HyNet Hydrogen Production Plant 1 – Technical Note

EPR RESPONSE – 5ci – BAT for Amine Emissions – Charcoal Filter

Summary

Confirm whether a charcoal filter will be installed to minimise amine carryover into the treated gas leaving the CO_2 absorber and, as a consequence, into the PSA tail gas.

Response

The Permit Application states within Table 3-9:

"A downstream charcoal filter has also been recommended to further reduce amine carry-over. The benefits conferred by such a filter will be evaluated at the Project's EPC stage. Preventing losses not only reduces the chemical's consumption, but also prevents its transfer to the Feed Fired Heater and Steam Boiler (via the PSA Unit and its tail gas production), and thus limits NOx production through amine combustion."

Therefore, the benefits of this charcoal filter and its operational setup shall be fully evaluated at the EPC stage.

However, the following is noted to provide some initial guidance on the topic and to what shall be considered during the EPC stage:

Pressure Swing Absorption Units (PSA) for this application are typically supplied and installed with an integrated guard bed such as a charcoal filter (activated carbon) within its battery limit, to protect it from any possible upstream carry over of unwanted compounds, such as an amine solvent.

However, to provide additional process resilience an independent charcoal filter (activated carbon) is expected to be installed downstream of the CO2 capture unit/ upstream of the PSA unit. The charcoal filter shall be installed as a lead/ lag system to allow continuous operations of the plant. The charcoal filter shall be highlighted as a requirement to the preferred PSA supplier. If they are unable to provide, then a separate charcoal filter shall be installed. This equipment shall be introduced to the equipment list as a line item.

Current levels of active solvent (amine) within the treated gas stream exiting the CO2 capture unit are in the range of 0.0000229 mol%, equivalent to 0.229ppm.

It is expected that the charcoal filter shall bring any amine carry over down to 0ppm, and hence 0ppm shall enter the PSA system and therefore not be present within the PSA tail gas/ combustion flue gas.

Reference List:

Heat and mass balance – carbon capture unit: 5194812-200-49EB-4-0001 Rev 05

Process flow diagram CO2 absorber and HP flash: 5194812-200-49DG02-4-0002-01 Rev 06