
ADVANCES IN FLOATING DIGESTER COVER GUIDE SYSTEM DESIGN

One of the most important components that differentiate fixed covers from gasholder or buoyant (floating) covers is the guide system. While fixed covers are anchored to the top of the digester wall, floating gasholder covers are free to move up and down, incorporating guide systems. Not surprisingly, proper guide system design is critical in ensuring that the cover operates well.

There are several challenges to guide design. Anaerobic digestion is a messy process, especially when high winds, drifting snow, and icing produce uneven loads on the cover. Properly designed guides will not allow covers to tip, bind up, will be easy to maintain, and will not be expensive to construct and install.



Figure 1. Tipped Digester Cover

Initially, Ovivo USA, LLC and others began constructing gasholder and buoyant (floating) covers with roller guides. Theoretically, as the cover moved up and down, a wheel in the guide system would rotate, allowing the cover to move up and down. The system was lubricated with grease supplied to the wheels from lines that ran down the side of the digester cover to the wheels. These systems were not very stable in high winds, however. In addition, debris in the guide system could cause one side of the cover to bind, and the cover might wedge itself into the digester. Also, maintenance of the wheels was a problem. If there were a problem with the wheel or with the grease lines, maintenance meant dewatering the digester and climbing into the digester tank to service the roller guide system. This was an especially undesirable task because of the time and expense needed to replace the damaged components.



Figure 2. Roller Guide Installed On Cover



Figure 3. Roller Guide Detailed View

In an effort to improve cover stability, Ovivo began to build spirally guided covers. The spiral guides increased the stability of the covers under high winds. They also prevented binding within the cover, since vertical movement also caused the cover to rotate spirally. This was a great breakthrough in cover design, since it meant an end to concerns over tipping covers. However, these guide systems were much more expensive and complicated than the regular roller guide systems. In addition, none of the maintenance problems had been solved, nor had the problems associated with non-spinning rollers, as the spirally guided covers still used grease lubricated rollers.



Figure 4. Spirally Guided Digester Cover with Rollers

In order to reduce the cost of guide systems, while improving maintenance concerns, Ovivo created the slide guide system. Using two brackets with UHMW slide blocks, Ovivo was able to reduce maintenance on the guide systems. The long wear life of the UHMW blocks meant that maintenance needs were infrequent, although maintenance still required removing the digester from service. There were no more grease lines to repair, and there were no more concerns over broken rollers. However, these systems were typically only acceptable in areas where high wind loads were not a concern, since they were not considered as stable as the spirally guided covers.

This led Ovivo to design and produce its current slide guide system. The current system utilizes a single slide bracket that runs the entire length of the digester cover. This feature prevents tipping of the digester cover by providing a continuous surface for loading and prevents binding of the guide system, since the slides exclude foreign material from the guides. Also, this design does not cost as much to manufacture as the spiral guide systems, nor is it as complex to construct, facilitating installation procedures.



Figure 5. First Generation Slide Guide Assembly with UHMW Wear Blocks and Stainless Steel Guides



Figure 6. First Generation Slide Guide Assembly Installed in Digester Cover



Figure 7. First Generation Slide Guide



Figure 8. Full-length Slide Guide Installed in Digester Cover

Maintenance of the guide system has also been immensely simplified. Replacement of the UHMW wearing surfaces are recommended every 10 years and does not require changing the digester sludge levels, removing the digester from service, or entering the digester. Replacing the wearing surfaces now requires just one person to pull the wearing surfaces from the top of the guides using a hook and slide the new UHMW piece down into position.



Figure 9. Slide Guide Current Design Detail (Note hole at top of wear strip to aid removal)

This new guide system represents one of many of Ovivo advances in more than 50 years of digester cover design. Ovivo is pleased to include its slide guide design as its standard on every new gasholder and floating digester cover that Ovivo manufactures.



Figure 10. Full-length Slide Guides Operating In Extreme Weather Conditions

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