

**«QUADRA GENERATING COMPANY» OJSC
BRANCH OF «QUADRA» – «VORONEZH REGIONAL GENERATION» OJSC**

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June 26, 2014

«Northern Interindustry Company
«The Alternative» Ltd
For the attention of
Deputy Director General for Development
A.E. Lebedev

About the results of operation

Dear Mr.Lebedev,

In response to your request No.08-01.3/194 dated June 19, 2014, we send you Appraisal report on technical condition of БК3-160-100 ГМ boiler unit (No.11 and No.13) of production subdivision CHP-1 according to the results of in-service inspection after installation of CMKA[®] heat exchange elements into regenerative air heater.

Enclosures: appraisal report on the performance results in 1 sheet in 1 copy.

Sincerely yours,
Chief Engineer

V.F. Ozhogin

**Appraisal report on technical condition of БК3-160-100 ГМ boiler unit (No.11 and No.13)
of production subdivision CHP-1, branch of «Quadra» –
«Voronezh regional generation» OJSC**

Main parameters of boiler performance before and after the replacement of RAH heat exchange elements according to the results of in-service inspection are stated in the list of the main technical and economical parameters.

**List of the main technical and economical parameters of the performance of
БК3-160-100 ГМ boiler unit No.11 and no.13**

No.	Parameter	Dimension	Data			
			Boiler unit No.11		Boiler unit No.13	
			Until repair	After repair with the installation of CMKA® heat exchange elements into RAH	Until repair	After repair with the installation of CMKA® heat exchange elements into RAH
			Aug.12, 2010	Jun. 29, 2011	Dec.21, 2011	Oct. 09, 2012
1.	Type of RAH		PБII-3800	PБII-3800	PБII-3800	PБII-3800
2.	Steam capacity	tons/hour	110	117	154	158
3.	Type of fuel	gas/ mazut	gas	gas	gas	gas
	Fuel consumption	m ³ /h	8950	9400	11000	11400
	Calorie content of fuel	kcal/m ³	8237	8066	8071	8345
4.	Air leakage into furnace		15	12	10	12
	Coefficient of excess air at furnace outlet		1.20	1.16	1.10	1.09
	Coefficient of excess air before RAH		1.31	1.27	1.24	1.18
	Coefficient of excess air after RAH		1.42	1.39	1.32	1.27
5.	Gas temperature at RAH inlet	°C	234	250	252	255
	Air temperature at boiler inlet	°C	35	32	28.5	27
	Gas temperature at RAH outlet	°C	134	125	149	124
	Air temperature at RAH outlet	°C	179	220	185	210
6.	RAH resistance by gas	mm of water column	42	55	75	85
	RAH resistance by air	mm of water column	–	–	–	–
7.	Temperature of exhaust gases	°C	134	125	149	124
	Heat loss with exhaust gases	%	5.80	5.35	6.55	4.97
	Boiler gross efficiency	%	93.27	93.77	92.98	94.42