Milking Machine Testing Procedures

Teagasc
Agriculture and Food Development Authority

Test Points

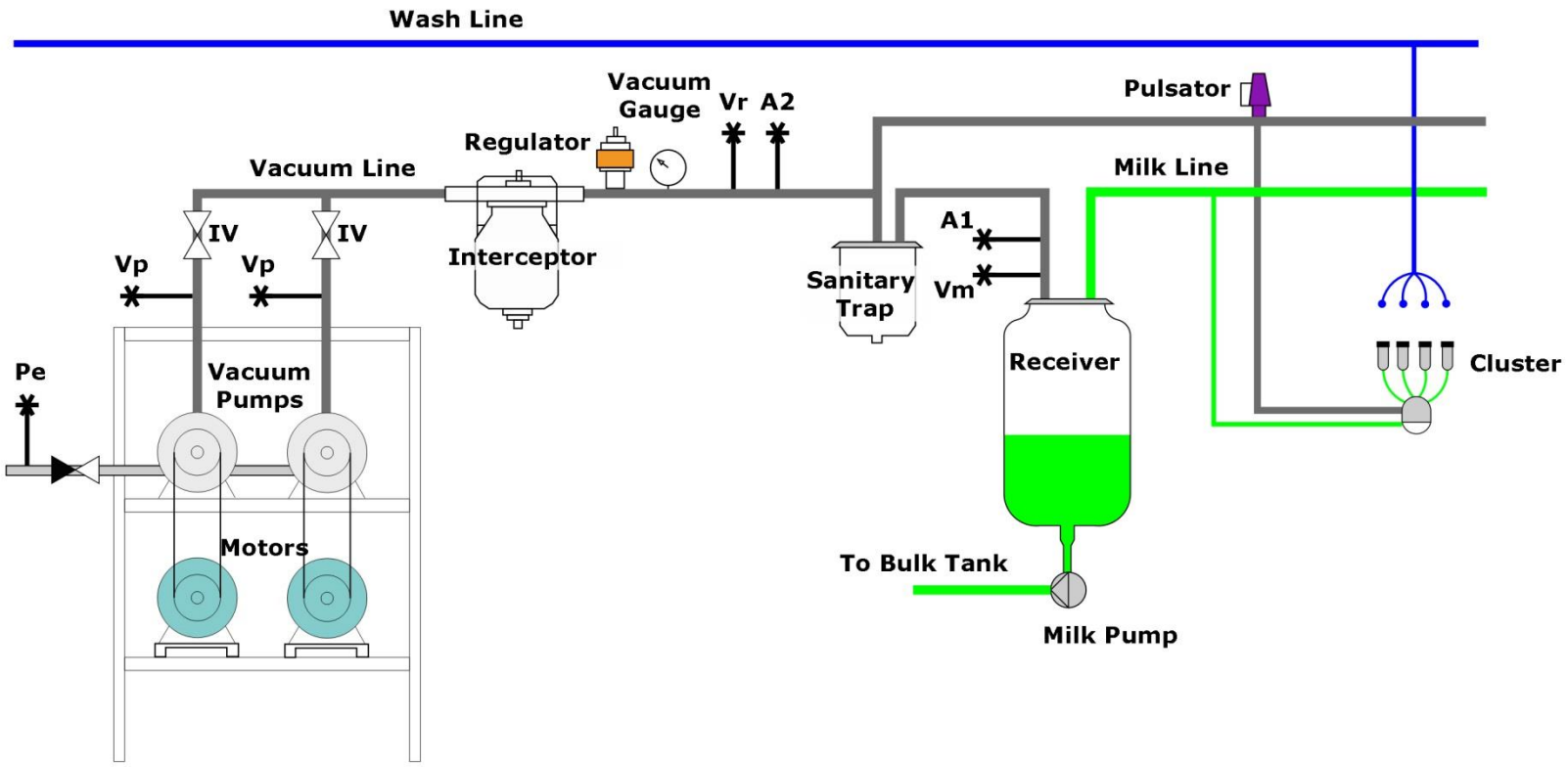
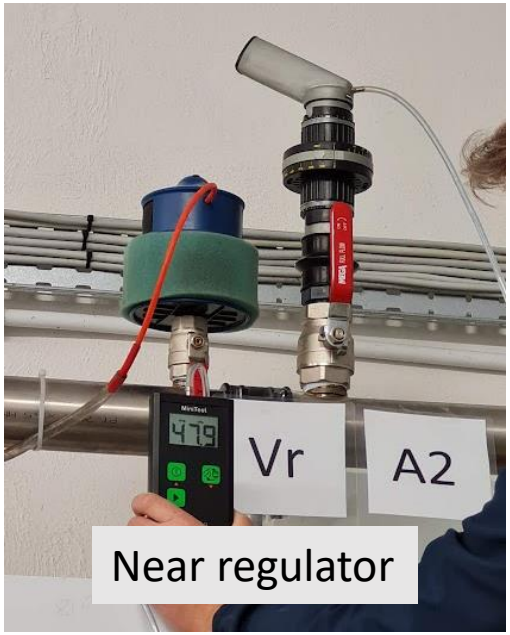


Figure 1: Location of test points in ISO standards (ISO 3918) tees + isollation valves (IV)

