Method statement for unloading sulfuric acid into the storage tank

The sulfuric acid tank is provided as part of the package unit of the evaporator. Its purpose is to provide sulfuric acid to the dryer and the evaporator. There, it is used to acidify the washing water in the respective scrubber allowing the capture of ammonium.
The membrane dosing pumps are each a part of the evaporator and the dryer, respectively.
The sulfuric acid will be supplied by the company Brenntag. It uses a compressor to pump the H_2SO_4 via pressurised air in the tank. With this method, the pipe can be emptied completely after the filling procedure.
The tank has a DN100 aeration opening to prevent any overpressure in the tank during filling. This aeration opening reduces the pressure head caused by emptying of the filling pipe, so that the tank can withstand this short increase in pressure.

1 Level control

The SAT (-05CM001) contains a level gauge LI (-05BG201) and a binary maximum level indicator L (-05BG302). The filling volume of the tank can be meter-read from the level gauge on the tank.

2 Refilling

Refilling of the tank must be supervised by the operator. It is a manual operation to prevent any injuries caused by the sulfuric acid. To ensure the safety of the tanker operator, two emergency showers and eye showers are mounted in the proximity. One is positioned inside the dryer hall, next to the sulfuric acid tank, and the second one is positioned outside the dryer hall, next to the filling cabinet. When planning the tank refill, the exact amount of sulfuric acid must be specified and ordered, to make sure the pipe can be emptied at the end of the filling process. That way an overfill scenario is avoided. Nevertheless, when refilling the tank with a tanker, the level gauge has to be observed continuously while the tank is slowly filled. If the maximum filling level is reached, tanking is stopped. In case of unawareness there is a second line of defence L (-05BG302), which activates an acoustic signal (-05SG001) to ensure that the operator notices.
Because of the small amounts of sulfuric acid used, a weekly, better a daily, check of the sulfuric acid level is required to determine whether refill is required. The maximum filling volume flow is 15 m^3/h.
The filling has to be conducted by at least two persons both wearing appropriate personal protection equipment. The plant operator must check the ullage in the tank

again before filling and double-check the maximum volume to be pumped into the tank. The routine is as follows:

1. Check and ensure that both emergency showers and eye showers are accessible and working.
2. Check and ensure that the spill kit is accessible and complete.
3. Filling routine as described by the H_2SO_4 delivery company (Brenntag).
4. When filling is complete and filling pipe is emptied as described by Brenntag: Closing of manual membrane valve at the filling cabinet.
5. Disconnecting of tanker hose.

3 Spillage of H_2SO_4

In case of spillage at the tanker connection point, there are several safety measures depending on the amount of sulfuric acid spilled. In any case, spillage must be reported and cleaned before anyone accesses the contaminated area.
Small amounts can be collected inside the filling cabinet, which can be emptied by a drain valve located on the underpart of the cabinet, and it must be disposed of appropriately.
If the filling cabinet cannot hold the amount of spilled sulfuric acid, a spill kit is lodged next to the connection point. This has to be used to prevent the sulfuric acid from spreading and flowing into the drainage system.
In case sulfuric acid has contaminated the leachate draining system, the spilling quantity and contamination degree needs to be assessed and the leachate tank may need to be emptied and disposed of before its contents are reintroduced into the process.
In case of spillage, the following steps have to be taken:

1. Close source of spillage (only when wearing suitable personal protection equipment!).
2. Use spill kit to embank the sulfuric acid.
3. Use spill kit to absorb the sulfuric acid.
4. When the spilled H_2SO_4 is cleaned, the used spill kit absorbents have to be disposed of appropriately.