Sulphuric acid system

The sulphuric acid tank is positioned in one corner of the dryer hall, next to the evaporators and close to the air washer of the belt dryer.

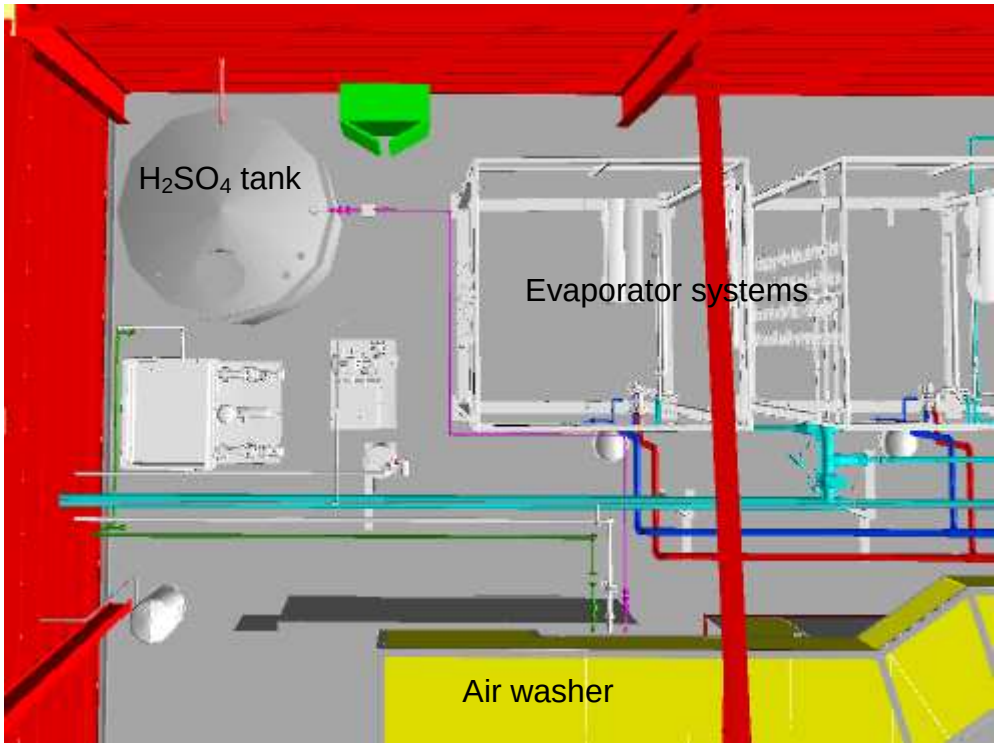

Figure 1: Position of sulphuric acid tank inside dryer hall

To define the measures for a safe and secure H_2SO_4 tank, a short risk evaluation was made:

Table 1: risk evaluation for sulphuric acid tank

risk	consequence	likelihood	Measure
Vehicle hitting the tank	Can cause a leak	none: Tank is standing on a position which is inaccessible for vehicles.	-
Medium inside the tank	Can cause a leak	Likely: pH 1-3	Use material resistant to 96% H_2SO_4, double walled system

Temperature	Can cause a leak	Highly unlikely: H_2SO_4 is not heated, ambient temperature inside tank	-
Pressure	Can cause a leak	Unlikely: H_2SO_4 is not pressurised	Aeration opening at the top of the tank to ensure ambient pressure inside tank
Abrasion by any medium inside tank	Can cause a leak	None: No particles in medium	-
Abrasion from equipment outside the tank	Can cause a leak	Highly unlikely: No moving equipment is in proximity to the tank	Double walled tank

Resulting from this table, a tank made of PE-100-RC-WK-S-800 is used. Additionally a catchment tank of the same material is mounted around the H_2SO_4 tank. The sulphuric acid tank has a DN100 aeration opening at the top.

To account for the harmfulness of the sulfuric acid, any risk of dropping sulfuric acid onto the alleyway in the dryer hall has to be eliminated. Additionally any leakage of sulfuric acid throughout the dryer hall has to be avoided.

As a consequence, the sulphuric acid pipes to connect the tank with the supplier equipment are also double walled systems. This is to eliminate any possible spillage not only for environmental reasons but especially for health and safety reasons.

Independent of the safety measures described above, the pipes and the tank have to be visually checked every day. The system is described in the following chapters.

1 Sulphuric acid tank (SAT)

The sulphuric acid tank is provided as part of the package unit of the evaporator supplier. It is a PE-100-RC-WK-S-8000 (black) storage tank with a catchment tank of the same material. This catchment tank can hold 15 m^3, which is the net volume of the storage tank. Further tank details are given in the data sheet and the technical drawings.
The SAT contains a level gauge LI and a binary maximum level indicator L. In case the maximum level is reached, an alarm horn / light inside and outside the dryer hall

is activated. Additionally a leakage sensor is mounted between the inner tank and the catchment tank which triggers an alarm if sulfuric acid is detected.

⇨ See attached specification of MKR

2 Connections to belt dryer / evaporator

The pipes are connected to a PVC-U socket at the vacuum lifting station at the roof of the sulfuric acid tank. Details are given in the attached technical drawings.

The connection from the H_2SO_4 tank to the steam scrubber inside the evaporator units is part of the evaporator manufacturer's supply. The pipes connecting the tank and the two evaporator systems are secured with an outer protective pipe. The inner pipe is made of PVC-U, the outer pipe of 1.4401. This double walled piping is running at constant height and it is mounted at the back side of the evaporator systems, where access would be restricted to authorized persons only.

The H_2SO_4 tank is connected to the dryer system via a double walled PVC-U pipe with an inner diameter of DN15. The double walled pipe is then connected to the sulphuric acid pump (supplied by the dryer manufacturer). This pump is positioned directly next to the H_2SO_4 tank inside a stainless steel drip tray. At the pressure side of the pump, the pipe rises to cross the alleyway at a height of 3m. Underneath this pipe crossing there will be a steel protection that could absorb potential impacts from outside.
A low point is created at the sulfuric acid pump. At the air scrubber the pipe is led in at the roof of the pump cabin. This connection is made by the dryer manufacturer. Again there is a low point at the end of the pressure pipe inside the air scrubber cabin. At each low point a transparent leak detection pipe will be mounted. In case of any leak of the inner pipe, the sulphuric acid is collected in this transparent pipe and will be noticed during the daily visual inspection.

3 Upstand and drain within dryer hall

Because of the extensive security measures explained above, the possibility that the sulphuric acid can spill into the dryer hall can be discounted. Therefore the dryer hall containment does not need to be designed to resist 96% H_2SO_4.

The drain within the dryer hall should remain open, as it is needed for an undisturbed operation of the evaporator system. Furthermore we have demonstrated above that no spilling of sulphuric acid will occur.