- 48.5 + or - 2mm connection for an airflow meter

Working Vacuum

- Working vacuum at Vm – receiver. No.1 on test report
- Working vacuum at Vr – regulator. No. 1a on test report
- Working vacuum at Vp – pump. No. 1b on test report
- Machine in milking position – liners plugged for all



Pump capacity

- Get working vacuum at Vp first (48.3kPa here)
- Machine in milking position – liners plugged
- Test gauge at Vp
- AFM direct to pump (1025 lit/min here)
- 2 on test report - **bold item** – record results

- Capacity at 50kPa
- 2a on test report
- Non-bold item
- Close in AFM to bring vacuum to 50kPa
- 1020 lit/min here

Vacuum Gauge

- Set to correct vacuum level
- Gauge easy to see during milking
- Set red pointer to working vacuum level
- Always check vacuum gauge accuracy
- Zero when machine off
- More than one gauge may be needed
- Never leave a machine without a gauge or with a faulty gauge.

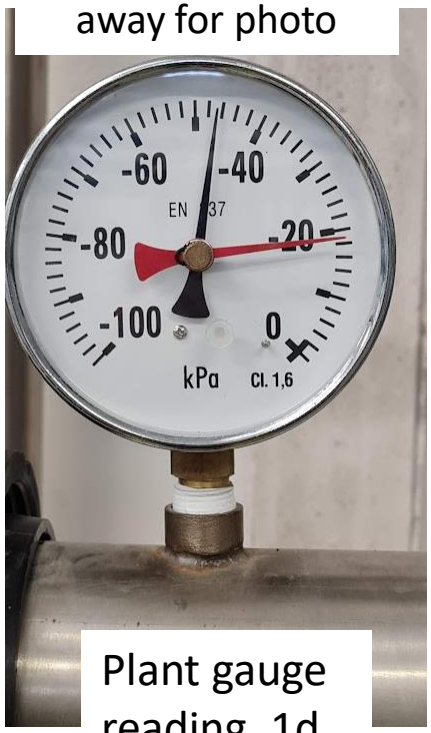
Plant vacuum gauge accuracy

- 1d and 1e on test report
- Have machine ready for milking

- Test near the plant gauge at Vr
- Plant vacuum gauge accuracy is 1d-1e
- Gauge error not to exceed 1kPa

Machine ready for milking

Red pointer moved away for photo



Plant gauge reading 1d

Test gauge reading 1e

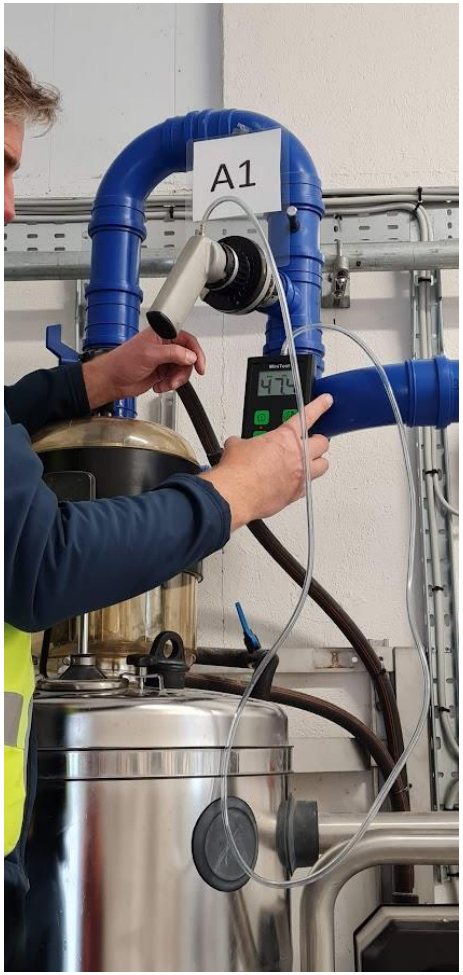
Effective reserve

Effective reserve (l/min)

- Have machine in the milking position – liners plugged
- Regulator(s) added
- Test at A1 and Vm (if no A1 and Vm test at A2 and Vr)
- Record working vacuum at Vm first
- Open AFM to drop vacuum 2kpa below working vacuum at Vm
- 47.9 - 2 = 45.9kPa
- Record results at No. 10 on test report

- See tables in manual for required effective reserves, etc.

- Test at A1 and Vm
- Record working vacuum at Vm first



Manual reserve, regulation loss and regulator leakage

Manual reserve (l/min)

- Have machine in the milking position – liners plugged
- Regulator(s) plugged (fully isolate)
- Test at A1 and Vm (if no A1 and Vm test at A2 and Vr)
- Record working vacuum at Vm first
- Drop vacuum 2kpa below working vacuum at Vm
- Record results at No. 9 on test report

