



In 1996 we contacted an independent research company to test and confirm the efficiency of Filtronic AB's units. The research company we contacted was IVL, which is "The Swedish environmental research institute".

All Filtronic's filter units still follow the same basic principle.

An excerpt of the IVL report is shown on the following pages.

IVL REPORT

A99144

Translation of an Excerpt

FOR FILTRONIC AB

Test of a filter's separation ability for isocyanates

Stockholm March 23, 1999

THE SWEDISH ENVIRONMENTAL RESEARCH INSTITUTE

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INTRODUCTION

When thermally resolving PUR-material not only the original material, that is the monomer of the isocyanate, is reformed but also isomer and homologue along with di- and trimeres of the isocyanate. In addition, isocyanates of type methylisocyanate, MIC and prophylisocyanate, PIC, are formed. The resolving products are dependent on which temperature the PUR-material is heated up to and for how long.

IVL has at the request of Filtronic AB carried out a test of a filter's capacity to separate isocyanates from stack gas when soldering PUR coated electronic printed circuit boards. The filter was a part of a system with suction attachments to separate and filtrate stack gas when soldering of electronic components, unit MG70 (art No 700-1000-ESD).

METHODOLOGY OF SAMPLING AND ANALYSIS

During the test the system was set to separate soldering smoke with gas filter type 700-2001-ESD in a suction cabinet. A soldering iron was brought forward to the printed circuit board and over its coated surface and components. The soldering wire was used in a normal way. The soldering smoke was caught in a suction nozzle connected to the filter unit.

The air was tested before and after the filter with the DBA method (0,01 M dibutylamin dissolved in toluole) with a impinger bottle. Soldering work was done during the whole time. The tests were taken with an airflow of 1,01 l/min during exactly 10 minutes. The tests were then analysed at the Institute of clinical chemistry at Lund's university hospital. The method of analysis is built on a combination of liquid chromatography and mass spectrometry, so called LC-MS-ESP.

Chart 1 Conditions during tests:

Test, (before/after)	Filter	Flow in suction device	Temperature on soldering iron	Amount soldering wire
1 and 2	new standard	approx. 900 l/min, position "2"	440 °C	approx. 2 meters type IF 14, Ø 0,7 mm ^{*)}
3 and 4	used filter (6 months)	as above	450 °C	as above

^{*)} heating of lacquered components

RESULT

Analysis showed that the separation was good. The air was tested before and after the filter. See chart 2 below.

Chart 2 Result of tests before and after filter (1 respectively 2 etc)

Test No	Test volume, l	2,4-TDI ($\mu\text{g}/\text{m}^3$)	2,6-TDI ($\mu\text{g}/\text{m}^3$)	4,4-MDI ($\mu\text{g}/\text{m}^3$)
1	10	5	5	-
2	10	-	-	-
3	10	2	4	-
4	10	-	-	-

Note:

TDI = toluole diisocyanates

MDI = methylene diisocyanates

- states below detection level, which is $0,5 \mu\text{g}/\text{m}^3$

COMMENTS

The test shows that the separation of the measured isocyanates is very good. Since the proportion of TDI after the filter was below the detection level, the correct separation degree can not be determined.

Tests (apart from this test) indicates that also the separation of lighter isocyanates, in our case isopropyl isocyanates (iso-PC), is good.