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AfiMilk MPC™

Periodic routine test

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Contents

1. Official accuracy tests

Local authorities may require annual accuracy checks of the milk meters, mainly for herd book registration. Periodic accuracy tests for AfiMilk MPC milk meters may be performed in one of the two methods described here. The local authority can choose or demand one of the two:

1. **Water test** – the tester runs a conductive water solution through the milk meter when the parlor is neither in milking nor in wash mode , and compares the milk meter reading to a weighed value of the solution tested. This is a relative test comparing the stability of deviations to an initial test as done during the calibration test procedure.
2. **Milk test** – the tester collects all milk run through the meter during milking of the cows and weighs it according to the ICAR calibration test procedure. This is an accuracy test assessing the precision of the milk meter.

1.1. Water Test (annual routine test)

This section describes the water test procedure for the AfiMilk MPC milk meter.

1.1.1. Equipment required

For performing the AfiMilk MPC water test, the following equipment is used:

Milking bucket equipped with 7/8” inlet and vacuum ports

Manual vacuum shut off valve placed between the milk line and the hose connected to the collection bucket.

Suction pipe with an inlet hole of 3.5mm, which allows a 4 ± 1 LPM (Liter per Minute) flow of water. The entire set should be tested and verified for the defined flow rate (see testing the equipment below). This part will replace the milking claw for the purpose of the test.

A nipple with air inlet 1mm in diameter should provide air intake of 10 ± 1 LPM.

Air inlet nipple should be connected no closer than 50cm from the water sucking port.

Hoses and connectors to set-up the test system – the milking bucket should have an inlet port of 20mm or more. Hence, the internal diameter of piping connecting between milk meter and bucket must be at least 20mm.

Water pail containing at least 20 liters water volume.

Electronic weighing scales.

1.1.2. Testing the equipment

Prior to the water test, the equipment (sucking pipe and air inlet) needs to be tested and confirmed for running the desired water flow rate for the test (4 ± 1 LPM) and for precise air intake of the air hole (10 ± 1 LPM).

1.1.3. Testing the water flow

To test the sucking pipe, a **water flow gauge** is used.

When testing the equipment, the water flow gauge is connected between the sucking pipe and air inlet nipple, before the milk meter inlet. When the vacuum is opened, water starts running through the system and the water flow is read (as shown in picture on the right).

Once confirmed for flow rate in the range of 4 ± 1 liters per minute, the water flow gauge is no longer used during the actual water test.

1.1.4. Testing the air intake

To test the air inlet an **air flow gauge** is used

To perform the test, place the air flow gauge in place of the water flow gauge.

Block the water inlet to allow air flow through the air inlet alone.

Open the vacuum valve and register the air intake measured.

- Verify that the air intake measured is in the range of 10 ± 1 liters per minute.

1.1.5. Reference values

An initial water test is performed after installation and calibration of the milk meters or the entire system. The results of this water test are the "**reference values**" for the periodic water tests performed for each milk meter annually or more frequently.

Please note that the initial water test is performed to establish a baseline and the following water tests at the farm are conducted to validate stability in time of the system. Since the device is calibrated for measuring milk rather than water, the deviations between water measurements and the scaling of the fluid are the baseline values tested, rather than ultimate accuracy of measurements (as calculated in milk tests).

1.1.6. Preparation for the test

Before performing the test the following parlor tests and checks should be carried out:

- Milk meters are cleaned properly. Verify functionality and operation of each unit.
- Consumable rubber parts (upper and lower gaskets, diaphragm and valve gaskets) are replaced as recommended, and seem flawless and clean.
- Clean air line is drained of water, milk meter solenoid air inlet is properly connected to the clean air line and to the vacuum supply.
- Test the vacuum level and stability. Ensure vacuum level above 30 kPa and ensure that the vacuum level in the parlor is not different from the level during the reference test by more than ± 10%.
- Check the G & H parameters and measure claw air intake. If the G & H parameters have changed or air intake has changed more than ± 10%, these G & H parameters have to be changed to the original values or an initial calibration/installation test has to be performed (see Afimilk MPC installation guide – chapter Milk Meter Calibration).

Record the measured values and check status's in the test report.

1.1.7. The water test procedure

1.1.7.1. Preparing the testing solution

Prepare the test solution as follows:

Measure a quantity of 13-20 liter of water for the test solution. Use lukewarm water at temperature as close as possible to the ambient temperature.

Calculate amount of salt and dissolve **4.5 grams of table salt** in each **liter of water**. Stir carefully to ensure that all salt is dissolved.

Measure the conductivity of the solution using a conductivity meter (see picture on the right). The target is to achieve conductivity between 10 and 12 Milli-Siemens. If required, add water or salt to reach the desired conductivity.

