MARINE CARE

BOILER- AND COOLINGWATER TESTKIT

Nitrite, Chloride, P-Alkalinity and pH Test

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HEALTH & SAFETY

Some reagents required for tests shown in this booklet are classed as hazardous and as such, a minimum protection of gloves (rubber or plastic) and safety goggles/ spectacles or facemask **MUST BE WORN**.

In addition please note and observe the Risk and Safety phrases on each reagent container and follow handling guidelines as instructed.

GENERAL NOTES

⇒ Avoid contact with skin or eyes

⇒ In case of contact with skin or eyes rinse immediately with plenty of running tap water, and seek medical attention

⇒ Seek attention if irritation persists

⇒ In case of ingestion, wash the mouth out thoroughly with water, try to vomit and seek medical attention

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Boilerwater tests

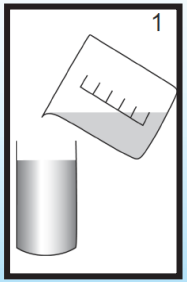
P-Alkalinity

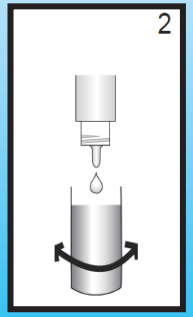
1. Take 20 ml of cold coolingwater sample with the 20 ml syringe.
   Spray the 20 ml in the clean test jar.

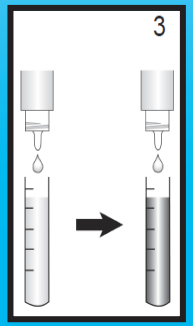
2. Add 4 drops of Reagent PA1. The sample will turn pink. In case the sample does not colour pink, the reading is zero.

3. Add drop by drop Reagent PA2, until the sample decolours.
   Count the numbers of drops used.
4. Each drop is equivalent to 40 mg/l or ppm P-Alkalinity expressed as $CaCO_3$

5. **Retain the sample after the alkalinity test, as this sample can be used for the Chloride test.**







Boilerwater tests

Drops of PA2 Reagent	P-Alkalinity as mg/l $CaCO_3$
1	40
2	80
3	120
4	160
5	200
6	240
7	280
8	320
9	360
10	400

Notes:

Low P-Alkalinity, increase product dosage to achieve 200 mg/l P-Alkalinity

Correct P-Alkalinity

Reduce P-Alkalinity by increased Top and Bottom blowdown

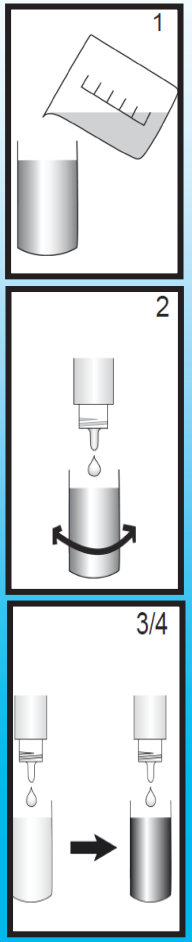
Boilerwater tests

Chloride Test

1. Take the sample that is first used for the P-alkalinity test.

2. Add 12 drops of Reagent BC1. The sample will turn pale blue/green.

3. Add drop by drop Reagent BC2, until a grey orange/brown colour appears. Count the numbers of drops used.
4. Each drop is equivalent to 20 mg/l or ppm Chlorides



Boilerwater tests

Drops of BC2 Reagent	Chloride as mg/l Cl^-
1	20
2	40
3	60
4	80
5	100
6	120
7	140
8	160
9	180
10	200
11	220
12	240
13	260
14	280
15	300
16	320
17	340
18	360
19	380
20	400

Notes:

Maximum Chloride levels:

⇒ Low pressure boilers : 300 mg/l

⇒ Medium pressure boilers : 100 mg/l

In case the chloride level is too high, reduce the amount of chlorides by blowdown.

