
DON'T BE DECEIVED
A CLEANED MESH MIST ELIMINATOR MAY LOOK LIKE NEW, BUT IS HIDDEN DAMAGE AFFECTING PERFORMANCE? USING A HIGH CAPACITY STYLE WILL EXTEND THE CAPACITY SAFETY FACTOR FOR THE LIFE SPAN OF THE MIST ELIMINATOR.
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During the inspection of process unit internals in turnarounds, it is not uncommon to find a knitted mesh pad that has experienced buildup due to the presence of solids. As many knitted wire mesh pads are installed from below the support ring, this observation tends to be focused on the bottom (upstream side) of the mesh pad. When an inspector finds buildup on the bottom of the mesh pad, there are two options: remove, clean, and reuse the knitted wire mesh pad or replace it. The traditional industry practice is to clean and reuse the mesh pad for several reasons: it is quick, typically done onsite, and it saves the cost of replacement. However, reusing a cleaned mesh mist eliminator will not necessarily provide adequate operating performance to the next turnaround.

CLEAN AND REUSE: A FALSE ECONOMY

The practice of cleaning and reusing mesh pads does not go without risk. As previously stated, inspectors typically look at the bottom of the mesh mist eliminator for problems. However, buildup can be well underway in the middle of a mesh pad by the time fouling is observed at the bottom, because incoming entrainment acts as a wash to flush solids off the bottom surface. Removing the buildup from the center of a pad is extremely difficult and the cleaning process can cause extensive damage.

As the buildup increases, it also accelerates. This occurs especially in the center of the mesh, where buildup is difficult to see and impossible to fully clean without destroying the mist eliminator. Solids buildup will take up from where it left off before shutdown, but with a head start compared to the beginning of the last startup.

Another often-overlooked problem when cleaning and replacing the mesh pad is the damage that is done to the used mist eliminator during removal, handling, and reinstallation. When the new pad was built, each section was made slightly oversized to allow compression at the joints and against the vessel wall. Compression from the initial installation does not spring back when the sections are removed, and the additional handling of the mist eliminator during cleaning will add to the problems. The reinstallation does not need to look as bad as that in Figure 1, before there are serious performance problems.

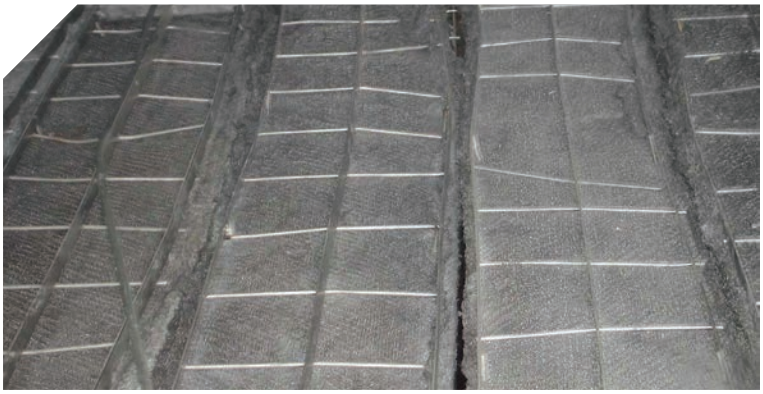

Figure 1. Mesh pad that was removed, cleaned and no longer retains a proper fit when reinstalled into service, due to the handling and cleaning process.

Optimally-designed mist elimination equipment plays a crucial role in the process industries. Within the operation of a given process unit, there can be many critical vapor-liquid separations in which liquid must be efficiently removed. While some of the mist elimination problems demand immediate attention, many take time to appear. Often, operations personnel will not even know there is a problem until the separators underperform. At this point, the resulting entrainment could have already damaged compressors, turbines, fans, heat exchangers, or downstream piping, or while expensive amines or other solvents silently disappear downstream.