1.1.7.2. Testing procedure

The basic steps of the water test

- Produce 20 kg of testing solution in a bucket.
- Using the sucking pipe connected to the milk meter, run testing solution through the unit and into the milking bucket until the display shows 12 ± 0.5 kg.
- Stop the vacuum using the manual valve and press the “removal” button of the milk-meter.
- Wait until the milk-meter valve opens to release the water accumulated during the last flow.
- The collected quantity of test solution should now be weighed and recorded against the figure shown on the display of the milk meter.
- The results are recorded and the difference between the value on the display and the scale is calculated.

1.1.7.3. Analyzing the results

Compare the weighed solution and the measured (displayed) weight and calculate the difference.

- Compare the difference calculated to the “reference value” collected at the calibration test.
- If the first measurement calculated difference deviates by no more than 0.1 kg compared to the “reference value”– no more actions are needed - the meter is confirmed.
- If the first measurement calculated difference deviates by more than 0.1 kg comparing to the “reference value”, proceed to a second measurement.
- If the average difference between the two tests is 0.2 kg or less from the “reference value” - no more actions are needed - the meter is confirmed.
- If the milk meter does not comply within the limits above in relation to the “reference value”, try to perform actions of maintenance described below under “Deviating milk meters”. Otherwise, calibration or other corrective maintenance is required (call service). Also, see the demands put forth in the chapter, “Preparation for the test”.
- Data are stored and compared with the reference values (see example sheet below)

Afimilk MPC Periodic Routine test													
Farm:	1265897				Technical check ☑			Vacuum level (kPa)				Parlor:	Haringbone (2x5)
	Farm tesing				Hygienic check ☑			- at reference determine			42,0	Date:	30-7-2018
	Cow road				G-/H-value check ☑			- this routine test			42,2	Performer:	Test person Joe
	Cow city				**Against ref. val.: One test: limit 0,1 kg; two tests: avg 0,2 kg**								
Nr.	G-value	H-value	Air intake	Ref.value	Cond.	Display	Unster	Diff.	Display	Unster	Diff.	Conclusion	Remarks
1	50	40	9	0,85	11,7	12,00	11,11	0,89				Ok	
2	52	40	9	0,85	11,6	12,00	11,10	0,90				Ok	
3	53	40	9	0,85	11,6	12,00	11,22	0,78				Ok	
4	58	40	9	1,05	11,6	12,00	11,10	0,90	12,00	11,05	0,95	Ok	Second watertest needed
5	52	40	9	0,85	11,5	12,00	11,28	0,72	12,00	11,25	0,75	Ok	Complet re-test after 2e technical check
6	51	40	9	0,85	11,8	12,00	11,28	0,72	12,00	11,27	0,73	Ok	Second watertest needed
7	57	40	9	1,02	11,7	12,00	10,95	1,05				Ok	
8	50	40	9	0,85	11,7	12,00	11,30	0,70	12,00	11,28	0,72	Ok	Second watertest needed
9	52	40	9	0,85	11,6	12,00	11,22	0,78				Ok	
10	51	40	9	0,85	11,5	12,00	11,21	0,79				Ok	

1.1.7.4. Deviating milk meters

When the measurements are not in line with the standard as specified above, the testing procedure with water should be repeated after checking the equipment, which may include, among other things:

- Re-measuring the conductivity and temperature of the testing liquid, the air flow of the sucking set,
- Ensuring no tilt of the milk meter body,
- Hose between the milk meter and the bucket is in downslope.

- If after maintenance procedure the meter still deviate from the expected result, the meter should be re-calibrated/adjusted or replaced.

1.1.7.5. Re-Calibrating the milk meter

Change the value of "G" parameter per calculated average deviation. If the result is negative (Milk meter reading is lower than the actual weight), the calculated adjustment value needs to be added to the value of G. If the adjustment is positive, the calculated value needs to be subtracted from the value of G.

General adjustment calculation →%Dev X (–2.5) = Adjustment value

Example: if the actual value of G in the milk meter is **55** and the measured deviation **-4% (Milk meters show 4% less than actual weight)**, modify the "G" parameter value by:

-4 X (-2.5) = +10 Change to 65

NOTE

When 25% or more of the milk meters have to be adjusted additional accuracy check per the new settings of "G" value is obligatory within a few days. This may be done by comparing total milk collected by the afimilk system to the bulk tank accumulation.

1.1.7.6. Adjusting G parameter in milk meter

To adjust G parameter follow this procedure:

- Ensure that *Afimilk MPC* is in wash mode (wash LED illuminated ).
- Type 2580 and press  to access programming mode.
- Press Group access number - 4 to enter Calibration Group
- G is the first parameter in the group and its value will appear after a short delay.
- Press  - G flashes indicating that editing is enabled.
- Type the desired value.

- Press  to confirm.
- When done, press  twice to exit editing mode.

