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TECHNIP Air Cooler Design Guide The following is a summary of TECHNIP's air cooler design guide, which is part of GE Process Engineering Design Guide Part 1 - Section 1. **Air Cooler Designation** TECHNIP conventionally designates an air cooler as follows: [width in feet] x [height in feet] x [number of rows or layers]. **Typical Heat Transfer Coefficient Values** The following table provides typical values for the heat transfer coefficient (U) for various services: | Service | U (W/m°C) | Btu/h/ft°F | | --- | --- | --- | | Condensing service | 100-120 | 570-680 | | Amine reactivator | 105-125 | 595-710 | | Ammonia | 75-90 | 425-510 | | Freon 12 | 50-60 | 285-340 | **Cooling Tower Design** In a cooling tower, water is cooled by evaporation of part of the water. There are several types of cooling towers: 1. **Mechanical-draft towers**: These have a fan mounted laterally at the side of the tower and force air through the packing. 2. **Forced-draft towers**: These also use a fan to force air through the packing, but it's mounted at the top of the tower. 3. **Induced-draft towers**: These suck air up through the packing from the top of the tower. The heat exchanger in cooling towers is usually on a counter-flow or co-current flow basis. This document provides guidance on the design of cooling towers and their electrical equipment for process engineering purposes. It covers the design parameters, such as air flow rate, temperature, and dimensions, as well as the installation requirements for fogging and plume abatement. Cooling towers are more expensive to install than other types, but they may be necessary in certain situations where there is a risk of ice formation or visual impact concerns. The document outlines the steps for preliminary design, including calculating the wet bulb temperature and dry bulb temperature of air, as well as determining the hot water temperature and cold water temperature. The combustion section of the document discusses the fuels typically used in refineries, such as gases and liquid fuels, and provides an equation for calculating the combustion reaction rate. API TDB92 contains an error; the correct value can be found in API TDB of 1983. To convert heating value to kcal/kg, divide the given values by 1.8. Common fuels contain sulfur that can cause acid corrosion when there is total or partial condensation of flue gas. In practice, Higher Heating Value (HHV) is rarely used. To obtain Lower Heating Value (LHV) from HHV: LHV = HHV - 5270 x (at 60°F) LHV = HHV x 5222 x (at 25°C) Note that LHV and HHV should be in kcal/kg, and x represents the mass percentage of hydrogen in the fuel. In the calculation of LHV for a gaseous hydrocarbon without inert components, a small amount of hydrogen can be added to estimate the approximate value (to be used only when LHV cannot be calculated by other methods): LHV = 1400 + 24.8 p This formula is intended for general use and should not be relied upon as an exact method.