© 2015 IJSRSET | Volume 1 | Issue 6 | Print ISSN : 2395-1990 | Online ISSN : 2394-4099
Themed Section: Engineering and Technology

Increasing Efficiency of Boiler : A Case of Sugar Manufacturing Industry

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ABSTRACT

This work describes the boilers efficiency improvement as a case of sugar industry in Maharashtra. It is necessary to improve efficiency of boiler for performance improvement. Here boiler efficiency is improved by increasing various tubes and addition of super heater.
Keywords : Boilers Efficiency, Super Heater Tubes.

I. INTRODUCTION

This project describes the modern boilers in the karmayogi shankaraoji Patil, sahakari sugar industry and ways to improve the boiler efficiency. Boiler is device which is used for any developing industries for production. It is necessary to improve efficiency of boiler for performance improvement. Here boiler efficiency is improved by increasing various tubes and addition of super heater. Along with this, extension of side wall headers and tubes (LH & RH), modification of front wall tubes headers & roof tubes, addition of furnace bottom tubes & headers, modification of screen tubes, addition of tertiary super heater coils, modification of steam drum to front header down comers, addition of front header to bottom header down comers, modification of steam drum &addition of relief tube. Improvements in mentioned parameters lead to performance improvement of boiler of super heater.

II. METHODS AND MATERIAL

Way of increasing boiler efficiency.
When the following Modification is given

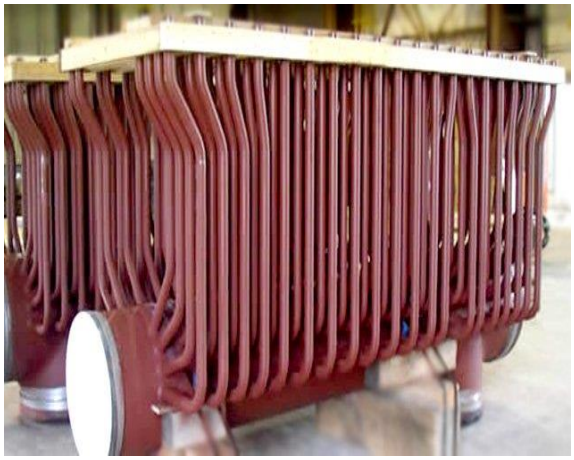
(A)EXTENSION OF SIDE WALL HEADERS & TUBES (LH)
(B)EXTENSION OF SIDE WALL HEADERS & TUBES (RH)

The Extension of side wall header to extent the tubes then the area is increasing .the increasing the boiler efficiency of boilers water cooling tubes along the side walls of said furnace, a cross drum, and connections from the upper ends of said side wall tubes to said drum, said connections comprising upwardly' extending tubes entering said drum at points spaced longitudinally along said drum, the lower ends of said last-named tubes being spaced from each other in directions transversely of said drum. e.g. the old tubes size is 76.2OD*4.06*11332 then the increasing size is 76.2OD*4.032*12332,so the heating area is increasing to increasing boilers efficiency. The extension side wall tubes is increasing heating area is 425°c. The increasing efficiency by this case 2.8%.

1. MODIFICATION OF FRONT WALL TUBES HEADERS & ROOF TUBES

A) ADDITION OF FURANACE BOTTOM TUBES & HEADERS

B) MODIFICATION OF SCREEN TUBE



The modification of front wall tubs headers that the addition of tubes to increase the area so that the increasing in the boiler efficiency. The Increases the area to increasing the boilers efficiency. E.g. the old tube size is 76.2OD*4.06*12525 and new tubes size is 76.2OD*4.06*13129.when the area increasing to increase the boilers efficiency. The heating area increasing this condition to increasing efficiency by 2.08%

3. ADDITION OF TERTIARY SUPER TUBE HEATER COILS

A) MODIFICATION OF STEAM DRUM TO FRONT HEADER DOWN COMMERS B) ADDITION OF FORNT HEADER TO BOTTOM HEADER DOWN COMMERS

When we add super heaters to increasing the boilers efficiency. The heating area is increases to increasing the boilers efficiency .the addition of super header tubes that the increasing heating coils and heating area. This case to increasing boilers efficiency by 3.87%

4. MODIFICATION OF STEAM DRUM TO FRONT HEADRES DOWN COMMERS

Due to modification of steam drum increases heating area so increases the boiler efficiency. The modification and addition of steam drums tube to increasing boilers efficiency.

E.g. the old tube size is 76.2OD*4.06*16506 and new tubes size is 76.2OD*4.06*17289. The heating surface is increases when the increasing the boilers efficiency. When this modification of steam drums to front headers down commers efficiency increases by 1.01%.

5. MODIFICATION OF STEAM DRUM AND ADDITION OF RELIEF TUBES

Modifications of steam drums and addition of relief tubes that the bend of tubes from the upper headers to drum .we are the addition of relief tubes to increases the heating surface area. When the increasing the surface heating area to increasing the boiler efficiency .by using this method increases boilers efficiency nearly by 1.78%.

III. RESULTS AND DISCUSSION

1. Extension of side wall headers & tubes

Tube Size	New Tube size	Ƞ%
76.2OD*4.06*11332	76.2OD*4.032*12332	2.18%

2. Modification of front wall tubes

Old tube size	New tubes size	Ƞ%
76.2OD*4.06*12525	76.2OD*4.06*13129	2.08%

3. Tertiary super heater coil

Parameter	Old	New	Unit
Capacity	80	90	TPH
Working pressure	53.3	53.3	Kg/cm^2
Super heater outlet temp	440	490	$^{\circ}c$
Heating surface area	2700	2929	m^2
Super heater outlet pressure	45	45	Kg/cm^2
Heating surface area coils	368	571	m^2

4. Modification of steam drums tubes

Old Tubes size	New tubes size	Ƞ%
76.2OD*4.06*8006	76.2OD*4.06*8107	1.1%

5. Addition of front header tubes

Old Tubes Size	New Tubes size	Ƞ%
76.2OD*4.06*16506	76.2OD*4.06*17289	1.01%

6. Addition of relief tubes

Old Tubes size	New tubes size	No. of tubes old	No. of tubes new	Ƞ%
76.2OD*4.06*7827	76.2OD*4.06*7433	10	12	1.78%

By using this concepts we increases the boiler efficiency up to 12%

IV. CONCLUSION

We increase the efficiency of boiler by increasing no of tubes &adding super heater. Boiler efficiency also increased by reducing heat losses & increasing heat input. This heat input is increased by adding oxygen in the furnace area so more heat input is transferred to boiler process so increases the efficiency of boiler. By increasing length of tube boiler & adding super heater boiler gives max heat input to the process so increases ton capacity of boiler. In this way we get profit by increasing efficiency of boiler.

V. ACKNOWLEDGEMENT

My special thanks to Prof.S.P.Joshi who at very discrete step in studies of this seminar contribution his valuable guidance to solve every problem that arose. I wish to thank our H.O.D. Prof. Kshirsagar S.R. for opening the door of department towards the realization of seminar report

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