



STAR
COOLING TOWERS

Weighing Fouled Counterflow Film Fill



**COOLING TOWER TECHNOLOGY
EXPERTS SINCE 1951**

POWER | PETROCHEMICAL | REFINING

sales@starcoolingtowers.com

starcoolingtowers.com
877-232-8418

Counterflow Film Fill Cooling Towers

are very susceptible to fouling, which refers to the accumulation of unwanted material on the surface of the tower fill. The tower fill is a crucial part of the cooling tower as it provides a large surface area for the water to be in contact with the air. It is made up of a network of plastic sheets that allow water to flow through them, and air to flow over them, which increases the rate of heat transfer.



Fill fouling is the deposition of material on the fill's heat transfer surfaces. It involves one or more of the following processes:

- Biological fouling due to biofilm development.
- Deposition of suspended solids due to sedimentation.
- Scaling of dissolved minerals due to precipitation.

The most common fouling is caused by a combination of suspended solids deposition with biological deposits. Since modern film fills have such large heat transfer surface area per unit volume, this type of fouling can cause problems such as significant decreases in thermal performance and increases in pack weight. The former will cause a loss of system efficiency and the latter can lead to catastrophic failure of the fill support system.



WHY SHOULD YOU WEIGH FILL?

FOULED FILL MAY GAIN AS MUCH AS 10X ITS INITIAL WEIGHT.

FILL WEIGHT GAIN WILL DECREASE COOLING TOWER PERFORMANCE.

A ONE-DEGREE INCREASE IN WATER TEMPERATURE CAN RESULT IN A 2% INCREASE IN ENERGY USAGE AND/ OR REDUCED PRODUCT OUTPUT.

PREVENT EXCESSIVE WEIGHT CAUSING CATASTROPHIC FILL COLLAPSE.

FORECAST THE LIFE CYCLE OF THE FILL AND PROVIDE BUDGETING FOR FUTURE FILL REPLACEMENT

DRY PACK WEIGHTS			
NOMINAL GAUGE		WEIGHT	
mils	mm	lb/ft ³	kg/m ³
10	0.25	1.7	27.2
15	0.38	2.4	38.4



STAR utilizes established weighing and inspection protocols based on years of field experience, ensuring that the weighing of the fill packs is conducted in an effective manner.

There are several protocols that should be followed to ensure accurate and reliable measurements:



- Calibration: Before using the scale, it is essential to calibrate it properly. This involves adjusting the scale to ensure that it is reading accurately at its maximum capacity. Calibration should be done regularly to ensure that the scale remains accurate over time.
- Weighing must be completed within 12 hours to produce usable results.
- Proper placement: When weighing fill packs, they should be placed in the center of the scale platform.
- Avoid drafts: Air currents can also affect the accuracy of the scale. Therefore, it is important to weigh the fill packs in a location where there is little to no air movement.
- Readability: The scale's display should be easily readable, and the operator should have a clear line of sight of the display to avoid errors in reading.
- Handling the fill packs: The fill packs being weighed should be handled carefully to avoid any damage or loss of fouling material inside the packs that could affect the accuracy of the measurement.



