Material, grade and tube-arrangement comparison

Service condition	Options to evaluate	Key controls
Clean controlled fluid	Carbon steel, stainless or project alloy	Oxygen, corrosion allowance, water quality and long shutdowns
Freshwater or cooling-tower water	Copper-nickel, stainless, duplex or titanium based on chemistry	Chlorides, sulfides, biology, velocity and fouling
Seawater	Titanium, selected copper-nickel or project-resistant alloys	Pollution, velocity, galvanic effects, tubesheet and cathodic protection
Frequent mechanical cleaning	Straight-tube arrangement	Two-end access, cleaning tools and head design
Large shell/tube temperature difference	U Tube, floating head or expansion joint	Thermal stress, startup/shutdown cycling and fatigue
Highly sensitive leakage service	Corrosion-resistant material and enhanced joint design	Weld/expansion method, leak test, online monitoring and repairability

Source / basis: https://niktrd.com/condenser-tube