1.2. Milk test

Milk tests are performed by collecting the milk of a cow in a bucket, weighing it and comparing it to the reading of the milk meter. In many farms this is a time challenging procedure, however in large scale operations this procedure might be the only one available. After collecting all data, statistical deviation calculations are done to indicate the accuracy level of the devices.

It is very important to carry out a proper procedure to ensure accurate weighing in accordance with regulations.

To carry out the milk test procedure, an electronic weighing scale and several milk buckets are required. The specifications of this equipment are similar to the equipment used in water tests. This paragraph describes the correct procedure of scaling and statistical calculations. If deviations in measurements are found, correct them by adjusting G&H values as described above.

Before performing the milk test, the following tests should be carried out for each unit:

1. Proper maintenance of the milk meters – as explained under maintenance procedure above.
2. Air intake of the claw – measure air intake of the claws and ensure calibration of the milk meters according to air intake.

1.2.1. Collecting the milk into a bucket

Per international regulations, the following rules are adopted for scaling:

- Multiple attachment measurements are **not** included in the statistics.
- Only milking claw air admission is allowed. Tests may not be valid if liner cracks or piping holes allow additional air intake by the system. Furthermore, tests where liners slip or large udders cause squawks are also rejected.
- The milk meter reading should be taken after the last dump of milk (milk dump after removal).
- For each reading, list milk meter reading vs. actual milk weighed.
- At least **three** valid readings are required for calculating milk meter accuracy.

To ensure proper measurements, ensure that the following restrictions are maintained:

- The collecting bucket must be placed below the meter outlet port.
- The hose connecting the milk meter to the bucket is situated correctly in a downward slope towards the bucket.
- The hose connecting the milk meter to the bucket has no pulling or pushing pressure on the outlet of the milk meter.

- Data are recorded in a data sheet (example below) for further statistical evaluation

Afimilk MPC Periodic Routine test with milk													
Farm:	1265897				Technical check ☑		Vacuum level (kPa)				Parlor:	Haringbone (2x5)	
	Farm tesing				Hygienic check ☑		- at reference determine	42,0		Date:	30-7-2018		
	Cow road				G-/H-value check ☑		- this routine test	42,2		Performer:	Test person Joe		
	Cow city				**Three measurements on avg limit 3% (advise adjust on max. 2%)**								
Nr.	Display	Unster	Diff.	G-value	Concl.	Remarks	Nr.	Display	Unster	Diff.	G-value	Concl.	Remarks
1	8,35	8,62	-3,1%	50			6	13,26	13,65	-2,9%	51		
	15,73	15,55	1,2%	50				16,90	17,30	-2,3%	51		re-check meter, no problem
	20,22	20,20	0,1%	50	Ok			16,15	16,20	-0,3%	54		
								17,78	17,70	0,5%	54	Ok	
2	14,86	15,20	-2,2%	52			7	19,36	19,30	0,3%	57		
	18,92	19,50	-3,0%	52		re-check meter, connection		18,42	18,38	0,2%	57		
	15,24	15,15	0,6%	52				15,96	16,00	-0,2%	57	Ok	
	17,40	17,36	0,2%	52	Ok								

1.2.2. Statistical accuracy calculation

After scaling milk weights for all the milk meters in the parlor, statistical accuracy calculation is performed for every milk meter.

Statistical calculation is done for each reading and corresponding weigh scale measurement by calculating the difference as a percentage value between the reading of the milk meter and the actual milk weight.

The following formula is used to calculate the difference between the milk meter reading and the milk weight.

$$\text{DIF (\%)} = \frac{\text{Milk meter reading (grams or ounces)} - \text{Weigh scale measurement (grams or ounces)}}{\text{weigh scale measurement (grams or ounces)}} \times 100\ \%$$

Average all of the DIF% deviations for each milk meter.

The average deviation for every milk meter should be less than 3% to be considered as an accurate measuring device.

Use the G adjustment procedure described below for adjusting inaccuracies in measurements of specific milk meters.

1.2.3. Re-Calibrating the milk meter

Change the value of G parameter per calculated average deviation. If the result is negative (Milk meter reading is lower than the actual weight), the calculated adjustment value needs to be added to the value of G. If the adjustment is positive, the calculated value needs to be subtracted from the value of G.

General adjustment calculation →%Dev X (–2.5) = Adjustment value

Example: if the actual value of G in the milk meter is **55** and the measured deviation **-4% (Milk meters show 4% less than actual weight)**, modify the "G" parameter value by:

-4 X (-2.5) = +10 Change to 65

To adjust the G parameter follow the procedure described in paragraph 1.1.7.6. Adjusting G parameter in milk meter.

1.3. Reporting the results

The results of the periodic tests of the milk meters, as well as interim changes and their accompanying checks will be reported to those concerned, to the farmer, the main supplier and the national milk recording organization.