Use of Filming Amines and Reverse Osmosis in boiler water treatment at CLEAN Camberley site

The Camberley plant is a large commercial laundry part of the CLEAN group of laundries. This plant processes up to one million pieces of linen per week on a two shift/7 day per week operation.

The steam system consists of two Byworth Yorkshireman2 3.5 tonne boilers running at 12.5 Bar. The boilers run in Service/Standby mode with only one in service. They feed five ironers, two continuous batch washers and two small washer extractor machines. The washers use direct steam injection from Flash steam as well as Live steam to achieve wash temperature.

Since 2010, when the plant was opened, the boiler feed water has been supplied via a Softening Set and a Reverse Osmosis (RO) unit. In addition, the feed water has been dosed with a filming amine, V2000 from **GEMchem Ltd**.

Checks for water softness after the softener set to ensure correct operation, and the boiler water TDS value are made daily. The boilers have a side mounted Auto TDS system which samples once a shift. If the TDS exceeds 2000, the system will control TDS by blowdown. Normal TDS level is 1000-1200. A full water analysis is done monthly. A daily two second blow down is done from the boiler bottom drain on boiler start up. Water analysis consistently shows no iron detectable in the system. (See sample report.) With the water kept in good condition, there is no need to blowdown to achieve correct TDS, hence there is a large annual saving of energy.

The hot well is kept at about 60 C and we have a heat exchanger after the pump set fed with heat from returning condensate and there are also economisers on the boilers. The hot well is dosed with filming amine in proportion to make up water. Make up water is about 0.6m^3 per hour.

At each annual inspection it has been noted that there is little, if any, sludge to remove from the bottom of the boiler. There is little or no scale on the boiler tubes and the small amount of pitting present is less than 0.5mm deep. (See photos.)

For us, the use of and RO plant and injection of amine is very successful. The boilers have stayed in good condition with minimal scaling in the boiler. TDS stays low and constant so blowdowns are minimised with a good saving in energy. We have little or no problems with the other parts of the steam system either.

L. Armitstead

Engineering Manager

Clean Camberley

June 2017

Boiler 2. Second and some third pass tubes and rear smoke box from top manway. June 2017

Boiler 2. Second pass and some third pass tubes and rear smoke box from top manway. June 2012

Boiler 2 Furnace, second and third pass tubes looking up through rear side inspection hole. June 2017

Boiler 2 Second and third pass tubes and rear smoke box from top manway. June 2013

GEMchem Ltd.

Industrial Water Treatment Specialists

GEMchem Ltd

ISO 9001

N°. GC03466/DS

1 John Street, BRISTOL BS1 2HR ***Tel: 0117 922 5544*** ***Fax: 0117 917 7011***

Client: *Clean Linen Services* **Date:** *7 February 2013*

Address: *40 Glebeland Road, Camberley, GU15 3DB* **Time:** *11.45 hrs*

WATER ANALYSIS REPORT

Sample Point	pH	Cond. (µS/cm)	TH	p-Alk	m-Alk	Cl^-	Fe	Cu	Amine	TDS (Actual)	TDS (Display)	
			(ppm CaCO3)			(ppm)						
Softener	7.4	775	<2	0	240	50	~					
RO	6.8	28	<2	0	15	5	~					
Feed Water	7.1	26	<2	0	15	5	0.0	~	0.2			
Boiler 1	11.4	1754	~	400	450	140	0.0	~	~	1053	870	
Boiler 2	11.1	1429	~	295	350	100	0.0	~	~	856	870	
Condensate	6.8	11	<2	0	10	5	0.0	~	0.1			
Note: TDS measured un-neutralized												

Observations / Recommendations:

1. The softener and RO plant were working correctly at the time of sampling.

2. The Feed water had a temperature of 57°C at the time of sampling. The feed water continues to be of the highest quality. The level of detected treatment in the sample remains good.

3. Both Boilers continue to remain at reasonable levels of concentration. Boiler 1 has dropped slightly and Boiler 2 has increased. The TDS meter on Boiler 1 was recalibrated.

4. The condensate continues to be of excellent quality.

Generally the treatment continues to go very well with Iron levels being of an undetectable level right around the system.

Treatment Details:		
System	Boilers	
Product	V2000	
Recommended Dosage	60 - 80 mg/l	
Dosing Method	Proportional	
Dosing Pump Adjustment	0.0645	
Softener & Cycle Balance	~	
Meter Reading (m^3)	14208	

Date of Next Visit
6 March 2013

FOR GEMCHEM: FOR CUSTOMER:

Signed: Dave Summerton Signed:

GEMchem
Water treatment

1 John Street, BRISTOL BS1 2HR

Tel: 0117 922 5544

N°. GC04833/DS

Client: *Clean Linen Services*

Address: *40 Glebeland Road, Camberley, GU15 3DB*

Date: *3 April 2017*

Time: *11.00 hrs*

WATER ANALYSIS REPORT

Sample Point	pH	Cond. (µS/cm)	TH (ppm CaCO3)	p-Alk (ppm CaCO3)	m-Alk (ppm CaCO3)	Cl^- (ppm)	Fe* (ppm)	Cu* (ppm)	Amine (ppm)	TDS (Actual)	TDS (Display)	
Softener	7.8	744	<2	0	215	50	~					
RO	6.4	39	<2	0	20	3	~					
Feed Water	7.8	34	<2	0	15	3	0.0	~	0.2			
Boiler 1	11.2	1803	~	320	380	120	0.0	~	~	1089	1150	
Boiler 2	11.2	2000	~	330	400	140	0.0	~	~	1203	1050	
Condensate	9.0	15	<2	Traces	20	3	0.0	~	0.1			
Note: TDS measured un-neutralized												

*(TH=total hardness, p-Alk=p-Alkalinity, m-Alk=m-Alkalinity, Cl=chlorides, Fe=iron, * for Indicative Purposes only)*

Observations / Recommendations:

1. The softener and RO were both working well at the time of sampling.

2. The Feed water had a temperature of 56°C at the time of testing. The sample of feed water continues to be of very good quality.

3. Boiler 1 had maintained its concentration since the last visit. Boiler 2 showed a small increase in its concentration. The TDS meter on Boiler 2 was recalibrated.

4. The condensate continues to be of very high quality and again showed an undetectable level of Iron.

The treatment continues to go well with Iron levels being undetectable through out the system.

Treatment Details:		
System	Boilers	
Product	V2000	
Recommended Dosage	60 - 80 mg/l	
Dosing Method	Proportional	
Dosing Pump Adjustment	0.0224	
Softener & Cycle Balance	~	
Meter Reading (m^3)	29467	

Date of Next Visit
3 May 2017

Certified that the water treatment programme detailed hereon has been ~~serviced / inspected / commissioned /~~ tested in accordance with the customer's specified requirements and unless otherwise noted, conforms in all relevant respects thereto.

FOR GEMCHEM:

Signed: Dave Summerton

FOR CUSTOMER:

Signed: