On Farm Milk

Filtration Standard

14 June 2010

DOCUMENT CONTROL

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1. Purpose

The purpose of this document is to revise current standards for the design and operation of inline milk filters fitted in farm dairies.

2. Background

Current requirements and standards for the filtration of raw milk on farm are found in two locations. DPC2: Animal Products (Dairy) Approved Criteria for Farm Dairies which sits beneath the Animal Products Act 1999 and outlines the requirement. NZCP1: Code of Practice for the Design and Operation of Farm Dairies which describes the equipment requirements that must be met on farm. The changes to NZCP1 are highlighted in red

DPC2: Animal Products (Dairy) Approved Criteria for Farm Dairies

Section 9
Milk Filtering and Cooling

Filtering

(1) Farm dairies must have milk filtering facilities adequate to enable milk to be filtered.

(2) Directly after milking, raw milk must be filtered through a filter of suitable size to ensure that the milk meets acceptable standards for sediment and foreign matter.

NZCP1: Code of Practice for the Design and Operation of Farm Dairies

Source: Section 12 of the NZCP1: Code of Practice for the Design and Operation of Farm Dairies Version 5, Amendment 2 – July 2013

12 Milk Filtering Systems

12.1 General Requirements

The purpose of filtration is to remove insoluble material that has entered the milk after it has been extracted from a healthy gland. Milk filtration:

- controls foreign matter to the dairy company milk reception standards;
- protects cooler hygiene and performance without damaging the milk; and
- maintains the wholesomeness of the milk.

A milk filtering system must be fitted immediately prior to the cooler and ensure compliance with this section and the MPI Animal Products (Dairy Processing) Specifications for milk filtering and cooling.

12.2 Performance

Filtration must be adequate to meet the milk quality standards required for further processing with respect to sediment and foreign matter, and to ensure no objectionable matter enters the vat. Milk must be free from visible dirt. The use of milk filters for milking installations does not absolve the milk supplier from taking the necessary precautions to avoid dirt or other extraneous

material entering milk during the milking process, nor can it give protection against legal action. Rather it is intended that pipeline filters should remove particulate matter, which, in spite of good milking practice, may on occasions inadvertently enter milk.

12.3 Construction

Materials used in the filter vessel that may come into contact with cleaning fluids must be suitable for such contact and, with the exception of single service elements, easily cleaned.

All raw milk filters installed after 1 June 2013, including filter elements, seals and associated fittings, must comply with the current industry approval standard, namely:

- filter elements must be able to withstand a pressure drop of at least 200kpa (2 bar) without failing;
- the filter cage and seals must withstand, without permanent damage or distortion, a pressure of 300 kPa (3 bar). This includes failure of components causing milk bypass across the filter that may allow unfiltered milk to enter the bulk milk vat;
- the filter body must withstand, without permanent damage or distortion, a pressure of 400 kPa (4 bar);
- filters shall be sized at a minimum of 6.0 cm^2/cow effective filtering area;
- there shall be an appropriate port on the milk pump side of the filter element(s) from which filter performance can be measured. This port must be of sanitary design.

Any filtration system installed prior to 1 June 2013 that is identified as being ineffective during assessment or trace back must be upgraded to meet the above standard. Filters must also be constructed in a manner that allows for easy removal and replacement of the filter element.

12.4 Identification

Filter bodies must be clearly and durably marked with the manufacturer's or vendor's name or trademark, together with some means of identifying the model (e.g. name, symbol or number). The filter element size must be correctly matched to the filter body size.

12.5 Filter Elements

Filter elements must be designed as follows:

- filtration must be sufficient to ensure that no extraneous matter is visible in the milk or when filtered milk is analysed using a MPI approved sediment, foreign matter or particle test. To achieve this, filter elements will typically have a maximum pore size of 100-150 microns;
- multi-use filter elements must be easy to clean either in place or after removal;
- single and multi-use filter elements must only be used in conjunction with the filter bodies for which the filter elements have been designed;
- filter elements must be able to withstand a pressure drop of at least 200kpa (30psi) across them without failing; and
- filter elements must comply with BS 3424, Part 4: 1982, "Testing of Coated Fabrics. Method 6. Method for determination of breaking strength and elongation at break".

