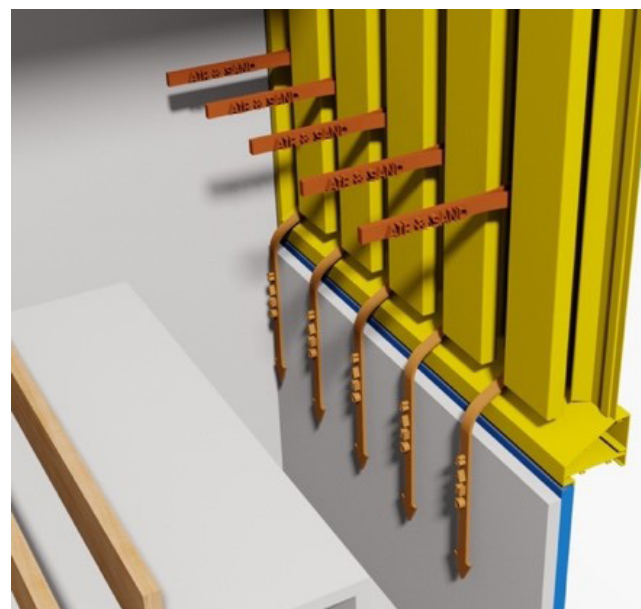




Introducing the AMCA Sand Louver Test Standard

An AMCA International White Paper



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ABSTRACT

This white paper describes how airborne sand has posed an increasing challenge for HVAC service technicians and how sand louvers can help mitigate sand-related problems.

For building owners in Persian Gulf countries, sand storms have long been a fact of life and a threat to HVAC equipment. And beyond the gulf, sand penetrates into buildings on islands, in coastal regions and in deserts—wherever wind, sand and buildings coexist. For this reason, there is growing global attention on the quantity of sand that moves through the louvers installed on building facades and casements of equipment penthouses and enclosures. But a great help has been introduced in this struggle against sand penetration, and that is the introduction of louvers specifically designed, tested and certified to reject sand.

ANSI/AMCA Standard 500-L defines these sand-rejection louvers (simply called “sand louvers”) as comprised of multiple vertical or horizontal blades that, when mounted in an opening, permit the flow of air while minimizing the ingress of airborne sand particles. In plain terms, these louvers multitask; while serving the purpose of letting fresh air in, they also serve the purpose of keeping sand out.

AIRBORNE SAND PROBLEMS

HVAC equipment needs prescribed amounts of outdoor air to function properly, and that air is typically provided through weatherproof ventilation louvers installed on building facades. When an airstream loaded with sand particles makes its way through the louvers, it deposits the sand onto the floors and in the air near machinery, which then clogs the air filters of HVAC equipment in mechanical rooms.



Sand louver with a plate containing holes for sand to exit. Image courtesy of Ruskin Titus Gulf.

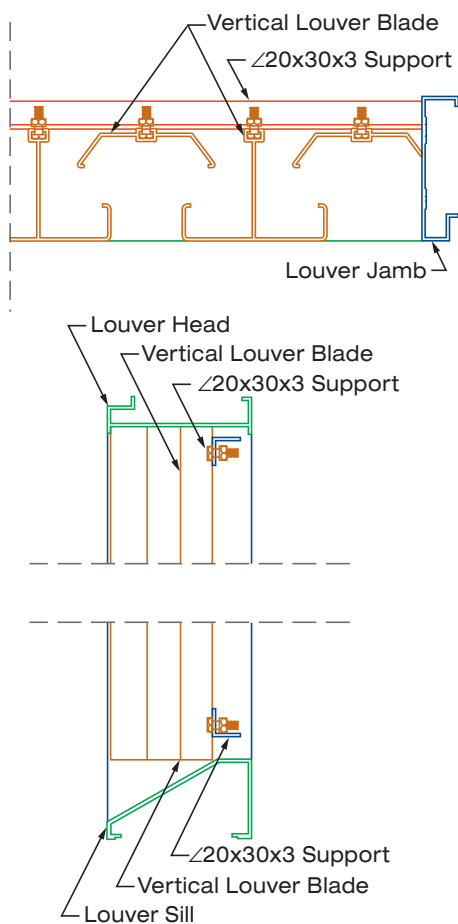


Figure 1. Cross section of a sand trap louver showing how sand is stripped from the airstream and allowed to fall to a bottom rail and fall toward the ground outside the building. Image courtesy of McGill Architectural Products.

A HISTORY OF THE PREFILTER SOLUTION

The use of sand louvers as prefilters is relative new, only beginning to come into use in the 1980s. Historically, the HVAC industry has relied on filters *inside* HVAC and other mechanical equipment, rated in accordance with two different ASHRAE test standards: ASHRAE Standard 52.1¹, which rates filters according to dust spot efficiency, and ASHRAE Standard 52.2², which rates filters for minimum efficiency reporting value. ASHRAE 52.1 has been withdrawn, so ASHRAE 52.2 is the active ASHRAE filter-rating standard.

Additionally, wind-driven particles travelling at high speeds would be intercepted by a fan unit's filters, rated in accordance with ASHRAE 52.2. Conventional louvers not tested for sand infiltration allow wind-driven sand and dust particles travelling at high speed to be intercepted by MERV filters, and this sand penetration leads to rapid clogging and choking of the ventilation equipment. Only frequently-scheduled or alarm-driven maintenance measures can prevent this. The problem is compounded since, over the last decade, HVAC equipment has become more air-quality sensitive. Some facilities report as much as an 80% increase in maintenance cost due to dust/sand infiltration, and that substantial increase is not an anomaly—it is a trend. The need for a prefilter solution appears to only be increasing as HVAC equipment technology advances.

These sand-related problems have created real costs for HVAC service companies. MERV-rated air filters intercept low-range particle sizes of 0.3–10 microns and up to 62.5–80 microns on the high range. As the filter becomes clogged, energy use increases, and the resistance to airflow takes a toll on the air handling unit compensating for the blockage of airflow. Building owners, then, will deal with more than the need to frequently replace air filters; they will also see sand intrusion drive up utility bills and take a toll on their equipment.

More severe costs begin to accumulate as well. The reduced airflow from clogged air filters can cause a chain reaction of costly problems. Insufficient airflow through a heating and cooling system can cause overheating of the air handling unit, heat exchanger and generator, which in turn can cause a premature shutoff. If that shutoff happens too often, the electronic limit switch safeguard can fail, and then the air handling unit will not function until it is serviced. Parts and labor for this can easily cost in the \$200 range.

Cleanup costs will also begin to mount for a building in a sand-afflicted zone. Sand needs to be removed from floors, ducts, air handling units, rooftop air conditioners and other air-system components. Service calls are frequent, creating a drain on time and budget.

These are all preventable expenses, because there exists a cost-effective means of trapping sand and depositing it on the ground along the building façade. This solution is the sand louver. Basically, sand louvers are prefilters. They solve the problem of excessive sand intrusion before the building envelope is even breached.



Figure 2. Sand louver with inclined plate, usually called a drain sill. Image courtesy of Ruskin Titus Gulf.