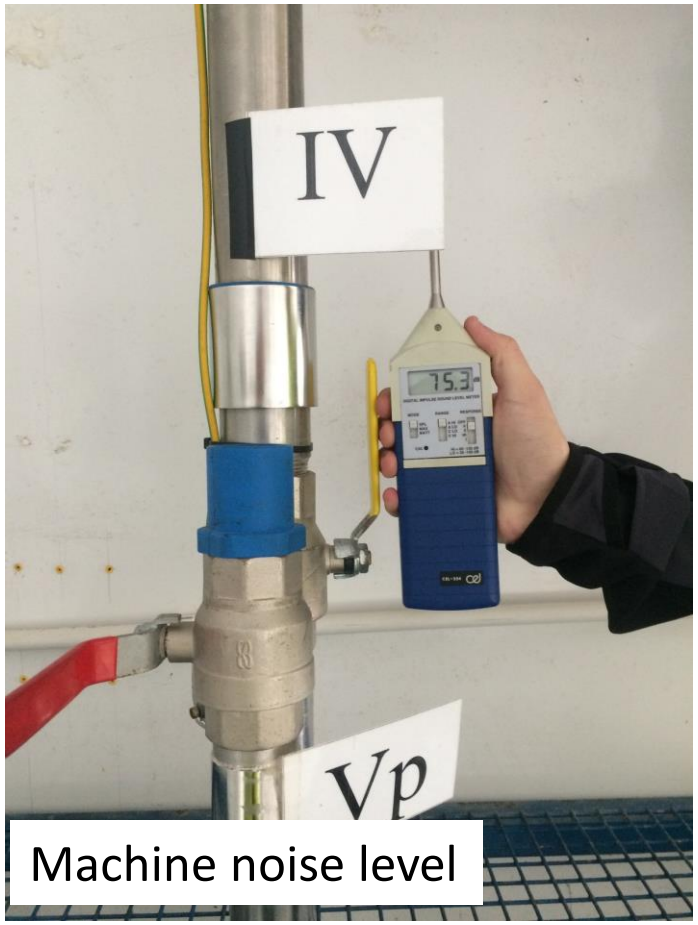
- Regulation loss No. 9 – No. 10
- Regulation loss 35l/min or 10% of manual reserve whichever is greater
- Regulator leakage 35l/min or 5% of manual reserve whichever is greater

- Test at A1 and Vm
- Record working
- vacuum at Vm first

Regulator(s) plugged (fully isolate)

Noise levels

- Noise levels increase up to 117dB when valve opened to turn off the machine – sudden rush in of air.
- Noise levels over 105dB from AFM whistling sound.



Machine noise level

Test valve opened –
noise increases for an instant
up to as much as 117dB

Pulsation tests

- Test all units
- Check all values
- Record results in test report
- Record max and min values
- Compare “b” phase vacuum to working vacuum – ideally use same vacuum gauge for each
- Are max and min values within limits
- <5% of each other

position (liners plugged), test at A2 and Vr or Vp ____ l/min

Claw air admission (4-5) ____ l/min

Pulsation Test Results

Rate c/min	Max____	Min____
“b” phase vacuum kPa	Max____	Min____
Ratio “a+b” % or ms	Max____	Min____
"a" value % or ms	Max____	Min____
“b” value % or ms	Max____	Min____
“c” value % or ms	Max____	Min____
"d" value % or ms	Max____	Min____

