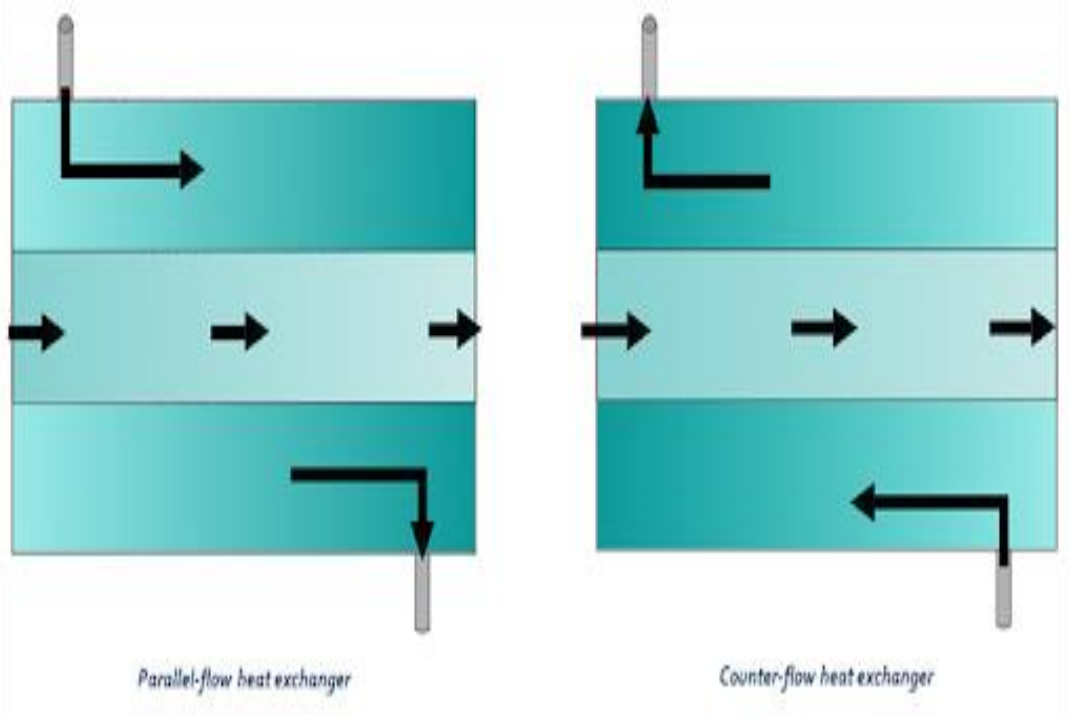
Heat exchangers

- The device at which heat exchange between two fluids at different temperatures and separated by a solid wall occurs is called heat exchanger.

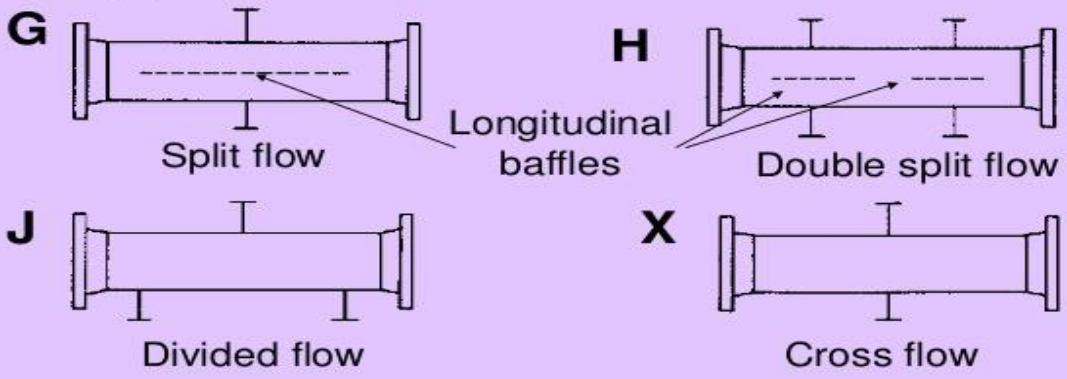
- Its applications may be found in space heating, air conditioning, power production, waste heat recovery and chemical processing.

TYPES:



More shell types

- G and H shells normally only used for horizontal thermosyphon reboilers
- J and X shells if allowable pressure drop can not be achieved in an E shell



Heat Transfer Coefficient

- **Heat transfer rate**, $q = UA\Delta T_m$

  U = overall heat transfer coefficient, $W/(m^2C)$

  A = heat transfer surface area, m^2

ΔT_m = mean temperature difference, ^oC

- **Overall Heat Transfer Coefficient, U_o**

$$\frac{1}{U_o} = \frac{1}{h_o} + \frac{1}{h_{od}} + \frac{d_o ln(\frac{d_o}{d_i})}{2k_w} + \frac{d_o}{d_i}\left(\frac{1}{h_i} + \frac{1}{h_{id}}\right)$$

h_o= outside fluid film coefficient, $W/(m^2.^oC)$

h_i= inside fluid film coefficient, $W/(m^2.^oC)$

h_{od}= outside dirt coefficient (fouling factor), $W/(m^2.^oC)$

h_{id}= inside dirt coefficient, $W/(m^2.^oC)$

k_w= thermal conductivity of the tube wall material, $W/(m^2.^oC)$

d_i= tube inside diameter, m

d_o= tube outside diameter, m