Beer Dealcoholization
Methods for beer dealcoholisation

**Evaporation**

- Thermal de-alcoholisation in falling film or thin layer evaporators by ethanol evaporation
- Operating parameters: 60-200mbar, 40-60°C
- Quality of beer: slight color increase, loss of volatile aromas, loss of acids, loss of CO₂, loss of „body“, high risk for worty, bready, caramely, and fatty acid taste
- High investment and operating cost
- High space requirement

**Reverse Osmosis**

- Pressure and concentration based membrane separation
- Operating parameters: 25-35bar, 5-20°C
- Quality of beer: fuller taste, lower risk of worty taste, reduced CO₂ loss, slightly sour character compared to original beer
- Modular design for simple scalability
- Small foot print
- Suitable for small to large scale operation
- Cost effective (investment to operating cost)
Membrane filtration principle

- Water
- Ethanol
- Aroma/Sugars/Acids...

Pressure

Crossflow promotes shear to prevent membrane fouling

Crossflow

Membrane

The membrane acts as a physical barrier, permeable only for ethanol + water.
Process principle – partial dealcoholisation

- **Beer**
  - Ca 6% Ethanol
  - 90 hl

- **Concentration**
  - ca 6% Ethanol
  - 30 hl

- **Water**
  - 60 hl

- **Re-dilution**
  - de-alco Beer
  - ca 2% Ethanol
  - 90 hl
Process principle – “full” de-alcoholisation

Beer
Ca 6% Ethanol
90hl

concentration

Concentrate
ca 6% Ethanol
30hl

diafiltration

Concentrate
ca 1.5% Ethanol
30hl

re-dilution

de-alco
Beer
ca 0.5% Ethanol
90hl

Water
60hl
**MMS AG De-alcoholisation system types**

**Batch systems**

**Batch Process**
- Smaller scale, <300hl/day
- Long resistance time for retentate
- Lower investment cost
Continuous or Feed & Bleed Process
- Larger scale, > 300hl/day
- Short resistance time for retentate
Reverse osmosis technology offers an effective and flexible solution for the removal of ethanol from beverages at moderate investment, in a broad capacity range with minimal space requirement.