Pulsation printout attached: yes/no ____

Simultaneous or Alternate ____

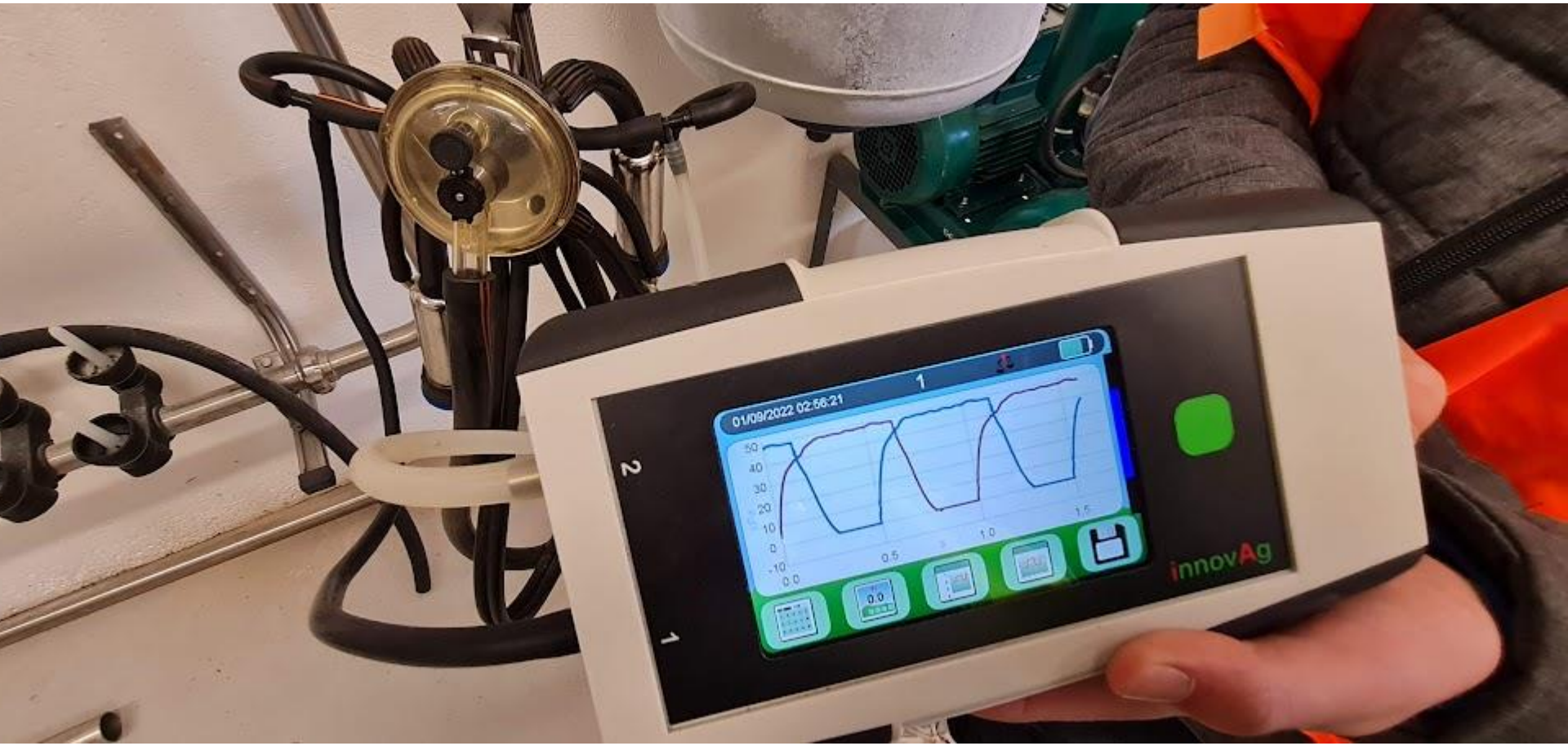
Limping (< 5%) ____

Faults

Recor

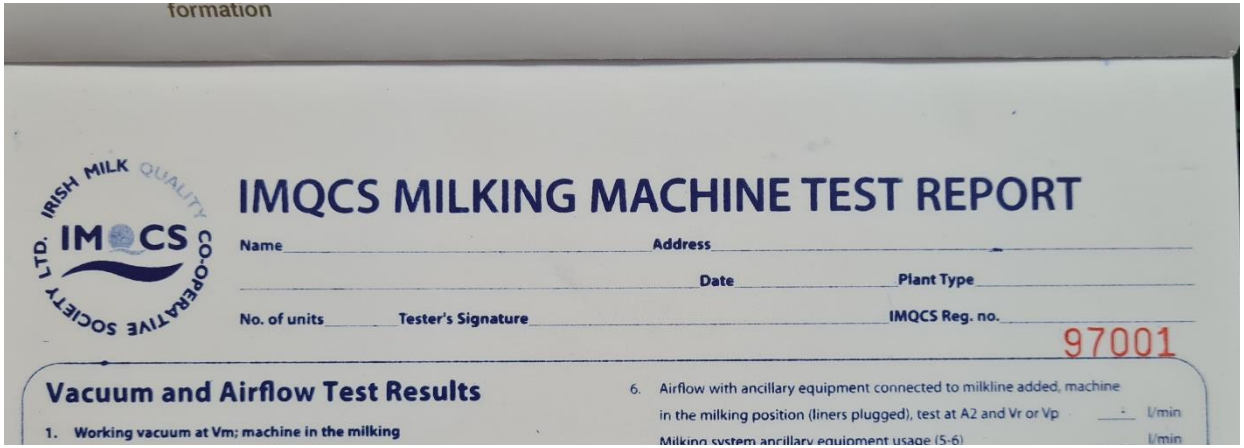
Pulsation tests are **bold** items on report

Pulsation tests



Other important bold items

Client and tester details


formation

IRISH MILK QUALITY IMCS CO-OPERATIVE SOCIETY LTD.

IMQCS MILKING MACHINE TEST REPORT

Name Address

Date Plant Type

No. of units Tester's Signature IMQCS Reg. no.

97001

Vacuum and Airflow Test Results

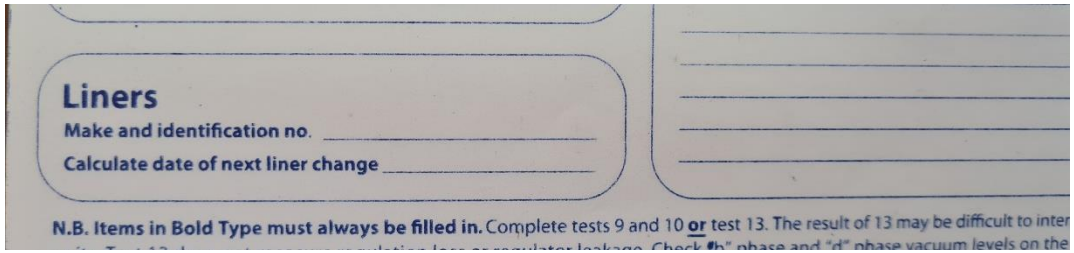
1. Working vacuum at Vm; machine in the milking

6. Airflow with ancillary equipment connected to milkline added, machine in the milking position (liners plugged), test at A2 and Vr or Vp l/min

Milking system ancillary equipment usage (5-6) l/min

Liner change interval (example)

- 16 units
- 128 cows
- 8 rows
- 2 milkings/day
- Each liner milks 16 times per day
- 2000/16 = 125 days is the liner change interval

