

Computer Aided Design of an Indirect Type UHT Heat Exchanger

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ABSTRACT

Ultra High Temperature (UHT) sterilization process involving indirect type heating has an advantage of simplicity in design and operation. Indirect type of equipment usually consists of either plate heat exchangers or tubular heat exchangers used for different stages of sterilization process. Tubular heating systems are advantageous than plate heating systems as a fouling layer on the heated surface has much less proportional effect on the area available for the product flow. Tubular systems can withstand a higher internal product pressures because of the absence of gaskets. This paper describes the computer aided design procedure for a tubular indirect type UHT heat exchanger for heating milk to sterilizing temperature. The unit consists of a triple tube heat exchanger (TTHE) with three concentric tubes having inner diameters 12.5, 22.5, 28.0 mm and outer diameters 15.0, 25.5, 31.0 mm respectively. The iterative computer aided design procedure gave an optimum length of 2.4 m for the TTHE with a milk processing capacity of 7.9 litres/ min. The overall heat transfer coefficients based on outside area of inner tube and inside area of middle tube for the TTHE were found to be 2564 and 2700 w/m² k respectively. The milk side heat transfer coefficient was found to be 4630 w/m² k.

Key words : Design, Heat Exchanger, Sterilization.