

Tekleen Water Filtration Systems Significantly Minimize Manual Cleaning And Cooling Tower Downtime

Installed in Terminal 2 of the Minneapolis St Paul (MSP) Airport, in Minnesota

Interviews were provided through the courtesy of Mr. Frank Hartranft, of the consulting engineering company Michaud Cooley Erickson, and Mr. Steve Shuppert, chief engineer for MSP Airport and the MAC Metropolitan Airports Commission. Photos are provided by Michaud Cooley Erickson.

The installation consists of two Tekleen Filtration Systems installed on two of the three cooling towers of MSP Airport Humphrey Terminal 2. Cooling Tower 3 is rarely used, so it was not required at this time to install a third system.

One of the three towers was installed first, to verify that the Tekleen filter would do what was needed. After a season, it was apparent that the Tekleen filter worked extremely well, so it was decided to install a second filter on cooling tower #2.

The Tekleen filter is being used to keep the evaporative cooling system clean, to maintain good working order. The Tekleen filter is self-cleaning, significantly reducing cooling tower maintenance, so that the nozzles in the towers which spray and cool the heated water over the heat exchanger “fill” elements do not get clogged.

Prior to the Tekleen installation, the evaporative cooler nozzles were continually plugging up from contaminants which might include dust, bugs, small objects and pipe rust, typical of this type of cooling system. As a result, this condition required significant downtime for cleaning and maintenance. High quality, reliable self-cleaning filter systems from Tekleen were the answer.

At Terminal 2, the heated water from the chiller is cooled in the cooling tower through the heat exchanger, from between 90 and 95 degrees down to 80 to 85 degrees before it is sent back to the chiller. With the Tekleen self-cleaning filters, the debris is continually filtered out of the water, the Tekleen filters are self-cleaned, and the water in the heat exchangers therefore remains clean. The spray nozzles remain open, and maintenance shut-downs are minimized.

The Tekleen system was chosen for its simplicity and reliability. As soon as a pressure drop is sensed at a certain level, the



Front side of cooling towers at terminal 2 (Humphrey Terminal)



Back side of cooling towers at terminal 2, showing one of the two installed Tekleen filters. It is the large cylinder hanging vertically beneath the walkway.



Close view of the Tekleen filter, vertical installation.



MSP Airport is the 43rd busiest airport in the world, as of 2013. It is 17th busiest airport in North America in number of passengers, and the 11th busiest in operations. It gets very high ratings from travellers, and employs nearly 77,000 people. The airport has a total economic output of more than \$10 billion.

Tekleen self-cleaning mechanism takes over. At the Terminal 2 heat exchangers outfitted with Tekleen filters, there were no nozzle plug-ups noted. The Tekleen filter is installed just upstream of the nozzles.

An application engineer from Tekleen was sent with the Tekleen systems to oversee the startup of the filters and to train MSP employees on the operation of the filter.

For reference only: HOW AN EVAPORATIVE COOLER WORKS: hot water removed from the chiller is circulated into the cooling tower, where it is sprayed over “fill” - usually made of corrugated plastic, where the hot water evaporates and loses heat. The cooled water is then circulated back to the chiller. Heat is shed from the tower into the atmosphere. The water sprayed over the “fill” element through small nozzles needs to be kept clean. Without filtering the water, accumulated scale and debris buildup reduces heat transfer and requires more electricity to operate. Also without filtration, the debris from air and rust can continue to accumulate, plugging the nozzles, which would then require downtime for cleaning out the debris.



Back side of cooling towers at terminal 2, showing both Tekleen filters.

WHAT THE INSTALLATION INCLUDES:

Chiller Plant Condenser Water Filtration 3 x 10”, 1,333 gpm, 150 psi, 100µ

(qty. 2) ABW10-P Automatic Filter From SST. 10” inlet/outlet flanges, 2” flushing ball valve. Max. 150 psi. Max 200F. 7.0 Sq.Ft. Sintered 100< 316L screen. 650lb. 80”x26”x30”

GB6 Electronic Backwash Controller in weather proof NEMA 3 plastic box. Rinsing by differential pressure, timer or manual. Complete with d/p sensor, backwash counter, emergency alarm. 110 VAC 10 amp, output 24 VAC, 12” x 9” x 7” 6#

28-10 Pressure relief and by-passing 10” valve. If the filter back-flushes more than 3 times in 2 minutes, the filter’s control will (1) open the 10” bypass valve, (2) turn on a red light on the panel, and (3) signal an alarm in the building automation system.

INFORMATION ADDED BY MAC CHIEF ENGINEER MR. STEVE SHUPPERT

MSP Airport strives to be as energy efficient as possible, and wanted to reduce the labor intensity required to keep the cooling towers functioning well and reliably.

The entire MSP airport is comprised of 17.5 million sq. feet, including both terminal 1 and terminal 2 ramps and other buildings. It uses a facility-wide building automation system to track operation of the connected systems and devices. The Tekleen units on terminal 2 are connected to this system to provide operational data to the facility management.

