



Vacuum Column Heater Package - Case Study



Birwelco Limited has a long-standing reputation for delivering high-quality engineered solutions to the petroleum refining and chemical processing industries. One of its key areas of expertise is the manufacturing of Vacuum Column Heaters, a critical component in vacuum distillation units (VDU) used in refineries and petrochemical plants, as evidenced by their recent fabrication adhering to the API 560 / API 530 Design Code & modular design.

Project Profile-

- ① Project title: Vacuum Column Heater
- ① Year of Built: 2023-2025
- ① End user: INDIAN OIL CORPORATION LTD, (IOCL)
- ① Industry: Petroleum Refining and Chemical Processing
- ① Design Code: API 560 / API 530
- ① Design Pressure: 15 kg/cm²g
- ① Design Temperature: 600 C
- ① Design Flow rate: 409260 kg/hr



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A vacuum column heater is a crucial component in the petroleum refining and chemical processing industry. It plays a significant role in the vacuum distillation process, which is used to separate and refine heavy hydrocarbons at lower temperatures, reducing the risk of thermal cracking and ensuring the efficient recovery of valuable petroleum products.

A vacuum column heater is primarily used to preheat the feedstock entering the vacuum distillation column. This process is essential for reducing the viscosity of heavy hydrocarbons and facilitating their separation at reduced pressures. Since vacuum distillation operates at lower pressures than atmospheric distillation, the heater ensures that the feed reaches the required temperature while preventing thermal degradation of the hydrocarbons.

The sequencing of these activities was critical to achieving the aggressive schedule required by the Client while still maintaining a safe work environment. Despite a number of additional in-progress requirements, the project was completed, with zero weld repair failures and with an outstanding safety record.

The company's manufacturing process includes:

- ① **Design & Engineering:** Utilization of advanced computational tools for thermal and mechanical design.
- ① **Material Selection:** High-grade carbon steel and stainless steel alloys resistant to high temperatures and corrosive refinery environments.
- ① **Fabrication & Welding:** Precision cutting, forming, and welding techniques ensure robust construction.
- ① **Assembly & Integration:** Incorporation of advanced burner technology for optimal combustion efficiency.
- ① **Quality Control & Testing:** Hydrostatic and thermal performance testing under operational conditions.
- ① **Installation & Commissioning:** On-site assembly and alignment of heater components.



Vacuum Column Heaters are integral to the refining and petrochemical industries, facilitating efficient hydrocarbon processing under vacuum conditions. Through a robust manufacturing process incorporating precision engineering, high-quality materials, and rigorous testing, Birwelco Limited ensures that its Vacuum heaters deliver superior performance, energy efficiency, and longevity in demanding industrial environments.

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Optimized heat transfer enhances thermal efficiency, reducing fuel consumption and improving overall operational performance. The use of high-quality materials and superior fabrication ensures durability and resistance to extreme refinery usage conditions, extending equipment life. Modular designs simplify maintenance, minimizing downtime and lowering associated costs.

Additionally, efficient heating technology reduces CO₂ emissions and energy consumption, supporting sustainability goals. Designed for seamless integration, the heater can be customized to fit effortlessly into existing refinery infrastructure, enhancing operational efficiency without major modifications.

The successful assembly and commissioning of the Vacuum Column Heater exemplify UnitBirwelco's expertise in delivering high-precision engineering solutions. By maintaining a strong focus on safety, quality, and efficiency, the project team ensured a seamless transition from fabrication to full operations. This achievement underscores UnitBirwelco's commitment to engineering excellence and sets a benchmark for future industrial projects.

- ① **Phase 1:** Pre-assembly of heater components, including radiant coils, convection sections, and steel framework, with rigorous quality checks and efficient material handling planning.
- ① **Phase 2:** Transportation and precise positioning of heater modules, burner systems, and refractory linings, ensuring seamless integration of fuel supply and air preheater systems while executing heavy lifting operations with safety measures.
- ① **Phase 3:** Installation of high-pressure pipework, burners, and control systems, requiring coordinated efforts between piping, electrical, and automation teams. Advanced welding and non-destructive testing (NDT) ensured top-quality standards.
- ① **Phase 4:** Comprehensive testing, including hydrotesting, burner ignition trials, and control system calibration, ensuring operational efficiency, safety compliance, and seamless commissioning.



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