

HyNet Hydrogen Production Plant 1 – Technical Note

EPR Response – 2D: Operating Techniques and BAT for the Flare

Summary

Background

The smokeless operation of the flare is referred to in para 2.3.33 and Table 3-22. The info is taken from the flare datasheet.

Problem Statement

Describe how smokeless operation will be achieved in absence of steam assist.

Action

Kent to advise on flare design for smokeless operation.

Response

Smokey Operation

Black smoke can form when the flame of a flare does not have enough oxygen to completely burn the waste gas.

Smoke is more likely when there are more complex molecules being combusted – more carbon to make smoke and more energy required to break bonds.

The gas being flared is generally readily combustible – so risk of smoke producing combustion is lower than say a typical refinery flare:

- H₂
- CO
- CH₄

Steam or pressured air assist, provided typically by blower(s), can be used if required to introduce additional oxygen for full combustion.

Existing Project Details

The FEED project datasheet (Document No. 5194812-000-45ED-4-0004) includes the requirement for smokeless operation on pages 3 and 4, line 7, for all duty cases and also in Note M12, which states “Flare shall be smokeless burn type. Steam is not available, supplier shall advise how smokeless operation can be achieved.”

During the FEED Phase of the project, proposals were received from two (2) vendors as follows:

- Zeeco Europe, and,
- GBA Flare Systems.

Both vendors adhered to the requirements of smokeless operation and they are both summarised below:

Zeeco Europe: The flare tips will be smokeless to Ringelmann 1 or less during all cases shown in the datasheet. For the cold/dry flare tip, it will be smokeless at the case stated. If there are any smaller flow rates for the cold/dry tip, however, that have similar or heavier possible release cases, a small blower may be needed to keep any small amounts of smoke from forming.

GBA Flare systems: In accordance with the project enquiry requisition, the flare tips are designed for smokeless operation with a safe, reliable and long life.

For both flares, GBA proposed using their single nozzle sub-sonic pipe flare tip, complete with pilots and windshield offered in our standard 310S stainless steel construction.

In addition they also clarified: smokeless flaring is defined as Ringelmann 1 or better when viewed from grade. For the given gas compositions we predict that the flare will be "smokeless" to Ringelmann 1 or less for all flowrates.

GBA also advised that there is very little carbon to produce any smoke in the project duty cases.

So as can be seen, neither vendor stated that they required steam or air assist for their designs for the project duty cases. If there are lower cold/dry flowrates introduced in the next project phase, it is not seen as a major change to add a small air assist blower. Ultimately the Vendors have to follow the requirements stated in the datasheet and have done so to date.

Updates to Design

None required. Requirement for smokeless burning flares is clearly stated and has been accommodated by the vendors approached during the FEED stage. Therefore, meeting this requirement is not seen as an issue going forward.