HELLMAN VATTEN

Troubleshooting with Degassed Conductivity

2015-03-12

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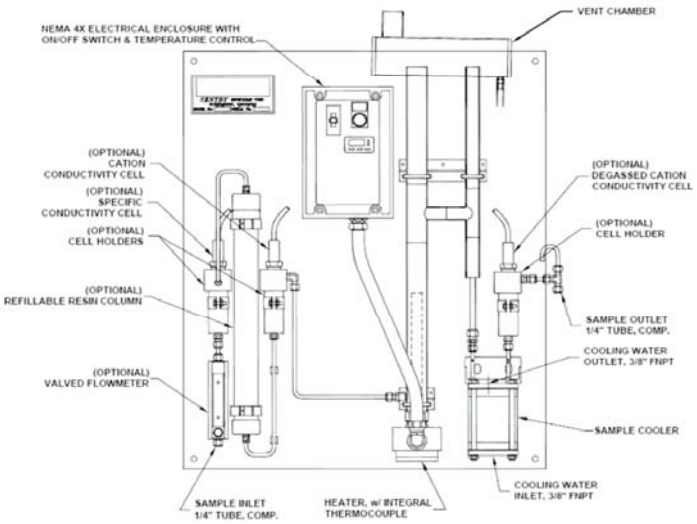
Värmeforsk rapport no. 873
Modified cation conductivity



Annika Stålenheim, August 2004

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Övik Energi

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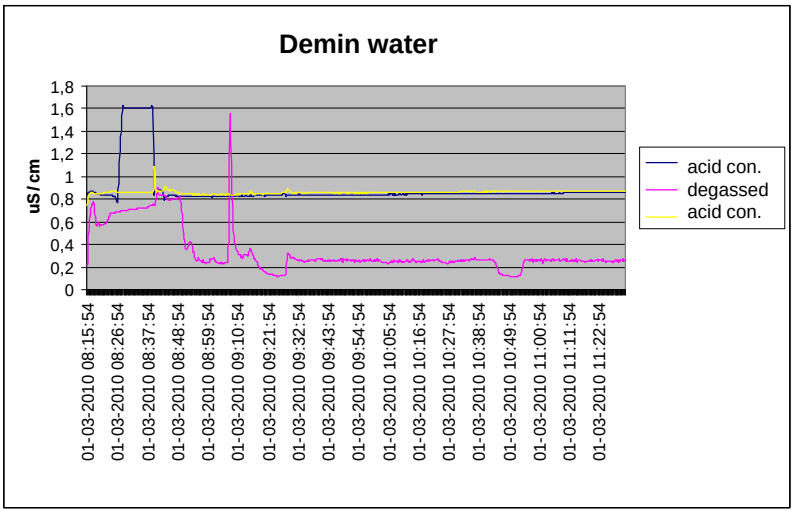
Övik Energi



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Övik Energi

Actions:

- EliminOx dosage turned off
- Optimization of demin plant
- Acid conductivity < 0,20 µS/cm

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Kalmar Energi

- Acid cunductivity in superheated steam
  - 0,6 µS/cm increasing
- Inleakage in feed water pump?
  - <5 µg/l O_2
- Turbine operation safe?
  - >1 µS/cm
- Degassed conductivity
  - 0,12 µS/cm

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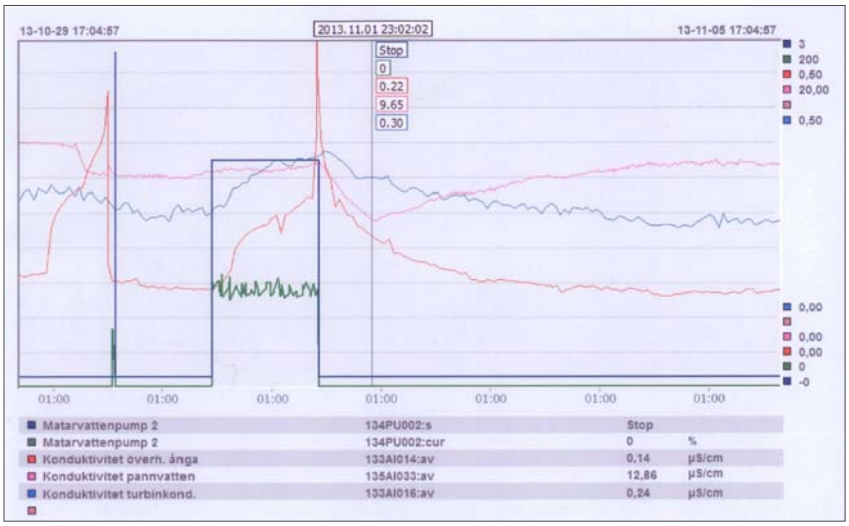
Kalmar Energi