⇒ 1 mg/l is 1 ppm

Boilerwater tests

Condensate pH Test (7,0 - 14,0)

1. Take 50 ml of cold condensate sample in the clean test jar.
2. Dip test strip for 1 second in the sample.
3. Shake off excess sample solution.
4. Compare with colour scale and read off the corresponding pH value.

pH value		
7,0	Corrosive	See fault finding chart
7,5		
8,0	Slightly corrosive	
8,5		
9,0	Non corrosive	Well treated
9,5		
10,0		
10,5	Corrosive on Copper	See fault finding chart
11,0		
11,5		
12,0		
12,5	Corrosive on Copper and Iron	
13,0		
13,5		
14,0		

Boilerwater tests

Fault Finding Chart	Cause(s)	Solution(s)
Chlorides too low	Boiler newly filled with de-mineralized or evaporated water	Boilerwater has to concentrate, will take several days
	High blowdown	Check blowdown valves for leakages
Chlorides far too high	Low quality feed water	Only use demineralized or evaporated water
		Check evaporator
	Sea coolingwater leakage	Search for leakage(s), for example at the condenser
P-Alkalinity too low	Boiler newly filled with de-mineralized or evaporated water	Boilerwater has to concentrate, will take several days
	Low Caretreat 3 Boiler dosage	Check dosingpump / increase dosage
P-Alkalinity too high	Low quality feed water	Only use demineralized or evaporated water
		Do NOT use shorewater
	High Caretreat 3 Boiler dosage	Check dosingpump / decrease dosage
	Low blowdown	Increase blowdown, check for blocked blowdown valves

Boilerwater tests

pH Condensate too low	Low hotwell temperature	Increase hotwell temperature to 80˚C
	Low Caretreat 4 Boiler dosage	Check dosingpump / increase dosage
pH condensate too high	High chloride level in boiler	see: chlorides far too high
	P-Alkalinity too high	see: P-Alkalinity too high
	Carry over, causing wet steam	Increase blowdown, check for blocked blowdown valves

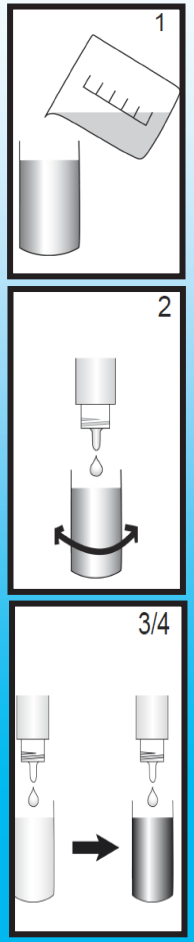
Coolingwater tests

Chloride Test

1. Take 20 ml of cold coolingwater sample with the 20 ml syringe.
   Spray the 20 ml in the clean test jar.

2. Add 12 drops of Reagent BC1. The sample will turn pale blue/green.

3. Add drop by drop Reagent BC2, until a grey orange/brown colour appears.
   Count the numbers of drops used.
4. Each drop is equivalent to 20 mg/l or ppm Chlorides



Coolingwater tests

Drops of BC2 Reagent	Chloride as mg/l Cl^-
1	20
2	40
3	60
4	80
5	100
6	120
7	140
8	160
9	180
10	200
11	220
12	240
13	260
14	280
15	300
16	320
17	340
18	360
19	380
20	400

Notes:

Maximum Chloride levels:

⇒ Low + middle speed engines : 100 mg/l

⇒ High speed engines : 50 mg/l

In case the chloride level is too high, reduce the amount of chlorides by partly refreshing the coolingwater with demineralized or evaporated water. After refreshing, repeat the Nitrite test.

⇒ 1 mg/l is 1 ppm

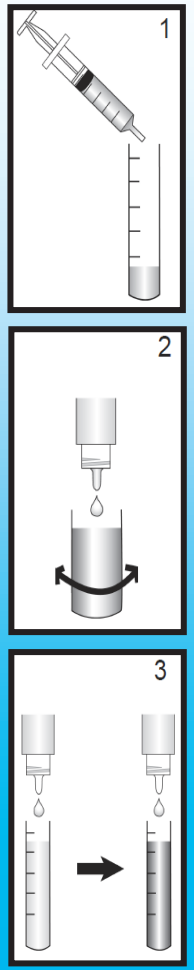
Coolingwater tests

Nitrite Test

1. Take 0,5 ml of cold coolingwater sample with the 2,5 ml syringe. Spray the 0,5 ml in the clean 10 ml test tube.

2. Add 4 drops of Reagent N1. The sample will turn orange.

3. Add drop by drop Reagent N2, until a pale blue colour appears. Count the numbers of drops used.
4. Each drop is equivalent to 200 mg/l or ppm Nitrite (NO_2)



