FLY ASH COMPOSITES AS INSULATION IN CIRCULAR PIPES

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Introduction

Fly ash, the waste product of thermal power plants, may become threat to environment if proper disposal/use of it is not found out. Fly ash only about 15% is used for different purpose like making bricks, concrete, cement and roads etc. out of approximately 100 million ton the rest is used for landfills or simply lying on the site of disposal [1, 2]. There is a need to find out the other area for use. In this backdrop an effort is made to find out whether fly ash with some other material like plaster of paris or cement as composites could be used as insulation [3].

Experimental

The main processes adopted are as follows:-

Different samples of different composition of ash, cement, lime and plaster of paris is made and its physical properties like density, strength water absorption, thermal conductivity are observed. Finally only two composites are selected for experimental work as lagging, one is 70% ash, 10% cement, 10% lime and 10% plaster of paris named composite-A and the other 50% ash and 50% plaster of paris named composite-B [4].

The molding process with the help of a concentric PVC pipe was tedious process. It takes a lot of time to finally shape up a consistent and durable lagging over a C.I. pipe. After drying of lagging the temperature drop is recorded for different fixed length of pipe in case of bare (unlagged) pipe and lagged pipes with the two composites at different flow rate 95, 85, 75, 65, 55, kg/hr and inlet temperature 50^0, 60^0 & 70^0 C as variables. Atmospheric temperature is also noted.

Result and discussion

Based on these data the % heat loss and over all heat transfer coefficient are calculated. A graph for temperature drop (Figure 1), a chart for percent heat loss (Figure 2) and a graph for over all heat transfer (Figure 3) is plotted with distance, flow rate and inlet temp. From the results it can be concluded that both the composites behave like insulation where lagging-A gives 7% less heat loss in comparison to bare; it is 10% in case of lagging-B.