If your mist elimination equipment is not performing at its original capacity due to buildup and/or excessive handling, your process could be experiencing:

- Corrosion in downstream piping or equipment
- Reduced product purity
- Increasing makeup of expensive solvents
- Increasing environmental emissions
- Fouling of heat exchangers, compressors or turbines
- Excessive molecular sieve regeneration
- Reduced equipment capacity

The above examples demonstrate how entrainment can have a serious impact on plant production and the profitability of the operating company. If a plant is cleaning and reusing DEMISTER® mist eliminators, it increases the odds of experiencing symptoms of entrainment.

EVALUATING THE RISKS OF REUSED KNITTED WIRE MESH PADS

Koch-Glitsch performed a test to better understand the condition of the reused knitted wire mesh pad. To evaluate the risks, the company obtained a used YORKMESH style 431 pad, which had been removed from an amine absorber during a routine turnaround. Inspection of the mesh pad revealed some moderate solids buildup. Using the normal industry practice, the pad was cleaned with detergent and high-pressure washing. After cleaning, visual inspection showed the mesh pad surface to be similar to that of a new pad. To determine the hydraulic performance, the comparison of the cleaned mesh pad to an identical new DEMISTER mist eliminator was conducted in the 36 in. (914 mm) dia. test towers at the Koch-Glitsch pilot plant facility in Wichita, Kansas, US (Figure 2).

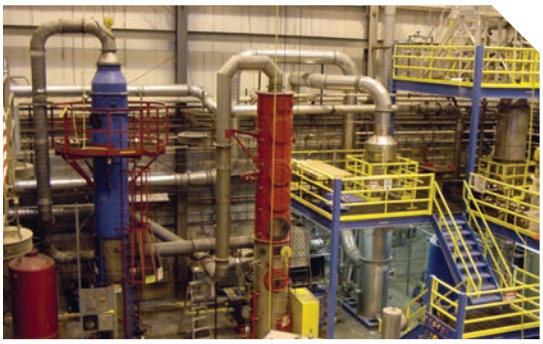

Figure 2. Koch-Glitsch test facility in Wichita, Kansas.

Although the mesh pads looked similar, testing revealed that the original capacity of the cleaned pad had been reduced by 31% due to solids that remained in the middle of the mesh pad. In addition, wire surface corrosion roughened the originally smooth wire surfaces, which increased the liquid holdup in the mesh, leading to further reduction in capacity. Performance tests showed that the cleaned mesh pad capacity at flooding was now 15% below the traditionally used design K-factor of 0.35 ft/sec. (0.106 m/sec.) (Figure 3).

The test results provide a clear indication of how cleaning knitted wire mesh pads can adversely affect capacity. While cleaning knitted wire mesh pads can initially be faster and less costly than replacing the equipment, the loss in capacity combined with the associated risks can cost operators more in the long run.

When comparing the cost of a replacement knitted wire mesh pad to the risks and costs associated with reusing a cleaned mesh pad, the choice is very clear. Taking an outage is costly enough but, if one must take an emergency outage due to poor performance from a cleaned mesh pad, this can result in a significant loss for the operating company. Fortunately, plant operators can easily make improvements to minimize the risks and increase mesh operating life, including the following:

- Replace with a new traditional-style mist eliminator
- Upgrade to a high capacity knitted wire mesh mist eliminator

Installing a new traditional-style mist eliminator will provide a clean start on the fouling and corrosion cycle. If the plant operates with the same feeds, at the same conditions, for the same time period, it will have an idea of what to expect. Therefore, when in doubt, replace the knitted wire mesh pad. Koch-Glitsch even offers emergency services to deliver a replacement product within a short time frame, resulting in no additional loss of downtime.