12.6 Filter Sizing

Filters must be sized at a minimum of 6.0 cm^2/cow effective filtering area. If the effective filtering area is unknown then it can be estimated using the formula:

Effective filtering area = (2 x Width x Length) x 80%

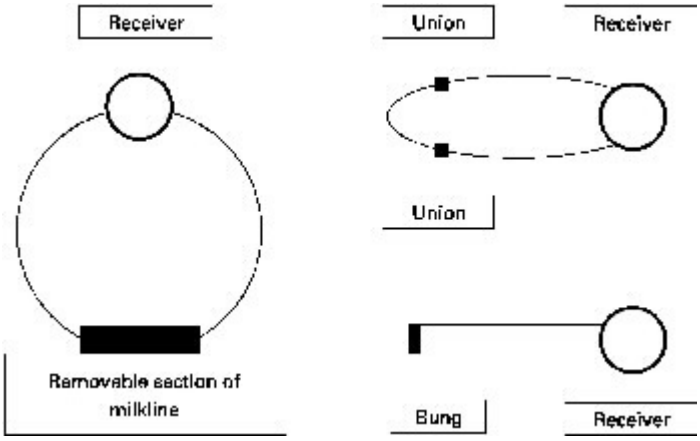
9.2 Installation

The milking plant, once installed, must comply with this Code of Practice.

Milk contact surfaces must be easily accessible for cleaning, inspection and/or monitoring either when in an assembled position or when removed. System accessories such as milk meters and cup removers must be accessible for inspection and removable parts must be readily disassembled according to the manufacturer's specifications.

There must always be a removable inspection point in any milkline, at the furthermost point from the receiving can. Alternatives to this requirement may be accepted if they can be demonstrated through suitable trials that a similar outcome can be achieved.

Diagram 2: Milk Equipment – Joints and Fittings



Where there is a CIP system installed that meets the basic engineering requirements of temperature, contact time, wash volume, detergent concentration and solution flow rate, the number of inspection points may be minimised.

All joints, unions and fittings must be assembled to prevent possible milk contamination. All pipelines must be able to be drained and all milklines, airlines and delivery lines must be drained between milkings.

Any sanitary trap mounted above the receiver, with a direct connection to the receiver must have an up-stand, of at least 50 mm, which prevents liquid entering the receiver from the sanitary trap. The sanitary trap must contain a shut-off device to prevent liquid from entering the main airline, and that device must close before any liquid flows over the up-stand into the receiver.

All airlines must be capable of being dismantled for inspection and cleaning. There must be a union at the end of the receiver airline immediately adjacent to the receiver and on the main airline immediately adjacent to the interceptor.

The receiver airline must be connected to either an interceptor or a self-draining sanitary trap.

There must be a threaded union in the pulsator airline for cleaning and inspection purposes.

Air purge systems must be designed and fitted to ensure no contamination of the milk system with oil. They must be operated in a manner, which does not damage milk or cause bypass of milk filter components allowing unfiltered milk to enter the bulk milk vat. Air purge systems must be set at no more than 300kpa (45psi) and should only be adjusted by a competent milking machine technician.

Air purge systems must also meet the requirements of the 3-A, Sanitary Standards & Accepted Practices 604-04, "Supplying Air Under Pressure In Contact with Milk, Milk Products and Product Contact Surfaces", published jointly by the International Association of Milk, Feed & Environmental Sanitarians, Inc & the USFDA, 01 November 1994.

As from June 2013 all new farm dairies and new milking plant installations in existing farm dairies must have an air purge system that meets the criteria above.
For new installations and major upgrades there must be a provisional approval only until the installer has supplied a certificate of compliance. This must include proof that the installation uses only food grade materials for all milk contact surfaces.

3. Issues

There is evidence within the industry that some current milk filters fitted in farm dairies are subject to milk bypass for various reasons:

- Filters do not have the capacity to effectively filter the peak volumes of milk being produced.
- Introduction of animal feeding programmes during milking exacerbate the problem above.
- In some cases filter seals are failing at relatively low pressures.
- Air purge systems are set at pressures in excess of the design pressure of the filter.

