1.1 Introduction to heat exchangers.

Heat exchanger is a device that’s used to transfer thermal energy between two or more fluid, between a solid surface and a fluid or between solid particulates and a fluid at different tempratures and in thermal contact .In a heat exchanger there are no external heat and work interactions.

Typical applications involve heating or cooling of a fluid stream of concern and evaporation or condensation of single or multi component fluid stream. Heat exchangers are classified in a variety of manners .Basically in many heat exchangers the fluids are separated by a heat transfer surface and ideally they don’t mix or leak. Such exchangers are known as direct transfer type or simply recuperators’ .Heat transfer in the separating wall of a recuperators generally takes place by conduction. However in a heat pipe heat exchanger, the heat pipe not only acts as a separating wall but also facilitates the transfer of heat by condensation ,evaporation and conduction of the working fluid inside the heat pipe. In general if the fluids are immiscible the wall may be eliminated and the interface between the fluids replaces a heat transfer surface as in direct contact heat exchanger.In contrast exchangers in which there is intermittent heat exchange between the hot and cold fluids-via thermal energy storage and release through the exchanger surface or matrix –are referred to as indirect type heat exchanger or simply regenerators.

Common examples of heat exchangers are shell and tube exchangers, automobile radiators, condensers, evaporators, air preheaters, and cooling tower. If no phase change occurs in any of the fluids in the exchanger it is referred to as sensible heat exchanger.

1.1.1Classification of heat exchangers

1)According to transfer process

* Indirect contact type.
* Direct transfer type-single phase

-multiphase

* Storage type
* Fluidised bed
* Direct contact type
* Immiscible fluids
* Gas liquid
* Liquid vapour

2)According to number of fluids

* Two fluid
* Three fluid
* N fluids(N>3)

3)According to flow arrangements

* Single pass
* Counter flow
* Parallel flow
* Cross flow
* Split flow
* Divided flow
* Multipass
* Extended surface
* Shell and tube
* Plate

4) according to construction

* Tubular
* Double pipe
* Shell and tube
* Spiral tube
* Pipe coils
* Plate type
* PHE-gasket ed

-welded

-brazed

* Spiral
* Plate coil
* Printed circuit

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