Hitachi Zosen INOVA

NEWENERGY

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APPENDIX

6

INDICATIVE WATER BALANCE AND BLOC DIAGRAM

APPENDIX 6: Indicative Water Balance and Bloc Diagram

Common system for 1 Line

Process system for 1 line

Town water 6.17

Rain Water, clean 0.00

Option

Floor drains (FGT area) 0.00

Various Drains Boiler Hall 0.00

Rain Water, dirty 0.00

Water Treatment System

Water/Steam cycle

Sampling station

Bottom ash water basin/tank

Boiler

Sootblowers

Boiler blow down system

Boiler shower cleaning

Bottom ash extractor

Cycle losses 1.16

Atmosphere 0.04

IBA 0.53

Flue gas 2.57

Bottom ash 1.88

Sewage system 0.00

1.16
4.42
3.54
2.43
2.43
1.74
1.75
0.88
0.17
0.12
0.12
0.12
0.58
0.17
1.09
1.75
0.12
0.53
0.24
0.04
0.37
0.53
0.37
1.09
0.12
0.12
0.71
2.59
2.59
1.88
0.00
0.00
0.00

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

A B C D E F G H I J K L

Figures are in t/h

Operating condition
- Normal operation at load point: LP N
- No. of Lines in operation: 1
- Rain water not considered

Mass Balance, status: i.o.
- **Total water input** 6.17 t/h
- **Total water output** 6.17 t/h

Design Data

Thermal power waste	per line	101.8 MW
Waste throughput	per line	37.5 t/h
Ash content waste		23.0%
Flue gas temp. inlet FGT		135 °C

Preliminary

Remarks
- The purpose of this mass balance calculation is to determine the overall process water consumption of the plant. It does not show all internal connections.
- The unit of all values is t/h (1'000 kg/h) except indicated otherwise.
- All given values are expected/assumed operating values and are given as mean values over the operation period.
- Water steam cycle losses are counted fully as losses despite partly being recovered in bottom ash and/or process water basin.
- The given values shall not be used for pipe sizing purposes since it may not correspond to the design value of it.
- The calculation of cooling water flow for boiler blowdown is based on the following assumptions:
  Temperature of cooling water: 20 °C
  Temperature of after cooling: 100 °C

Rev.	Date	Description
2		
1		
0	25.08.17	First Issue

Project Name	Project No	Load point
Rockingham	YE-3324	LP N

	Date	Name
Prepared	25.08.17	Rem
Checked		
Approved		

Prog. No. : CSP-104 / V4.5

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Water Balance - Process

Bloc Diagram

HZI doc. N° :	Revision
-	1

Print date : 25.08.17 Page : 1/1

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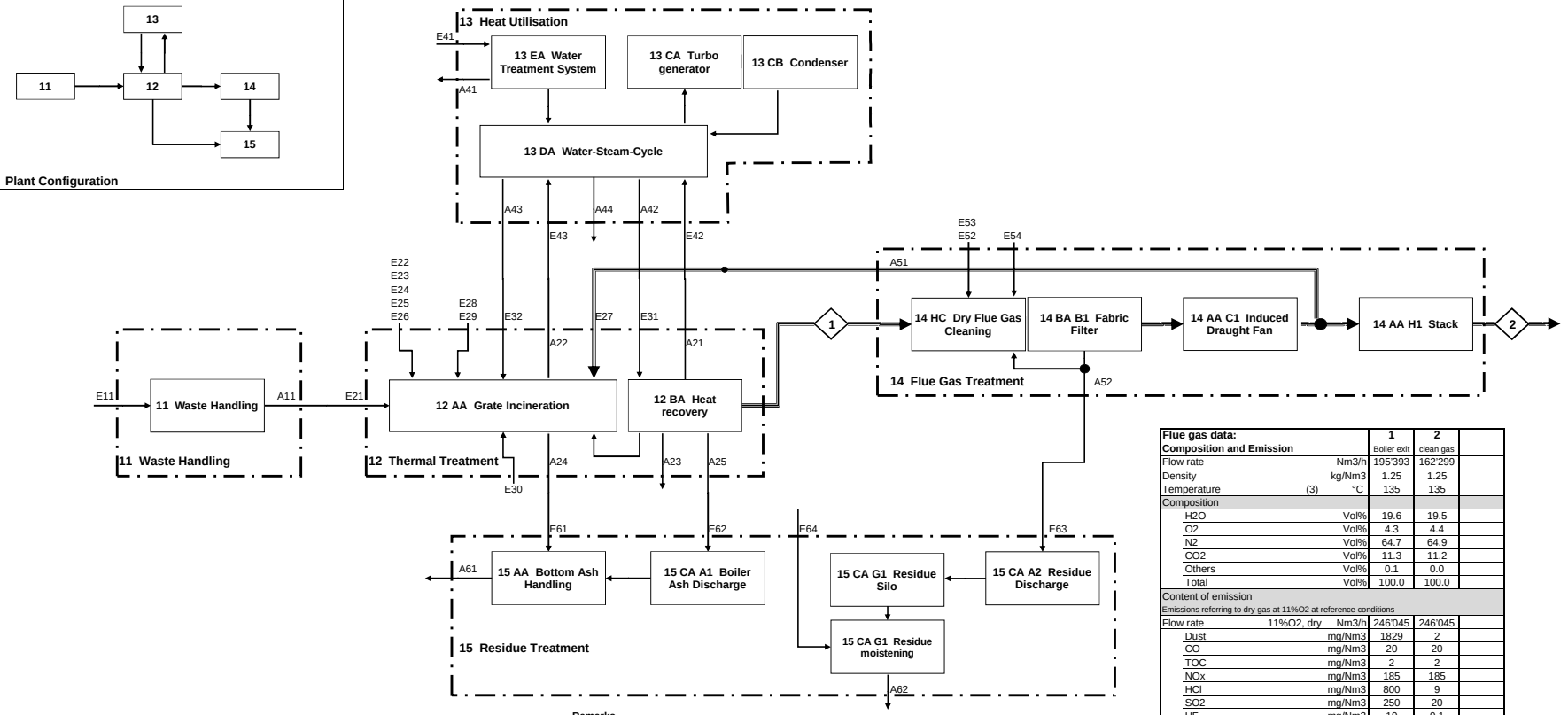

