# PROJECT REFERENCE

## SHELL DEER PARK CHEMICAL PLANT

## AP Armaflex®

- **Summary**
  In 2011, the two 82-ft. diameter butadiene storage spheres at Shell Deer Park were re-insulated. Planning the re-insulation of the spheres was an involved process that required exhaustive research and testing before Shell ultimately decided to use AP Armaflex closed-cell elastomeric foam as the insulating material.

- **Place**
  Houston, Texas

- **Installation date**
  2011

- **Market segment**
  Petrochemical industry

- **Application**
  Chemical storage spheres

- **Insulation systems used**
  1-1/2 inch AP Armaflex with a minimum R-value of 8.4

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The primary purpose for insulating the tanks was energy efficiency and savings. The butadiene must be maintained within a temperature range of approximately 35 – 40°F. If it gets too warm, it will vaporize and lead to costly product waste. By combining two thicknesses of 1-1/2-inch Armaflex, Shell was able to achieve an R-value of better than 8.4.

To keep the butadiene within this temperature range, it is circulated through a chiller pack that sits adjacent to the two storage spheres. The chemical is constantly moving to and from the chiller pack, except during cooler weather when outdoor temperatures are sufficient to keep it within proper range. Insulation is required to minimize heat gain and thus reduce the load on the chillers. With a massive amount of fluid circulating through the tanks, this energy savings is significant.

Condensation control was also extremely important. Chilled butadiene spheres sweat if they aren't tightly insulated. Any moisture that is allowed to accumulate beneath the insulation increases the risk of corrosion under insulation (CUI), a situation that could potentially compromise the structural integrity of the vessel. AP Armaflex addressed all of these concerns because: 1. Its firm, yet smooth skin could be tightly adhered to the surface using Armaflex® 520 BLV Adhesive, 2. Its closed-cell structure and very low water vapor permeability provide a material that neither absorbs nor transfers moisture.

Shell had selected an Epoxy Intumescent Fireproofing system to protect the tanks in the event of a fire. This thick, paint-like material is sprayed onto the surface of the spheres before the insulation is applied. When heated to extremely high temperatures, this material expands and forms a protective shell around the vessel and its contents. It was critical that whatever product was chosen to insulate the tank didn't interfere with the reaction of the fireproofing in the event of a fire. Shell ordered the coatings manufacturer to perform high temperature burn tests at their R&D facility in the UK.

The test showed that while Armacell elastomeric foam meets the 25/50 flame spread and smoke requirement for insulation, it will disintegrate as needed at very extreme temperatures, allowing the fire proofing system to swing into action. It also provided the final assurance that elastomeric foam was the right insulating material for this demanding application.

While the planning process was intense, the installation process was quite simple. The installation crew worked with 4-foot wide rolls of AP Armaflex, installing several lengths at a time using the Armaflex® 520 BLV Low VOC adhesive. (Low VOC adhesives were required to meet Shell's stringent health and safety standards). The final step was installing a rubber membrane cladding onto the insulated exterior to serve as a weatherproof shield. Interior applications of AP Armaflex would not require such cladding, but because the spheres would be exposed to all forms of weather and ultraviolet rays, it was required.

As a result of their exhaustive qualification process, the Shell project team is confident the Armaflex material will provide the necessary thermal performance and interact with the fireproofing system as needed. When coupled with the ease-of-installation, this is an insulation system that will deliver consistent and reliable performance.

**Armacell Engineered Systems Ltd | Registered Office**
Suite No. 60 of Jumpstart Business Centre, Room 1501-08, Millennium City 5, • Kwun Tong, Kowloon • Hong Kong

**Armacell GmbH | Operations Centre & Technical Office**
Robert-Bosch-Str. 10 • 48153 Muenster • Germany

**Phone**
+49 251 7603 916 (Office hours: 9:00 - 17:00 CET)

**Email**
General enquiries oilandgas@armacell.com
Technical enquiries technical.oilandgas@armacell.com

Please consult our website for a full list of regional offices and contact details:
www.armacell.com/oilandgas

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