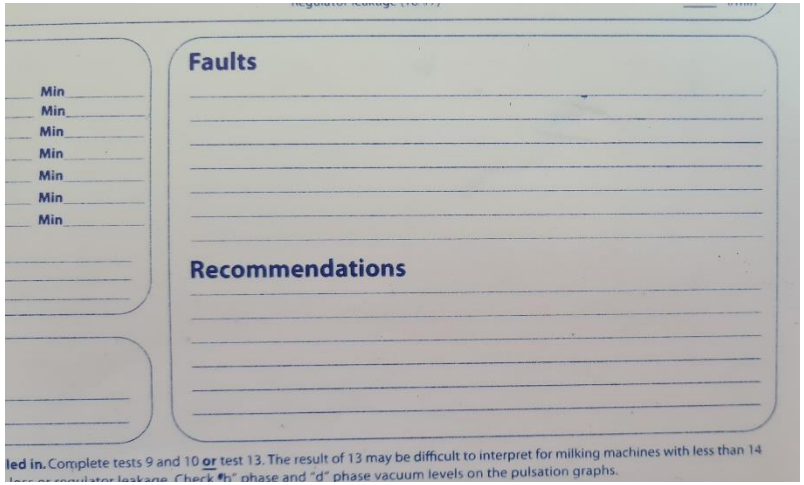

Liners

Make and identification no.

Calculate date of next liner change

N.B. Items in Bold Type must always be filled in. Complete tests 9 and 10 or test 13. The result of 13 may be difficult to inter

Faults and Recommendations


Min

Min

Min

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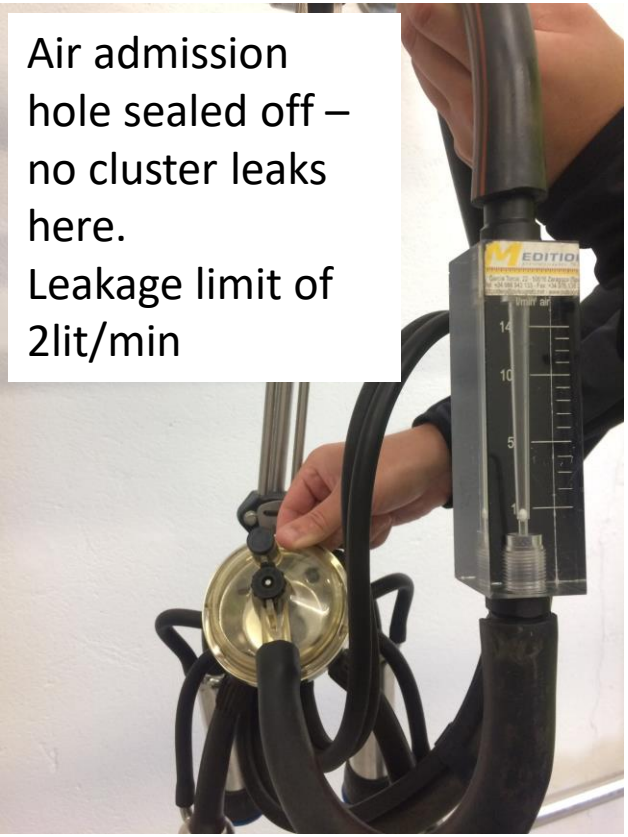
Faults

Recommendations

led in. Complete tests 9 and 10 or test 13. The result of 13 may be difficult to interpret for milking machines with less than 14