Coolingwater tests

Drops of N2 Reagent	Nitrite as mg/l NO_2
1	200
2	400
3	600
4	800
5	1000
6	1200
7	1400
8	1600
9	1800
10	2000
11	2200
12	2400
13	2600
14	2800
15	3000
16	3200
17	3400
18	3600
19	3800
20	4000

Engine type	Chloride as mg/l Cl^-	Nitrite as mg/l NO_2	Initial Dosing rate in l/m^3
Low speed	< 50	1200-1600	4
Middle speed	< 50	1600-2000	5
High speed	< 50	2000-2400	6
Low speed	50 - 100	1600-2000	5
Middle speed	50 - 100	2000-2400	6
High speed	50 - 100	2400-3000	8

Notes:

Maximum Chloride levels:

⇒ Low + middle speed engines : 100 mg/l

⇒ High speed engines : 50 mg/l

In case of too low Nitrite level dose Caretreat 2 Diesel. 2 liters per m^3 gives 750 mg/l NO_2.
In case of too high Nitrite level partly refresh the coolingwater with demineralized or evaporated water. After refreshing, repeat the Nitrite test.

Coolingwater tests

Coolingwater pH Test (4,0 - 10,0) or (7,0 - 14,0)

1. Take 50 ml of cold coolingwater sample in the clean test jar.
2. Dip test strip for 1 second in the sample.
3. Shake off excess sample solution.
4. Compare with colour scale and read off the corresponding pH value.

pH value		
4,5	Highly corrosive	See fault finding chart
5,0		
5,5		
6,0		
6,5	Corrosive	
7,0		
7,5		
8,0	Slightly corrosive	
8,5		
9,0	Non corrosive	Well treated
9,5		
10,0		
10,5	Corrosive on Copper and Aluminium	See fault finding chart
11,0		
11,5		
12,0		
12,5	Corrosive on Iron, Copper and Aluminium	
13,0		
13,5		
14,0		

Coolingwater tests

Fault Finding Chart	Cause(s)	Solution(s)
Chlorides far too high	Low quality feed water	Only use demineralized or evaporated water
	Sea coolingwater leakage	Search for leakage(s)
Nitrites low	Coolingwater leakage	Add Caretreat 2 Diesel
	Coolingwater (partly) refreshed	Add Caretreat 2 Diesel
Nitrites remain low	Air intake in the system	Check coolingwater pumpseals
		Check header/expansion tank
	Exhaust gasses in the system	Check for leakages, for example leaking cylinder head gaskets
	Bacteria in the system	Check for slime deposits
		Add a non corrosive biocide, Caretreat Bacteria
	Product drum used for other chemical	Check Nitrite level of the product or take a new product drum

Coolingwater tests

pH Coolingwater too low	Bacteria in the system	Check for slime deposits
		Add a non corrosive biocide, Caretreat Bacteria
	Low Caretreat 2 Diesel dosage	Check dosingpump / increase dosage
pH Coolingwater too high	High Caretreat 2 Diesel dosage	Check dosingpump / decrease dosage
		Refresh the system partly with demineralized or evaporated water

Partslist Boiler- and Coolingwater Testkit		11912
Description	Amount	Article number
pH strips (100 ea.) 7,0 - 14,0	1	11932
pH strips (100 ea.) 4,0 - 10,0	1	11933
Reagent BC1	2	11934
Reagent BC2	1	11935
Reagent N1	1	11936
Reagent N2	1	11937
Reagent PA1	1	11938
Reagent PA2	1	11939
Syringe, 20 ml	1	11980
Syringe, 2,5 ml	1	11981
Test jar, 50 ml	2	11982
Test tube with screwed cap 10 ml	1	11983

WHEN IN DOUBT

- ⇒ Read the boilers manual regarding the boilerwater systems treatment
- ⇒ Read the engines manual regarding the coolingwater systems treatment
- ⇒ Contact us for advise
- ⇒ E-mail us all test figures over a period of at least 3 months
- ⇒ Samples Boilerwater
  - ⇒ Send us a Boilerwater and Feedwater sample
  - ⇒ Take a sample in a clean bottle at least 0,5 liter per sample
    Fill the bottle(s) to the top
- ⇒ Samples Coolingwater
  - ⇒ Send us a Coolingwater and Make-up water sample
  - ⇒ Take a sample in a clean bottle at least 0,5 liter per sample
    Fill the bottle(s) to the top

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