§ 13. Generelle krav til ventilasjon
(6) Omluft skal ikke benyttes dersom den forurenser rom hvor mennesker er til stede.
(6) Recirculation shall not be used if it contaminates rooms where humans are present.

§ 13-2. Ventilasjon i boligbygning
(4) Kjøkken, toalett og våtrom skal ha avtrekk med tilfredsstillende effektivitet.
(4) Kitchen, toilet and bathroom needs extraction with satisfactory efficiency.

§ 13-2 Tabell 1: Avtrekksvolum i bolig.

<table>
<thead>
<tr>
<th>Rom</th>
<th>Grunnventilasjon</th>
<th>Forsert ventilasjon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kjøkken</td>
<td>36 m³ /h</td>
<td>108 m³/h</td>
</tr>
<tr>
<td>Bad</td>
<td>54 m³ /h</td>
<td>108 m³ /h</td>
</tr>
<tr>
<td>Toalett</td>
<td>36 m³ /h</td>
<td>Som grunnventilasjon</td>
</tr>
<tr>
<td>Vaskerom</td>
<td>36 m³ /h</td>
<td>72 m³ /h</td>
</tr>
</tbody>
</table>

TEK 17 – Norwegian technical description for building houses.
In kitchens there is a requirement that there must be a hood with extraction over the hobs. The hood must have adjustable, mechanical extraction and return to the open air and have sufficient efficiency to remove moisture and gaseous contaminants from cooking. The extraction must be capable of being increased to at least 20 l/s.

Paragraph 3. Kitchens in homes must be equipped with an extractor hood with extraction over the hobs. The hood must have adjustable, mechanical extraction and return to the open air and have sufficient efficiency to remove moisture and gaseous contaminants from cooking. The extraction must be capable of being increased to at least 20 l/s.

In kitchens there is a requirement that there must be a hood with extraction over the hobs and into the outside air. This requirement will always apply when installing cooking plates in a home. Recirculation hoods will not normally meet this requirement, including recirculation hoods with carbon filter. The extraction of the hood must be able to be increased to at least 20 l/s. If the hood has an extractive capacity of 75 per cent or higher than the hood, the hood shall be 75 per cent more effective. DS/EN 61591 or DS/EN 13141-3 will normally meet the requirement for sufficient efficiency to remove moisture and gaseous contaminants from cooking. Hotplates may be, for example, electric or gas-heated and built into a stove.
Odour reduction factor

For the Nordics we are working with very limited extractions possibilities

Diagram 1: Uppmätt uppfängningsförmåga (%) för spiskåpa.

Odour reduction factor

Comparison between EN 61591 and modified "61591"
EN label – does not say anything about odour reduction level/efficiency and and the airflow is significant higher the the inlet-air can handle

Is the EN Label valid for hood performance or just a tool for comparison?
Grease filter

Different charcoal filters

- Plasma filter
- Active carbon filter
- Monoblokk filter

No measurement standard
- Measured after EN 61591
- MetylEtylKotan
- Cooker hood level max normal
- Measured after EN 61591
- MetylEtylKotan
- Cooker hood level maw normal
The different carbon filters have different performance of MEK reduction of course.

What happens with charcoal filters after some period of time with »bad handling» of grease filters?

- Active carbon filters ‘capture’ the smells. The filter capacity for smell absorption decreases as more smell is absorbed. The filter thus has a ‘limited’ lifetime.

- Breakthrough measurements show this decrease in absorption efficiency.

- Test procedure:
  - Constant concentration of MEK upstream the filter (i.e. 80ppm)
  - Measure the concentration downstream the filter as function of time.
Shall tests also be based on «fish odour» or real life cooking situations?

<table>
<thead>
<tr>
<th>Measuring data of odour extraction in recirculation mode with Trimethylamine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of odour filter(s) after conditioning</td>
</tr>
<tr>
<td>Setting (max. fan speed in normal use)</td>
</tr>
<tr>
<td>Background value before test of C₁</td>
</tr>
<tr>
<td>Maximum concentration in the test room</td>
</tr>
<tr>
<td>Maximum concentration – background value (C₂₀)</td>
</tr>
<tr>
<td>Background value before test of C₂</td>
</tr>
<tr>
<td>Concentration after 30min operating time</td>
</tr>
<tr>
<td>Concentration after 30min – background value (C₂₀)</td>
</tr>
<tr>
<td>Time from C₂ to 15 % of C₁ – Odour dispersion time</td>
</tr>
<tr>
<td>Value after C₂ + 60 min operating time</td>
</tr>
<tr>
<td>Odour reduction level (O₁)</td>
</tr>
</tbody>
</table>
Methyl Etyl Kotan does not represent «real life cooking»

TVOC: Performed test:
Amino 3 hamburgers
Sulphide 12 min cooking sequence
Aldehydes Enough inlet air when duction out
Ketones Identical plates, butter in frying pan, external circumstances
Organic acids Setting level 3 on cooker hood.
TVOC = Smell/fumes from 3 hamburgers like the previous test
No difference between a Monoblokk filter and Plasmafilters.
Our conclusion – plasma has little effect, the importance is having a good recirculation filter.

With the information we have at the present time, duct out is 35% better than recirculation in this performed test.

Thank you for listening.