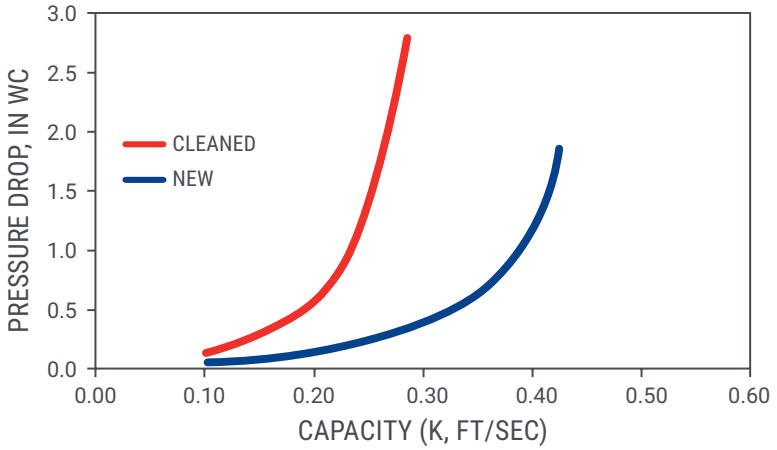

Figure 3. Hydraulic capacity test results show the performance of new versus cleaned mesh. The cleaned mesh was removed from service, cleaned and reinstalled into pilot plant column for testing.

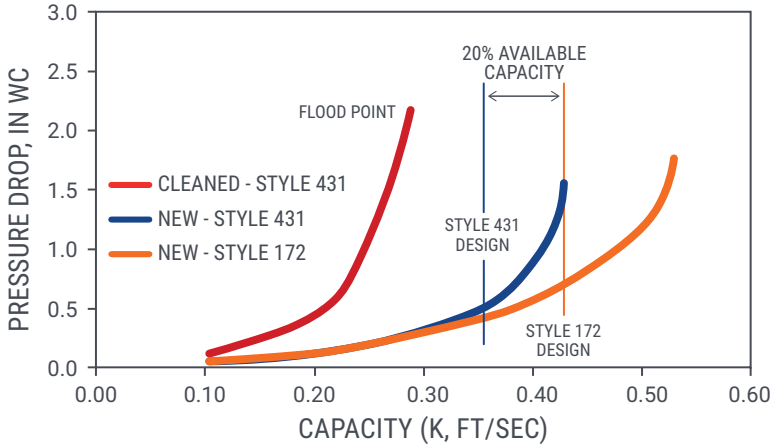

Figure 4. Hydraulic capacity test results show the benefit of using high capacity mesh to replace traditional style mesh.

A HIGHER-CAPACITY OPTION

If nothing changes in the process, the traditional style 431 may get the plant to its next turnaround; however, using a YORKMESH knitted mesh style 172 can increase capacity by 20% over the traditional style 431 pad. The extra capacity may not be needed immediately, but the extra capacity can be critical when fouling starts to reduce the available safety factor. As shown in Figure 4, using the style 172 knitted mesh mist eliminator shifts the dangerous re-entrainment point much further from a plant's operating rates.

Koch-Glitsch has developed and refined a family of DEMISTER mist eliminators that replaced traditional knitted mesh styles. The new high-capacity styles take advantage of improved knowledge about the way internal wire geometry affects capacity and performance in the same way that structured packing surpassed random packing performance in distillation columns.

Traditional Style	High Capacity	Capacity Gain	Efficiency Gain	Description
371	215	>35%	Same	Glass fiber & metal for maximum efficiency
326	194	>25%	Same	Ultra-efficiency design for fine particles
421	709	>20%	Same	Heavy duty, high efficiency design
431	172	>20%	Same	General purpose style
931	708	>22%	Same	High open area for viscous or dirty liquid

Compared to the traditional styles, the high-capacity DEMISTER mist eliminator styles from Koch-Glitsch can provide the following advantages:

- 20% or more design capacity (Table 1).
- Higher efficiency at design velocity.
- Lower pressure drop.
- Equal or better corrosion and fouling resistance.

Upgrading to the high-capacity style DEMISTER mist eliminator technology allows significant improvements in both capacity and fouling resistance, while maintaining the same efficiency. The latest technology mesh designs take advantage of more effective internal mesh structure and are completely interchangeable with the traditional mesh mist eliminators currently in service.

CONCLUSION

Although traditional industry practice is to remove, clean and reuse knitted wire mesh pads, operators need to consider the risks involved with this practice. Inspecting a mesh pad seems simple, but there are many blind spots that can deteriorate the capacity of a cleaned mesh mist eliminator. This deterioration becomes amplified by the damage caused by excessive handling of the knitted wire mesh pad sections. Therefore, it is best practice to replace the mesh pad with a new DEMISTER mist eliminator or upgrade to a high-capacity DEMISTER mist eliminator.

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