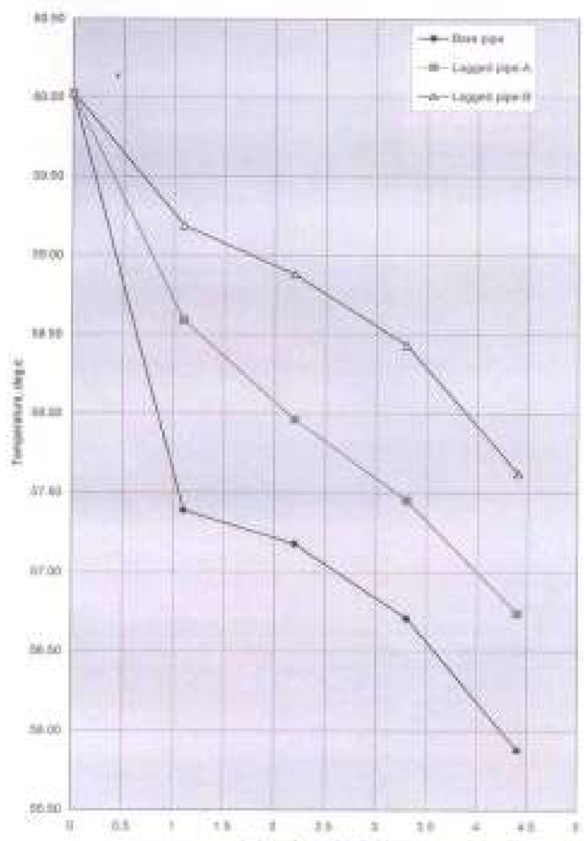

FIG 1- TEMPERATURE PROFILE AT CONSTANT INLET TEMP. OF 60 DEG. C AND FLOW RATE 75 Kg/hr

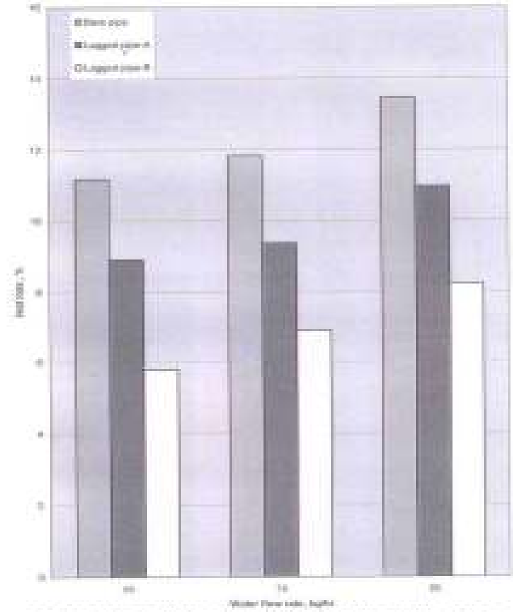

FIG 2. PERCENTAGE HEAT LOSS AT CONSTATNT INLET TEMP. 60 DEG. C

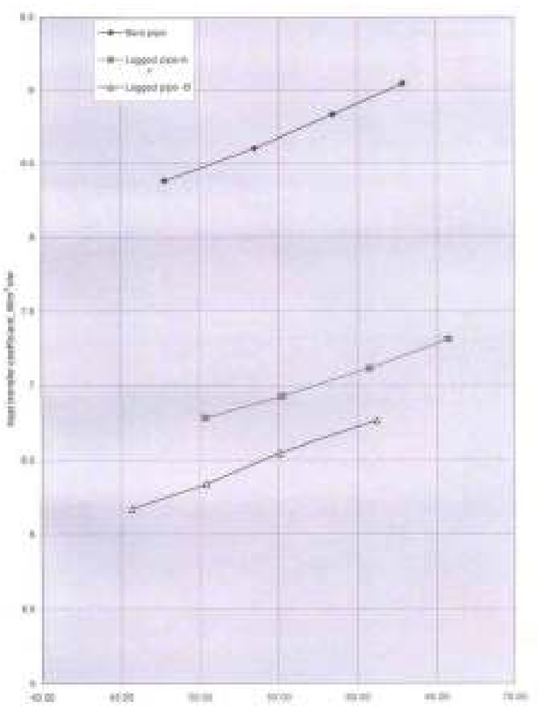

FIG 3. INLET TEMP. VS OVERALL HEAT TRANSFER COEFF. FOR FLOW RATE 75 Kg/hr

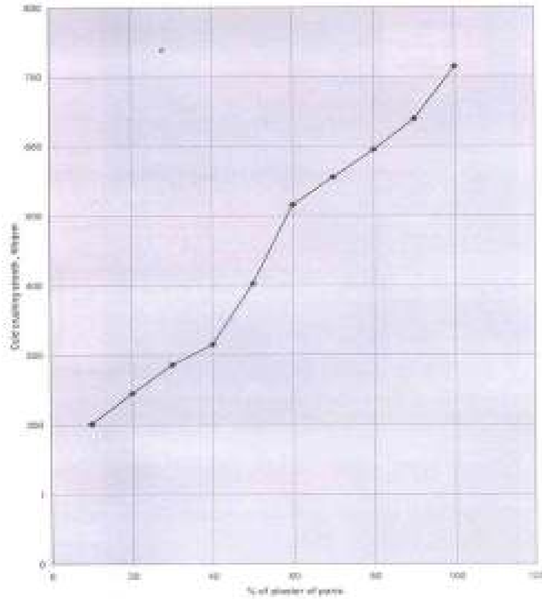

Fig.4 :CSS OF FLY ASH, PLASTER OF PARIS COMPOSITE

Conclusion:

With the studies of these graphs it is justified that the composite of lagged pipe-B is more effective in comparison to lagged pipe-A and bare pipe as an insulation. Future scope in this area is required with a broad range of composition and thickness of composites, flow rate and inlet temperature as variables. So that final claim can be made about its feasibility, durability, viability as insulation.

References

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