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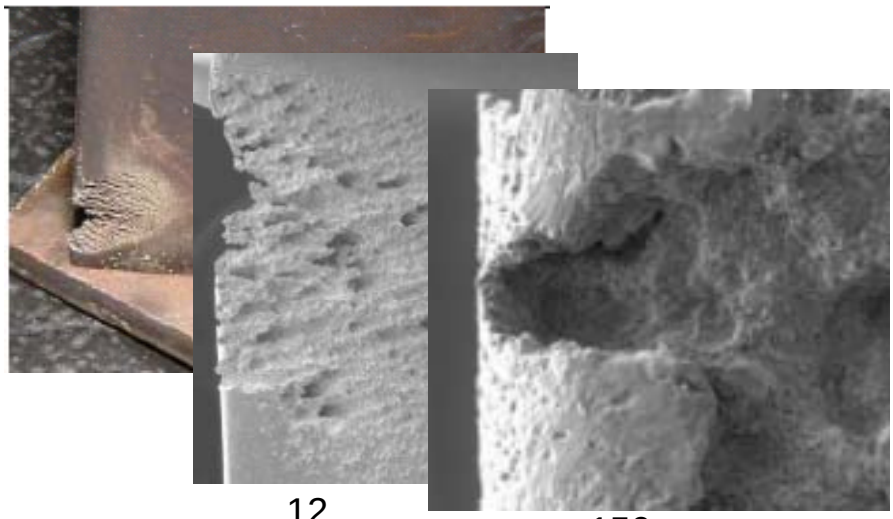
Eksjö Energi

2005
Vølund boiler
18 MW, 30 t/h
16,5 bar, 225 °C

Dresser-Rand turbine
1,8 MW
3 turbine wheels
steam extraction

HELLMAN VATTEN

Eksjö Energi



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Eksjö Energi

		Rek. gränsvärden	PV	MA-VA	kond
Total hårdhet	°dH			<0,1	<0,1
Kalcium hårdhet	°dH				
Fenolftalein alkalitet	NaOH mg/l		4	6	6
Total alkalitet	NaOH mg/l		6	8	
Natriumklorid	NaCl mg/l			4	
Sulfat	SO_4 mg/l				
Fosfat, orto	PO_4 mg/l		0		
Fosfonat	mg/l				
Natriumsulfit	Na_2SO_3 mg/l				
DEHA	mg/l				
Syre	O_2 µg/l			< 5	
Ledningsförmåga	µS/cm		20	40	20
pH			10,3	10,1	10,4
Järn	Fe mg/l				

VGB 33

6.2.4 Requirements on steam for condensing turbines

Table 6.10: Steam

STEAM for steam turbines				
Acid Conductivity [1]	µS/cm	N	0.10	
		AL 1	0.20	
		AL 2	0.50	
		AL 3	1	
Silica (SiO_2)	µg/kg	N	< 5	
		AL 1	20	
		AL 2	–	
		AL 3	–	
			Boiler Water Treatment AVT or Caustic	Boiler Water Treatment Phosphate
Sodium (Na)	µg/kg	N	< 2	< 5
		AL 1	5	10
		AL 2	10	20
		AL 3	20	40
	µg/kg	N	< 5	
		AL 1	20	
		AL 2	–	
		AL 3	–	
	µg/kg	N	< 1	
		AL 1	3	
		AL 2	–	
		AL 3	–	

Date **2008-01-24**	pH	Conduktivity µS/cm	Sodium mg/l Na	Silica mg/l SiO_2
Feed water	**10,2**	**34,3**	**< 0,003**	**< 0,003**
Target value	*9,5-10,5*		*<0,010*	*<0,020*
Boiler water	**9,9**	**21,3**	**0,188**	**1,2**
Target value	*9,5-10,5*	*< 50*	*<900*	*< 70*
Steam	**10,2**	**34,2**	**< 0,003**	**< 0,003**
Target value	*9,2-9,6*		*<0,010*	*<0,020*
Condensate	**10,2**	**32,9**	**< 0,003**	**< 0,003**
Target value	*9,2-9,6*		*<0,010*	*<0,020*

degassed conductivity: 0,12-0,15 µS/cm

HELLMAN VATTEN

Eksjö Energi

2005
Vølund boiler
18 MW, 30 t/h
16,5 bar / 225 °C

Dresser-Rand turbine
1,8 MW
3 turbine wheels
steam extraction

2007
5 turbine wheels
2,1 MW

2008
4 wheels
higher alloy
2,1 MW

Mixed bed filter after RO
- 0,056 µS/cm

Ammonia dosage

New on-line instrumentation:
- calculated pH on feed water and superheated steam