



CAMSYS™

# iCAM™ Filters

## Fixed Filter Card Options



Mirion Technologies offers several filter options for the iCAM™ alpha/beta air monitor.

### DESCRIPTION

- ICAM/FCF: FSLW membrane filter card, for improved alpha spectrum resolution with consequent reductions in MDA and false alarm rate
- ICAM/FCC: charcoal-loaded filter, for simultaneous beta particulate and molecular iodine monitoring
- ICAM/FCI: GFA filter card and charcoal-loaded filter, for simultaneous alpha particulate, beta particulate and molecular iodine monitoring
- ICAM/FCM: FMLB membrane filter card, for improved alpha spectrum resolution and lower MDA with increased flow rate compared to FSLW
- ICAM/FC: GFA glass fibre filter for high flow rate and long filter life

All filter cards include a tear off tab so that they can be counted in an iMatic after sampling.

### FEATURES

- ✓ ICAM/FCF:
  - > x 2 reduction in MDA, so 4–10 x reduction in false alarm rate
  - No changes in setup of iCAM required
- ✓ ICAM/FCC:
  - A low cost method for beta particulate and molecular <sup>131</sup>I monitoring (non-discriminating)
- ✓ ICAM/FCI:
  - A low cost method for alpha and beta particulate and molecular <sup>131</sup>I monitoring (non-discriminating)
- ✓ ICAM/FCM:
  - Improved alpha peaks resolution and MDA
  - Allows higher flow rate compared to ICAM/FCF
- ✓ ICAM/FC:
  - Extended filter lifetime
  - Lower operating costs

## iCAM™ FILTERS

### ICAM/FCF

- Type: FSLW
- Material: PTFE and support made of HD polyethylene
- Average pore diameter: 3 µm
- Useful diameter: 25 mm
- Thermal stability: up to 135 °C

This filter card can dramatically improve the iCAMs performance at a low cost. In particular, false alarm rates (already low in iCAM due to the adaptive radon compensation) can be reduced by a factor of up to ten for the same alarm levels and background conditions. This improvement is achieved by replacing the standard GFA filter card with the ICAM/FCF filter, which uses a Millipore Fluoropore FSLW 3 micron membrane filter (as used in the iCAM/MF). This gives far superior alpha spectrum resolution compared to the GFA filter, and so reduces the size of the tails of the radon and thoron daughter peaks, thus reducing the background in the U/Pu region and reducing the MDA and false alarm rate. In good operating conditions the standard deviation of the compensated alpha reading (and thus the MDA) is reduced by a factor of > 2, and in poor/high background conditions, the improvements are even more dramatic.

### ICAM/FCC

- Type: charcoal-loaded filter (Whatman type 72)
- Useful diameter: 25 mm
- This filter absorbs molecular iodine with very high efficiency, in addition to collecting particulate. <sup>131</sup>I, the most common iodine isotope of interest, has several high intensity betas and so will be detected with very high efficiency (~24%) by the iCAM's beta channel.
- **Detectable high-intensity beta energies:**
  - Isotope: <sup>131</sup>I
  - Half life: 8.0207 days
  - Mean beta energy: 181.92 keV
  - Intensity: 100.50 %

Iodine occurs in two distinct forms: molecular iodine, i.e. I<sub>2</sub>, is normally encountered as fission product from fuel or reprocessing. This form is readily collected by a charcoal-loaded filter paper such as ICAM/FCI. The second form is organic iodine, e.g. methyl iodide, more frequently encountered in nuclear medicine. This form is not readily absorbed by a thin filter, so a bulk iodine absorption cartridge must be used (as in the IM 201 monitors).

Iodine in the environment is also likely to have exchanged with organic molecules so a cartridge-type system such as the IM 201 monitors should be used for wide area environmental monitoring systems. The ICAM/FCC is not suitable for alpha particulate measurement due to the poor spectrum shape produced, but it is suitable for beta particulate in air monitoring. If simultaneous alpha, beta and iodine monitoring is required then use the ICAM/FCI filter.

### ICAM/FCI

- Type: glass fibre filter in GFA (for alpha and beta particulate) combined with a type 72 charcoal-loaded filter
- Useful diameter: 25 mm

Using the ICAM/FCI allows an iCAM to monitor for alpha and beta particulates and for molecular iodine simultaneously, with the comments above for the ICAM/FCC filter applying to the iodine monitoring. The only disadvantage of using this filter is the greater pressure drop caused by the two layers, with consequent reduction in the filter life (typically 1–2 days) compared to the lifetime of a standard GFA filter of 5–7 days. Note, <sup>129</sup>I and <sup>125</sup>I do not have a detectable beta emission and so will not be detected by an iCAM fitted with the ICAM/FCI or ICAM/FCC filters.

### ICAM/FCM

- Type: FMLW 5 µ filter (MERCK)
- Useful diameter: 25 mm

The FMLW filter used in the ICAM/FCM filter card is of identical material and construction to the FSLW filter material used in the ICAM/FCF, but with a larger mean pore size (5 µm as opposed to 3 µm). The improvement in spectrum resolution, and therefore performance, is therefore similar to that achieved with the FSLW filter, but with the added advantage that the filter does not clog up so quickly, allowing a high flow rate to be maintained for longer, especially in high dust loading applications. This can lead to lower MDAs, and therefore lower false alarm rates, than with the ICAM/FCF filter cards.

### ICAM/FC

- Type: GE/Whatman GFA random oriented glass fibre filter
- Diameter: 25 mm
- The ICAM/FC card replaces the ICAM/FCA one

The ICAM/FC filter gives a good compromise between resolution, flow rate and cost, with a single filter typically able to run for > 5 days in typical applications.