AFM for testing claw air admission, cluster and shut-off valve air leaks

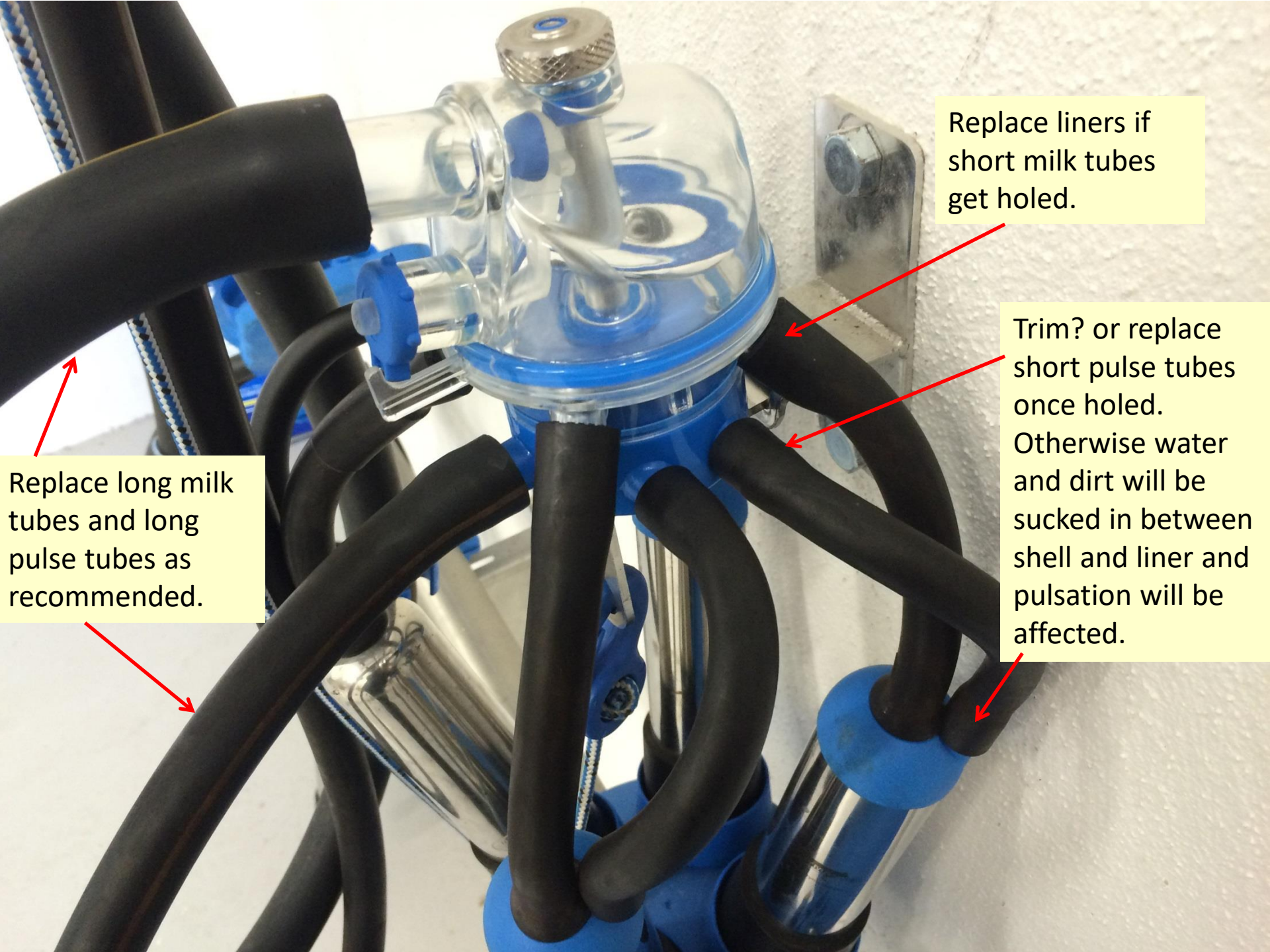


Air admission hole sealed off – no cluster leaks here.
Leakage limit of 2lit/min

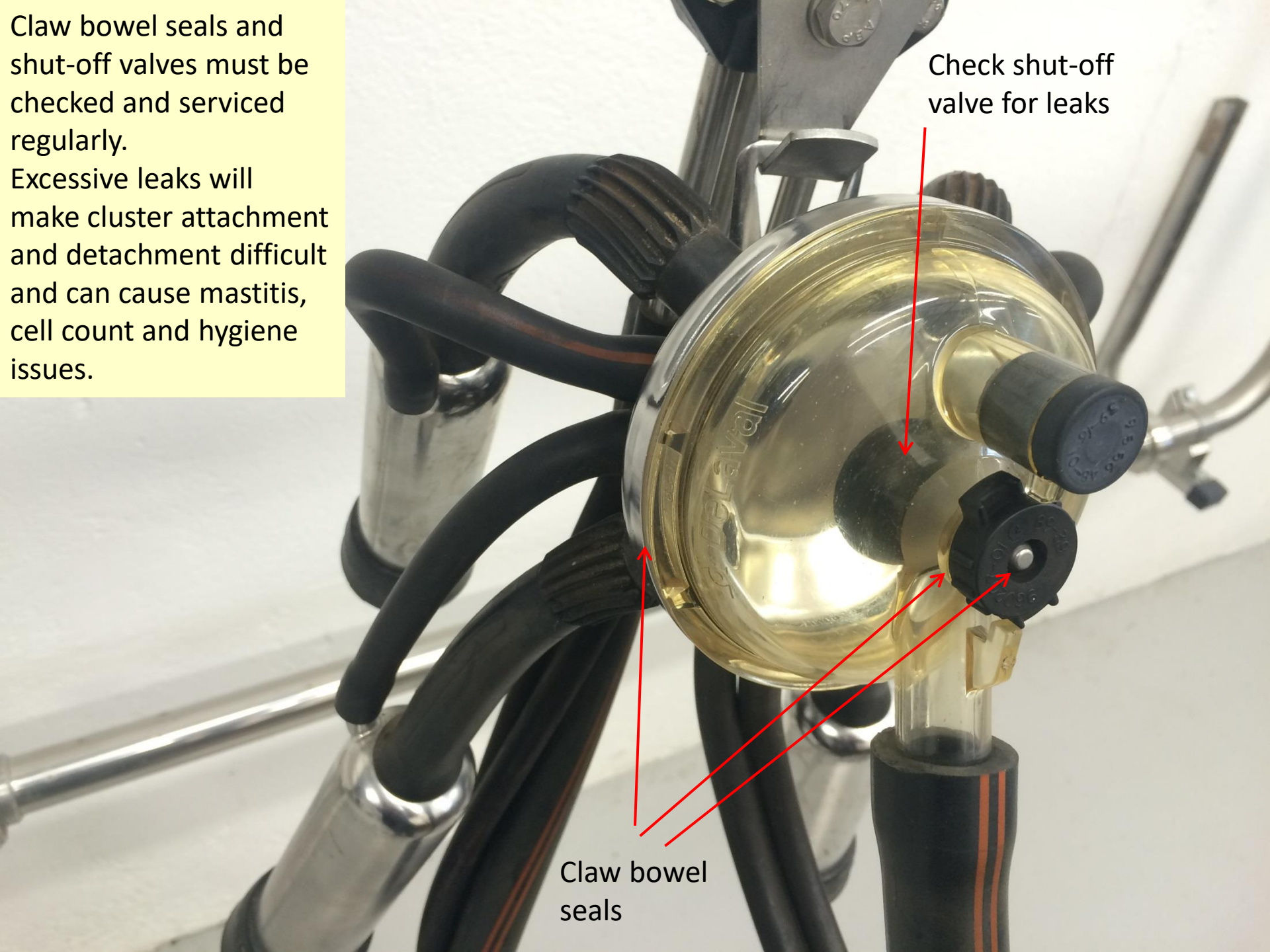
Air admission hole open – claw air admission is 7 lit/min

Checking shut-off valve – perfect seal

Dipping bowel in bucket of water would also show up leaks


Replace liners if short milk tubes get holed.
Trim? or replace short pulse tubes once holed. Otherwise water and dirt will be sucked in between shell and liner and pulsation will be affected.
Replace long milk tubes and long pulse tubes as recommended.