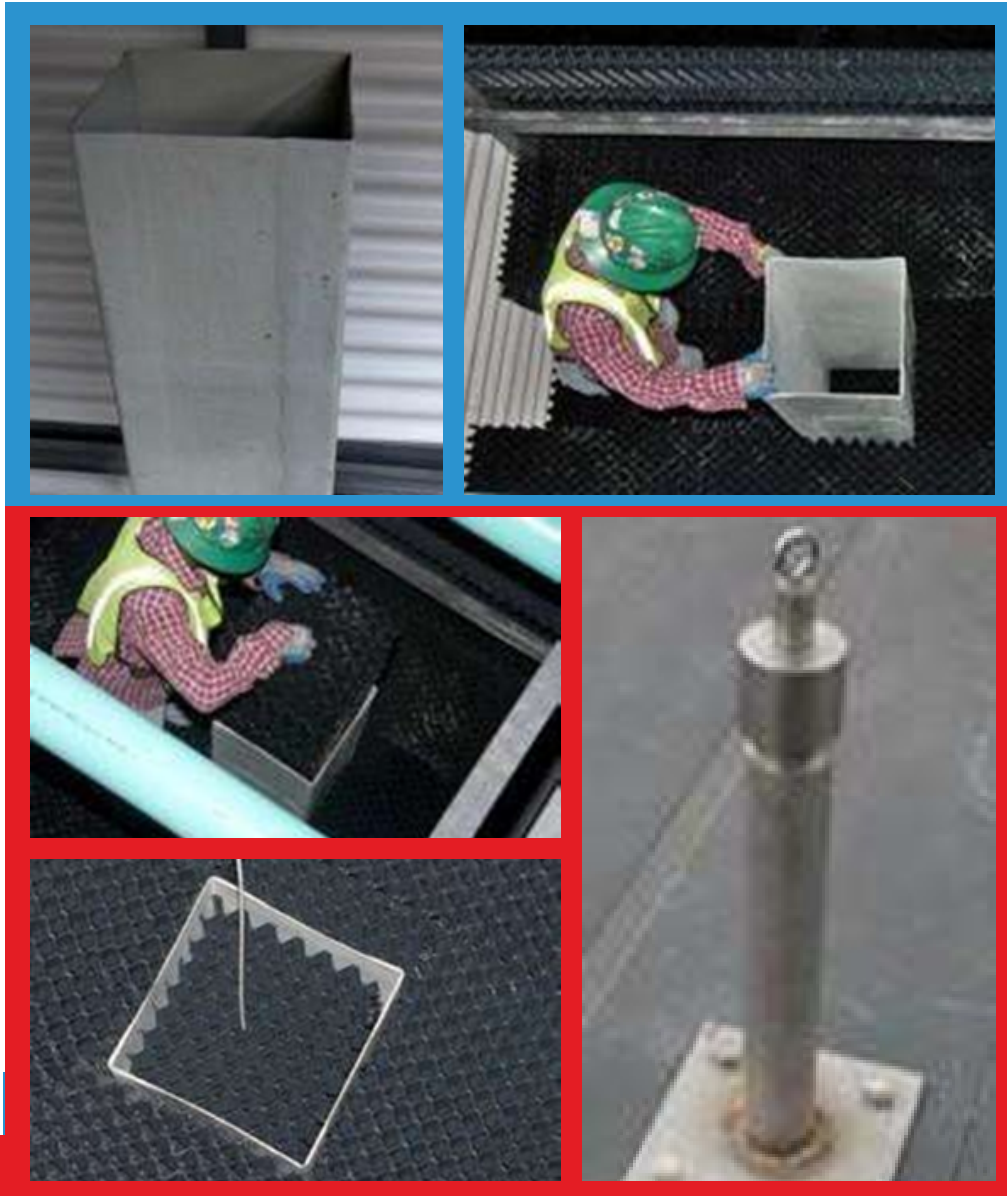


The weight of the fill pack vs. the fill manufacturer's published initial weight is used to establish weight gain. For example, a fill pack weighing 106.6 lbs. and with an initial weight of 40.8 lbs., the weight gain would be 2.61x. Obviously, the greater the weight gain, the greater loss of cooling capacity and a higher probability of a fill collapse.

ENGINEERING REPORT TO CUSTOMER INCLUDES:

- Summary of fill weights by location and layer.
- Fill pack inspection results.
- If possible, assist the customer to identify source(s) of fill fouling.
- Provide an estimate of the remaining fill service life.
- Performance predictions and considerations. (Note: CTI ATC-105 field performance test not included is the only method to establish the true reduction in performance resulting from fouled fill.)
- Identify any risk to the overall tower structure resulting from excessive fill weight gain.
- Budget pricing for fill replacement.

Fixed Fill Monitoring System



The STAR Fill Monitoring System is a simple, direct way to monitor your cooling tower's film fill for fouling. The system utilizes an FRP fill weigh box. A portion of the film fill is field cut around the box, then field trimmed to fit inside the box. This block of fill is attached via a stainless-steel rod and assorted stainless-steel hardware to a retainer assembly on the fan deck. The block of fill can then be lifted and weighed periodically from the fan deck without having to enter the cooling tower.