



# DEPROPANISER ACCUMULATOR

CASE STUDY

**CATEGORY**  
PRODUCTS / PRESSURE VESSELS

**Equipment :** V6606 Depropaniser Accumulator

**Industry :** Refining

**Reference :** LA2832

**Client:** Shell (Geelong)

**Year :** 2012-2013

The aging Shell Geelong Refinery needed to replace an original pressure vessel which had been in service for approximately 40 years. The project was an opportunity to bring the vessel up to current standards and lower the risk profile of the equipment by applying modern engineering standards for cold metal embrittlement in pressure vessels. These requirements led to a set of very specific chemical and mechanical requirements for the raw materials and welding







**The Requirement** was design and manufacture of a replacement pressure vessel constructed from a custom blend low temperature carbon steel and single piece dished ends. These onerous specifications were in place to service the vessel's operating conditions where propane flashing during depressuring presented a brittle fracture risk scenario for the material.

**Scope** included Design, Draft, Verify and Register



# PROJECT DETAILS

## Engineering

-  Design Pressure 2164 kPag
-  Design Temperature -48°C to 240°C
-  Dimensions 3.05m ID, 5m O/A height x 9.2 long
-  Mass 35,000 kg
-  Standard : AS1210 Class 1
-  PWHT 635°C =+/-15°C per 25mm



## Materials

- Shell : ASTM 516-60 S5/S54 x 40mm thick
- Heads : ASTM 516-60 S5/S54 x 45mm, single piece
- Flanges & nozzles : ASTM A350-LF2

## Manufacturing

- NDE 100% Visual, RT, UT, MT, PT, HT, PMI
- Hydro pressure 3680 kPa

## Surface Treatment

- Epoxy 3 coat system 275um

## Delivery / Transport

CIF, Geelong





## Planning

The long lead time on custom material meant the project's schedule needed to plan for material and engineering in parallel, while adjusting the build sequence to accommodate the single piece dished end lead time. In addition welding consumables also needed to be custom made, so planning this with Lincoln Electric and development of new weld procedures to meet the chemical and mechanical requirements established a clear critical path in the schedule and identified risks.

## Challenges

The primary challenges for the project was obtaining the custom milled plates, with the required chemical and mechanical properties. In particular the narrow limit in carbon content, the Cu + Ni sum limited to 0.15% or less with minus 500C impacts. Because of the relatively small volume (approx. 25 tonnes) negotiating a mill run with European supplier also posed a scheduling challenge. The secondary challenges were the manufacture of a chemically constrained welding consumable to meet the copper, hardness and impact constraints and the forming of the single piece 3m inside diameter dished end.

## Notes

The vessels geometry, dominated by a large sump and a top located manway, resulted in an overall load height of 5.0m making transport planning more complicated due to a high centre of gravity and nearing the maximum 'off the road height' of 5.2m

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