



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 FT-units still follows the same basic principle.

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

IVL REPORT

L93/92

Translation of an Excerpt

FOR FILTRONIC AB

REPORT FROM AN INVESTIGATION OF THE EFFICIENCY OF A FILTER
UNIT DESIGNED FOR SOLDERING WORK IN THE ELECTRONICS
INDUSTRY

Göteborg 18th May, 1993

THE SWEDISH ENVIRONMENTAL RESEARCH INSTITUTE

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Result; Aldehydes

	Acetaldehyde ----ug/m3-----
BEFORE FILTER	29
AFTER FILTER	3.3*

* The values have the same level as the background.

Result; GC/MS-analysis

To estimate the efficiency of the filter, the total quantity of substances occurring before cleaning (counted as the total area under the total ion chromatogram) was compared to the total quantity after cleaning. After compensation for the test quantity, we could establish that

- the total quantity of substances in the test before the filter
= $1.11 * 10^{10}$ unit areas
- the total quantity of substances in the test after the filter
= $8.17 * 10^7$ unit areas
- the efficiency of the filter => 99,9%

More than 150 substances were detected in test 10 (soldering smoke before cleaning in the filter). 19 substances, which represent appr. 70% of the total quantity of components, were selected for identification. The greater part seems to be cyclic hydrocarbons with 10 carbon atoms, which might form from the flux that is used in the solder (see Table 1). The identification is uncertain as there are many similar forms (isomers) of these substances, whose mass spectra are almost identical to each other. To get a positive identification, reference substances are required.

A smaller number (appr. 60) of substances occurred in test 55C (soldering smoke after cleaning). Twelve substances, which represent appr. 60% of the total quantity of components, were selected for identification and are pre-sented in Table 2. Cycloalifatic hydrocarbons, which occurred mostly in test 10, did not occur among these 12 substances, indicating that this filter has a very good ability to retain these substances.

Table 1
Identification of substances in soldering smoke before cleaning

Test 10, taken before the air purification step (18 litres test)

Scan	Substance	Unit areas	% of total quantity based on unit areas
1777	2-pyridinecarbonitrile	13598200	2.19
2088	2-propylheptanol?+decane	13822400	2.23
2155	unknown	7592700	1.22
2208	ClOhydrocarbon	32833800	5.29
2246	ClOhydrocarbon	23612400	3.81
2262	methyl-isopropylcyclo-hexanol?	32617500	5.26
2301	unknown	69812700	11.25
2448	ClOhydrocarbon	10206700	1.64
2461	ClOhydrocarbon	39388400	6.35
2504	dimethylstyrene	7204350	1.16
2642	ClOhydrocarbon	16216400	2.61
2688	trimethyl-bicyclo (2.2.1) heptanol	10333400	1.67
2759	unknown	12226800	1.97
2771	methyl-isopropylcyclo-hexanol	6394370	1.03
2795	chloro-trimethyl-bicyclo 2.2.1) heptane	28963690	4.67
2848	diinethyl-metoxy-bicyclo (3.1.1) heptane	12178400	1.96
2871	unknown	22331400	3.6
2891	unknown	18706800	3.1
2926	tnmethyl-cyclohexenyl-metanol?	61850600	9.97
	sum		70.98

Table 2
Identification of substances in soldering smoke after cleaning

Test 55C - taken after the air purification step (36 litres test)

Scan	Substance	Unit areas	% of total quantity based on unit areas
344	isocyanomethane	181782	8.01
367	methylpentane	210535	9.27
402	dimethylbutene	504080	22
1236	toluene	36104	1.59
1320	4-methyl-2-pentanol	33865	1.49
1665	xylene	53735	2.37
1883	cyclohexanone	46137	2.03
2087	decane	81993	3.61
2441	undecane	2441	4.39
2587	nonanal	85449	3.76
2770	dodecane	84032	3.7
2908	unknown	53536	2.36
sum			64.58