

How dry is dry enough?

A well designed and operated sulfuric acid plant drying tower should reduce the water vapor in the air or process gas down to a dew point of about -43 degrees Celsius (C).

During an investigation into a high stack opacity problem combined with several liters per hour of acid drainage from the cold heat exchanger (SO₃ side) at a metallurgical acid plant, it was found that the dried gas being sent to the converter had a dew point of -28 degrees C, or about -18 degrees Fahrenheit (F). The assumption would be that this would not be a problem. After all, -28 degrees C is pretty cold.

Is the difference between -28 degrees C and -43 degrees C significant? For some acid plants, perhaps not. However, in this

particular case where the SO₂ gas concentration to the converter was low and fluctuating, it was found that the additional 350 mg/m³ (approximate) of water in the process gas stream raised the acid dew point in the cold heat exchanger SO₃ side enough to cause the drainage they experienced.

It was also found that the -28 degrees C dew point after the main compressor was not due to poor drying tower operation, but rather to holes in the inlet duct to the main compressor which had previously been hidden under the insulation. As soon as these holes were found and patched (one as large as 1,000 cm²), the stack cleared up and the cold heat exchanger drainage stopped.

Lesson Learned

Besides the drying tower, the main compressor inlet duct condition is also important to keep a clean stack and minimize equipment corrosion.

Packing chips: pay me now or pay me later

During a start-up or turn-around, cleaning the packing chips out of the bottom of strong acid towers is a messy job, and frequently gets short cut in order to meet schedule. Sometimes a facility is lucky. Sometimes they are not.

In one particular case of commissioning a new acid plant, ceramic packing chips were being cleaned from the strong acid tower bottom screens. A failure of one of the tower bottom screens was found and repaired, but not before

some amount of chips had escaped to the strong acid pump tank. It was decided that to drain and clean the strong acid pump tank would delay the start-up too long; and hopefully any of these fugitive packing chips would safely settle out on the bottom of the tank and not cause any problems.

Murphy's Law prevailed however, and during start-up, one of the plate and frame acid coolers suddenly developed a high-pressure drop, reducing the acid circulation to the towers. It was discovered (the hard way) that the inlet basket filter diameter on one of the plate and frame acid coolers was too small and did not get a good seal. The result was after plugging up this basket filter, sufficient acid bypassed around the filter and plugged up the



small channels in the plate and frame cooler. The result was more delay in the startup than if the pump tank been cleaned in the first place.

Lesson Learned

Packing chips will eventually plug something. If not filter screens, then someplace more inconvenient, like coolers, distributors, sample lines, etc. Circulating an exces-

sive amount of chips for an extended period can also cause erosion damage to equipment, such as pumps or piping.

The above Lessons Learned submissions were provided by MECS Inc.

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Specialized in safety — Southwest Refractory of Texas

For nearly a quarter of a century, industry has relied upon the specialized refractory services of Southwest Refractory (SWR) of Texas.

Headquartered in Alvin, Texas, the company was established in 1985 with the goal of providing engineering, construction, maintenance and specialty services to a wide range of clients. Founder Ronnie Rudell Sr. committed his company to work that was both safe and cost effective, all the while never sacrificing quality. Rudell

guided his company into the refining and petrochemical markets, beginning locally with the Texas coast. By the mid-1990s, SWR had moved beyond the Lone Star State and was providing specialized service — including several sizeable shut-downs — in the states of Nevada, Indiana and Louisiana.

Since it's founding, SWR has placed great emphasis on safety in the workplace. The company's commitment to safety is validated through their ever-growing list of clients that gives them high marks in safety performance.

Company safety policy is based on the provision of a safe and healthy work environment for all of SWR's employees. Management also takes a proactive approach to ensure that the company is up to date on all federal and state regulations, and in full compliance with all client safety regulations.

In the 21st century, SWR has expanded its reach to include new industries and new territories. The company currently specializes in installing and repairing refractory and acid proof lining systems for large capital projects. To support these projects, the company prides itself on its qualified staff in several departments including

Acid Brick installation within a sulfuric acid storage tank.

engineering, safety, project management and qualified bricklayers. SWR has also grown its service base from a national success to supporting clients globally. There are numerous international projects on the SWR roster, as well as many large maintenance contracts stateside with some of the leaders in industry.

SWR's plans for the future, as always, include the delivery of safe, innovative and

cost-effective work locally, nationally and globally. The company maintains a close watch on the markets, ensuring a proactive partner to its clientele. As industry levels fluctuate and needs evolve, SWR stands ready to respond quickly and effectively.

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Acid Tower support dome installed in a Gulf Coast acid producing facility.