4. Objectives

The following points have been identified as possible additions to NZCP1 that will give Dairy Companies and Regulatory Bodies confidence that regulatory requirements are being met. It is important to recognise that any standard when set must be measurable and have the ability to be audited. This must be achieved whilst not inhibiting future innovation

- **Filter Sizing**
  - Filters shall be sized at a minimum of 6.0 cm^2/cow effective filtering area
    - **Notes**
      - **To accommodate cow numbers in relation to filter sizing compliance will be assessed to within 95% of 6.0 cm^2/cow (5.7 to 6.0 cm^2/cow**

- **The calculation MUST be made on the EFFECTIVE filtering area of the filter element NOT the total surface area.**
- **Typically, effective filtering area is 20% less than total element area**
- **Effective filtering area can be calculated using the following formula**
  (2 x Width x Length) x 80%

Filter Sizing Example

Filter Sock Size		Effective Area (cm^2)	Cows	cm^2/cow
100	610	918	150	**6.12**
100	760	1188	200	**5.94**
150	610	1428	240	**5.95**
150	760	1848	310	**5.96**
150	880	2184	360	**6.06**
140	930	2158	350	**6.16**

- Filter elements must be able to withstand a pressure drop of at least 200kpa (30psi) across them without failing.
- Filter cages or element holding devices and associated fittings, must be capable of withstanding a pressure of 400kpa (60psi) without bypass occurring across seals.
  - **Notes**
    - **Filters, including**
      - **Elements**
      - **Elements element holding devices**
      - **All associated fittings**

    Must be approved to the by-pass standard i.e. not by passing at less than 400kpa (60 psi)
    - **These approvals must be done using accepted methodology. Current companies currently recognised to carry out approvals are Stevens Filterite and QCONZ**
    - **All current filters on offer from manufacturers must be approved before 1 October 2010**

- In all new/modified installations,
  - There shall be an appropriate port on the milk pump side of the filter element (s) from which back pressure can be measured. This port must be of sanitary design.

- Air purge systems
  - Must be set at no more than 300kpa (45psi) and should only be adjusted by a competent milking machine technician.

5. Approval of Filtration Systems

- New/modified installations, shall comply with the new installation standard.

6. Assessment of Filtration System

The following criteria should be assessed when auditing the milk filtration system

- Compliance with the new filtration standard
- Any filtration system fitted after date October 1 2010 must comply with new filtration standards
- Filter body, cage and filter element retainer
    - Cracks or distortion of filter body
    - Filter cage integrity
    - Retainers, cracked, split, perished
- Filter elements should be sighted to ensure
    - Elements are being used
    - Elements are not failing during milking
- As a minimum the primary cooler inlet and outlet pipes are to be removed and galleries inspected for foreign matter. Ideally the cooler should be opened or there should be evidence that the cooler has been opened and inspected since the last assessment
- Is sediment evident in bottom of vat after milk pick up?
- Is an in dairy feed system fitted?
- Are automatic cup removers fitted.
    - vacuum shut off not activated at cluster removal (clusters dragging before vacuum shut off)
- Is strategic teat washing common practice? How??
- Are air purge settings above 45psi?

Any failure of the filtration system will result in Major non compliance under Structures and Facilities and full compliance to NZCP1 is required

7. Filtration Traceback

- Pressure data logger to be fitted to the filter for a minimum 4 milkings,
- Filter elements should be sighted to ensure
    - Elements are being used. (Location of new and used elements)
    - Elements are not failing during milking. (Evidence that used elements have not burst)
- Filter body, cage and filter element retainer
    - Cracks or distortion of filter body
    - Filter cage integrity
    - Retainers, cracked, split, perished

- As a minimum the primary cooler inlet and outlet pipes are to be removed and galleries inspected for foreign matter. Ideally the cooler should be opened or evidence that the cooler has been opened and inspected since the last assessment
- Is sediment evident in bottom of vat after milk pick up
- Is an in dairy feed system fitted?
- Are automatic cup removers fitted.
    - vacuum shut off not activated at cluster removal (clusters dragging before vacuum shut off).
- Is strategic teat washing common practice? How?
- Are air purge settings above 45psi?
- Teat soil loading of cows presented for milking. (Clean, semi clean, high soil loading)
- Raceway condition. (Dry, light slurry, deep slurry)
- Soil type (generally, is it Hauraki Blue Mud or coastal type).
- Weather conditions at time of trace back
- All information collated and forwarded to the local MQA

Any failure of the filtration system will result in Major non compliance under Structures and Facilities and full compliance to NZCP1 is required