Semiconductor : Hot Water Cooled by Water

The Objective

The customer, a manufacturer of semiconductor processing equipment, required a constant stream of water to be supplied to the machine for cooling purposes. The wastewater leaving the machine needed to be cooled before it could be safely discharged to the drain. The solution also needed to meet spatial constraints and ensure efficient thermal performance.

The Challenge

- Cooling wastewater effectively before discharge
- Maintaining reliable operation under spatial constraints
- Ensuring efficient heat transfer without adding maintenance complexity

The Solution

Exergy implemented a compact Shell & Tube Heat Exchanger, Model #00256-1 (35 Series), constructed entirely of 316L Stainless Steel. Water was recommended as the cooling fluid over water-glycol to maximize efficiency. The design's small tubing facilitated turbulent flow, enhancing heat transfer within a compact 1.5" shell diameter and 20" tube length.

The Results / Benefits

- Compact Design: Small footprint fit within the customer's space constraints.
- Efficiency: 2.93 ft^2 of heat transfer area enabled effective cooling.
- Reliability: No maintenance was required, ensuring long-term performance.
- Process Safety: Ensured wastewater was cooled to acceptable levels before discharge.

Conclusion

The installation of Exergy's 35 Series Shell & Tube Heat Exchanger addressed the customer's needs by delivering efficient cooling in a compact, reliable, and maintenance-free design. This solution ensured compliance with wastewater discharge requirements while supporting the reliability of the semiconductor process.