Claw bowel seals and shut-off valves must be checked and serviced regularly.
Excessive leaks will make cluster attachment and detachment difficult and can cause mastitis, cell count and hygiene issues.



Set–up cluster properly

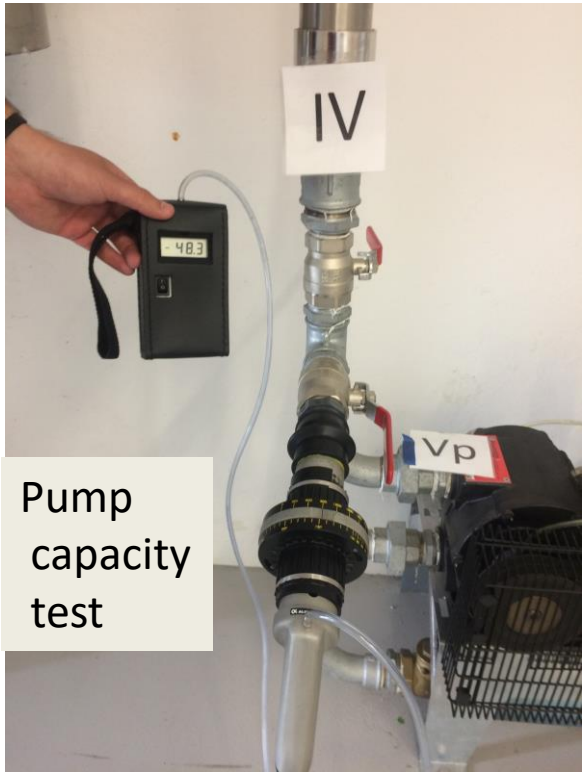
- Careful liner refitting is important
- Short milk tubes pushed fully home
- Short pulse tubes correct length and pushed on well
- Line up short milk tubes and short pulse tubes properly when fitting
- Easier attachment and detachment
- Requirement to limit airflow through cluster until attachment
- Liners not twisted in their shells
- Have spare liners and box of short pulse tubes
- Check for claw nipple damage when changing liners

Test for overall airflow usage and leakage

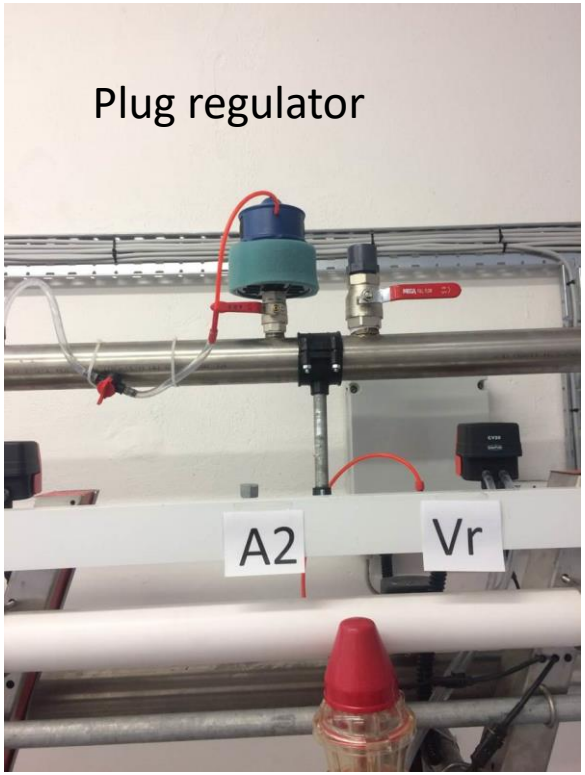
- Non-standard test
- Measure working vacuum at Vp
- Measure pump capacity l/min)

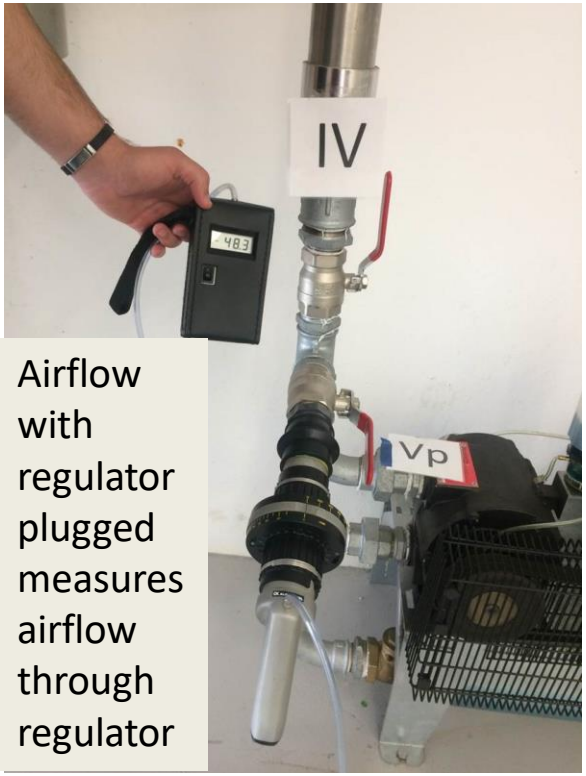
- Plug regulator(s)

