	0.15	150 - 250	100% > 1 micron >98% < 1 micron

### COMMENTS :

- The filtration duty in the 2<sup>nd</sup> Absorber is less difficult , as less submicron mist is generated by absorption. The efficiency required must be high enough for pollution control requirements ( vary country to country )
- The 6 types of fibre candle filters are possible for use, and the performance comments above are valid for this tower duty.
- G25 fibre type, the High velocity candle filter option gives the lowest cost, and where the exit mist level could meet the emission limits.
- Candle filters are normally supplied in 316L Stainless Steel structures. The G25 & B12 types are only supplied in standing style.