



1 DEFINITION OF TASK

Between 16 and 18 of May 2020 Performance Tests were carried out on Unit 3 of Caofeidian Power Station in China. The Boiler Efficiency Tests were carried out according to EN 12952-15 at five (5) different loads to determine the efficiency of the unit after implementing the energy saving technologies. Furthermore, the supplied fuel mass flow was calculated acc. to chap. 6.3 of this document serving as input data for the calculation of the Unit Net Efficiency.

2 SUMMARY OF TEST RESULTS

The tests were carried out at 1000 MW, 788 MW, 750MW, 525 MW and 500 MW loads with energy saving technologies (Test 1 to 5). During the 1000 MW load (Test 1), the oxygen content downstream RAPH was significantly higher than the design value of 3,67 %, therefore a correction to the design value has been applied as per agreement between the power plant owner and Shenergy (Test 1A). A summary of the main test results is presented in the table below. More detailed information is listed in enclosure 1 of chapter 8.

Test Loads		1000 MW	1000 MW	788 MW	750 MW	525 MW	500 MW
Test No.		1	1A	2	3	4	5
Plant Configuration		with innov.	with innov.	with innov.	with innov.	with innov.	with innov.
Boiler Efficiency η_B	%	94,00	94,30	94,15	93,93	94,16	94,23
Supplied Fuel Mass Flow	kg/s	94,59	94,37	76,62	74,46	52,33	49,73
P_{Gross}	MW	999,7	999,7	796,9	754,5	529,5	501,9
P_{Aux}	MW	27,5	27,5	19,7	19,2	18,1	17,4
P_{Net}	MW	972,2	972,2	777,2	735,3	511,4	484,5
Net coal consumption rate	g/kWh	263,4	262,8	263,8	265,6	271,6	273,8
Unit Net Efficiency η_{net}	%	46,45	46,56	46,37	46,07	45,04	44,69

With all plant features in operation the boiler efficiency was between 93,93 % (Test 3) and 94,30 % (Test 1A) and the Unit Net Efficiency between 44,69 % (Test 5) and 46,56 % (Test 1A).

The boiler efficiency tests and calculations were carried out acc. to EN 12952-15 based on coal analysis from the client. The supplied fuel mass flow was calculated acc. to the formula given in chap. 6.3 of this document.

The Unit Net Efficiency is determined as:

$$\eta_{net} = \frac{P_{net}}{\dot{m}_{Fo} H_{(N)}}$$

The Net Coal Consumption Rate was calculated acc. to the following formula:

$$NCCR = b_s = \frac{122,835}{\eta_{net}}$$