- Close in AFM to bring vacuum level back to working vacuum at Vp
- Read AFM l/min
- Overall usage is difference between the two readings. Divide by no. of units to get usage per unit – typically 40 to 65l/min



Pump capacity test

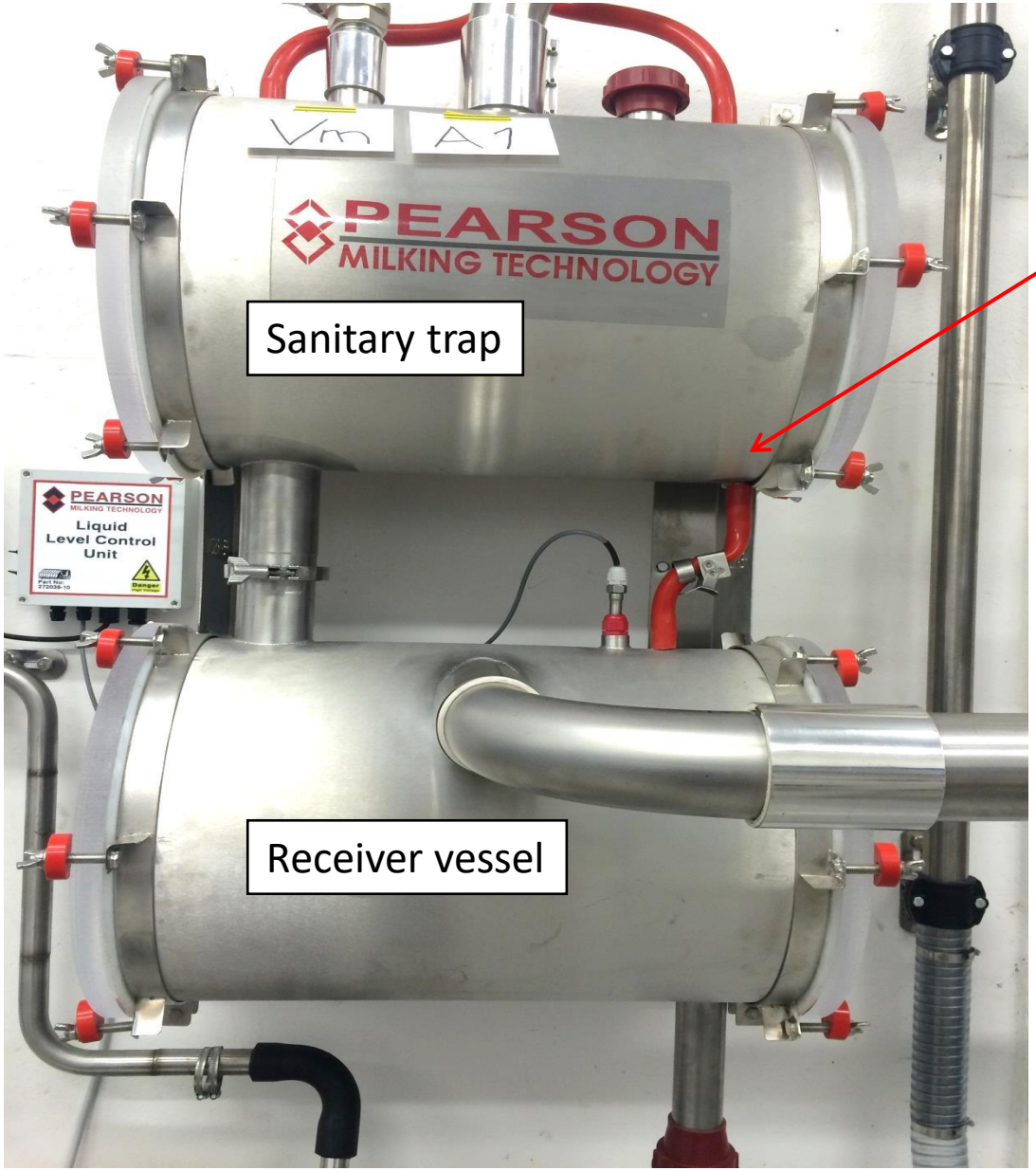




Airflow with regulator plugged measures airflow through regulator

Large bore lever valve at end of airline

- Large bore nipple and lever valve at end of airline is very useful for washing the airline
- Dipping a large bore suction tube in and out of wash solution can simulate slug washing
- A large drop in reserve if measured at end of the airline indicates a blockage somewhere downstream



The wash drain tube valve between the sanitary trap and the milk receiver must be closed during milking, otherwise drain-back, if any, will affect TBC.

Fall in main airline should be towards interceptor or other drain valve

Breather lines

- Clean/replace filters as required
- Check breather tube connection to relays
- No filters on some original installations
- Birds, vermin or water can get in if no filters
- Filters reduce noise