

ABSTRACT

A zero-power-consumption self-adaptive distributed waste heat recovery and utilization system for an ethylene device is provided. The waste heat recovery and utilization system includes a waste heat collection pipeline system, multiple waste heat recovery devices (9) arranged in groups, and a waste heat return pipeline system. The waste heat collection pipeline system is configured to lead out a working medium having waste heat from a waste heat source of the ethylene device and distribute the working medium to the waste heat recovery devices (9). The waste heat recovery devices (9) are configured to heat combustion-supporting air of a bottom burner of an ethylene cracking furnace through the waste heat. The waste heat return pipeline system is configured to transport the working medium that has undergone waste heat recovery and utilization back to the waste heat source. The waste heat collection pipeline system includes a collection master pipe (16), collection main pipes (7) and collection branch pipes (12). The collection master pipe (16) is provided with a master pipe flow control element (17), each of the collection main pipes (7) is provided with a main pipe flow control element (6), and each of the collection branch pipes (12) is provided with a branch pipe flow control element (11), so that flow rates in groups of waste heat recovery devices (9) are uniformly distributed. Flow rates can be self-adaptively adjusted through a design of flow distribution, and uniformity of flow rates in groups of waste heat recovery devices (9) can be realized without adding an adjustment control valve, thereby ensuring uniformity of the temperature field in a furnace chamber of the ethylene cracking furnace.