Remarks

Indicated values are expected average operating values and not guarantee values
The Reference Condition for gas volumes (described as Nm3) is: 0.0 °C / 1013.25 mbar
Air density: 1.279 kg/Nm3
(1) Steam parameters: 61.5 bara 421 °C
(2) Feedwater temperature: 120 °C
(3) Based on marginal boiler fouling (approx. 800 operating hours)

Flue gas data: Composition and Emission			1 Boiler exit	2 clean gas	
Flow rate		Nm3/h	195'393	162'299	
Density		kg/Nm3	1.25	1.25	
Temperature	(3)	°C	135	135	
Composition					
H2O		Vol%	19.6	19.5	
O2		Vol%	4.3	4.4	
N2		Vol%	64.7	64.9	
CO2		Vol%	11.3	11.2	
Others		Vol%	0.1	0.0	
Total		Vol%	100.0	100.0	
Content of emission (Emissions referring to dry gas at 11%O2 at reference conditions)					
Flow rate	11%O2, dry	Nm3/h	246'045	246'045	
Dust		mg/Nm3	1829	2	
CO		mg/Nm3	20	20	
TOC		mg/Nm3	2	2	
NOx		mg/Nm3	185	185	
HCl		mg/Nm3	800	9	
SO2		mg/Nm3	250	20	
HF		mg/Nm3	10	0.1	
NH3		mg/Nm3	2	2	
Heavy metals					
Hg		mg/Nm3	0.2	<0.01	
Cd+Tl		mg/Nm3	2	<0.02	
Sb+As+Pb+Cr+Co +Cu+Mn+Ni+V		mg/Nm3	50	<0.2	
Dioxins / furans TEQ		ng/Nm3	2	<0.05	

Input				Output			
11 Waste Handling							
E11	Waste (NCV = 9.77 MJ/kg)	37'500	kg/h	A11	Waste	37'500	kg/h
E12				A12			
E13				A13			
12 Thermal Treatment							
E21	Waste	37'500	kg/h	A21	Superheated steam (1)	128'511	kg/h
E22	Primary air	96'254	Nm3/h	A22	Condensate air preheater	6'750	kg/h
E23	Secondary air	26'926	Nm3/h	A23	Continuous boiler blowdown	380	kg/h
E24	Burner cooling air	3'400	Nm3/h	A24	Bottom ash, wet	8'310	kg/h
E25	Leaking air through feed hopper	1'280	Nm3/h	A25	Boiler ash	300	kg/h
E26	Air rear ventilated refractory lining	2'750	Nm3/h	A26			
E27	Recirculated flue gas	34'594	Nm3/h	A27			
E28	SNCR solution reaction medium	7	kg/h	A28			
E29	SNCR injection air	908	Nm3/h	A29			
E30	Water bottom ash extractor	1'746	kg/h	A30			
E31	Feedwater (2)	129'471	kg/h	A31			
E32	Steam air preheater pressure level 1	6'170	kg/h	A32			
E33				A33			
E34				A34			
E35				A35			
E36				A36			

Input				Output			
13 Heat Utilisation							
E41	Water water treatment system	1'554	kg/h	A41	Blowdown water treatment system	403	kg/h
E42	Superheated steam (1)	128'511	kg/h	A42	Feedwater (2)	129'287	kg/h
E43	Condensate air preheater	6'750	kg/h	A43	Steam air preheater pressure level 1	6'170	kg/h
E44				A44	Cycle losses & sampling	771	kg/h
E45				A45			
E46				A46			
14 Flue Gas Treatment							
				A51	Recirculated flue gas	34'594	Nm3/h
E52	Activated carbon	9.8	kg/h	A52	Residues FGT	1'240	kg/h
E53	Hydrated lime	500	kg/h	A53			
E54	Air	1'500	Nm3/h	A54			
E55				A55			
E56				A56			
15 Residue Treatment							
E61	Bottom ash, wet	8'310	kg/h	A61	Bottom ash, wet	8'610	kg/h
E62	Boiler ash	300	kg/h	A62	Residues moistened	1'463	kg/h
E63	Residues dry	1'240	kg/h	A63			
E64	Water for moistening residues	223	kg/h	A64			
E65				A65			
E66				A66			

Indicated values taken from the following design calculations:

	Prog. No.	Doc. No.	Rev.	Date
Heat Mass Balance - Boiler	CSP-005	N/A	0	23.08.2017
	-	N/A	0	xx.xx.xxxx
	-	N/A	0	xx.xx.xxxx
	-	N/A	0	xx.xx.xxxx

Rev.	Date	Description
2		
1	31.08.17	Residue moistening included
0	25.08.17	First Issue

Project Name	Project No	Load point
Rockingham	**YE-3324**	**LPN**

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BLOC DIAGRAM

	Date	Name
Prepared	23.08.2017	strobel / Kas
Checked		
Approved		

HZI doc. N° :	Revision
-	1

Prog. No. CSP-103 / V2.0 — Print date : 1.09.17 — Page : 1/1

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