Before the installation of the Tekleen filter units, the MSP terminal cooling towers required intensive cleaning 5 to 6 times every week and a long shutdown period each time. The small

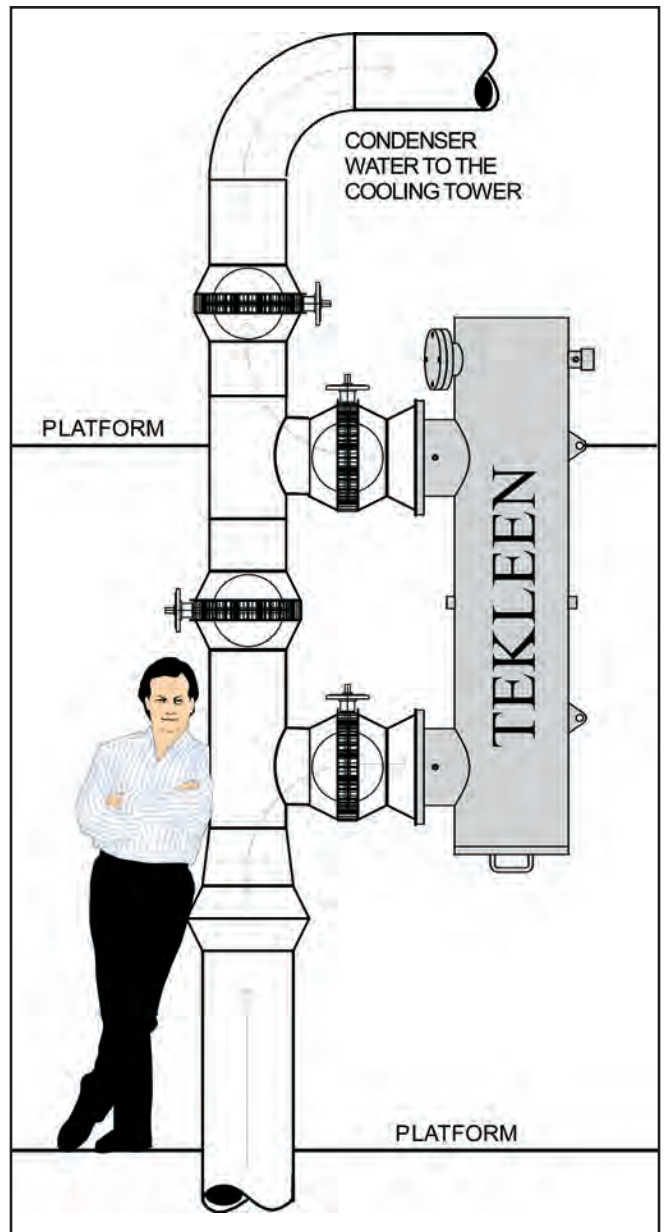


Diagram of installation

size of the cooling tower nozzles meant a lengthy manual cleaning process, with significant shutdown periods. After the Tekleen units were installed, the service was required only twice during the summer.

Important considerations included whether to install the Tekleen units vertically or horizontally. The vertical configuration was selected.

Water pressure available to the Tekleen filters is determined by the condenser water pumps that serve the chillers and towers. Mr. Shuppert notes that it is important to provide the water pressure needed by the Tekleen units from the available water pressure through the cooling tower. The pressure available at MSP can only handle one of the two Tekleen self-cleaning filter processes at a time, instead of both units on the same schedule.

Mr. Shuppert estimates the labor savings from the reduced need for maintenance are as follows:

Three to four personnel in each tower, estimated cleaning time of nozzles 1.5-2 hours each time. Before installation: five to six times a week during summer months. After installation of filters, with same 3 to 4 personnel, and the same time to clean 1.5-2 hours, but it was only required twice during the summer .

In dollar amounts this translates as follows:

After installation, the frequency of cleaning and resulting down time were dramatically reduced. Rough numbers are over \$15,000 in saved labor.

Mr. Hartranft is an engineer with Michaud Cooley Erickson, which is an engineering/design firm with a long-standing relationship with MAC, the owner of MSP Airport and several other smaller airports in Minnesota.

MAC is an active participant of STAR, Stewards of Tomorrow's Airport Resources, a sustainability program which is concerned with water and air quality, water conservation, noise abatement, etc.

The MAC, or Metropolitan Airports Commission, owns the MSP airport and is a public corporation of the state of Minnesota. Mr. Steve Shuppert is the chief engineer for MAC.

Interviews were conducted during Dec. 2014 with Mr. Frank Hartranft, of the consulting engineering company Michaud Cooley Erickson, and Mr. Steve Shuppert, chief engineer for MSP Airport and the MAC Metropolitan Airports Commission. Photos and diagram are provided by Mr. Frank Hartranft of Michaud Cooley Erickson. The installation took place in 2014.

Tekleen is located in Los Angeles, CA.

Please visit www.tekleen.com

AUTOMATIC FILTERS, INC.

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Tekleen industrial self-cleaning water filters are suitable for a wide range of applications: HVAC, petrochemical, pulp & paper, drinking water, golf & turf, sugar processing, metal processing, waste water, sea water filtration, greenhouse & nursery, plastics manufacturing, food industry, power generation, car wash water reuse and recycling, and fruit & vegetable irrigation.