

Applying Expandable Liner Hangers in Complex Gas Wells in Germany

L. Bierenriede¹, B. de Vries²

¹Neptune Energy Holding Germany GmbH, Drilling & Wells, Hanover, Germany, ²Halliburton, Completion Tools, Emmen, The Netherlands

Drilling in the North-West of Germany has its own specific challenges. One of these is the casing design. Its complexity has increased since loss zones/depleted reservoirs require a separate zonal isolation in addition to the other critical areas e.g. swelling clays, salt sections, potential inflow zones and weak formations. In consequence more casing strings are required as applied in the past to reduce the operational risk as much as possible.

Thus, finding a compromise between technical requirements, reliability/risk and economical boundary conditions was one of the key tasks while designing and preparing Adorf Z17.

Adorf Z17 was drilled in 2022 in Neptune's recently discovered Adorf Carboniferous Gas Field in the Western Emsland close to the Dutch-German border. It was necessary to implement one more string, compared to the two previous wells drilled from another cluster site, since a high risk of total mud losses was predicted for highly fractured, shallow Turonian Carbonates.

Several casing designs were discussed and also the availability of adequate equipment had to be considered resulting in a casing design modification only in the first two sections, while the proven concept below could be kept. Long wellhead delivery times required the ordering far before a basis for a detailed engineering of Adorf Z17 was possible and a liner hanger system the only option to manage all these boundary conditions.

Halliburton was able to deliver a technical solution and suggested a relatively large 17" expandable liner hanger system, which could be set successfully in the 20" surface casing of Adorf Z17 and the succeeding Adorf Z18 well. These expandable systems provide a couple of advantages compared to conventional liner hanger systems. The expandable liner hangers are available in large sizes, have no moving parts, and the redundant sealing elements are providing bi-directional holding capacity. Together with a larger flow area and an underreamed section, the equivalent circulating density could be reduced significantly and led to a successful cementation without losses afterwards.