



Twinning Project IL/11

Implementation and Strengthening the Environmental Framework for  
IPPC, Resource Efficiency and Eco-Management in Israel



# Release of HF in 2003





## Release of HF on July, 07th of 2003

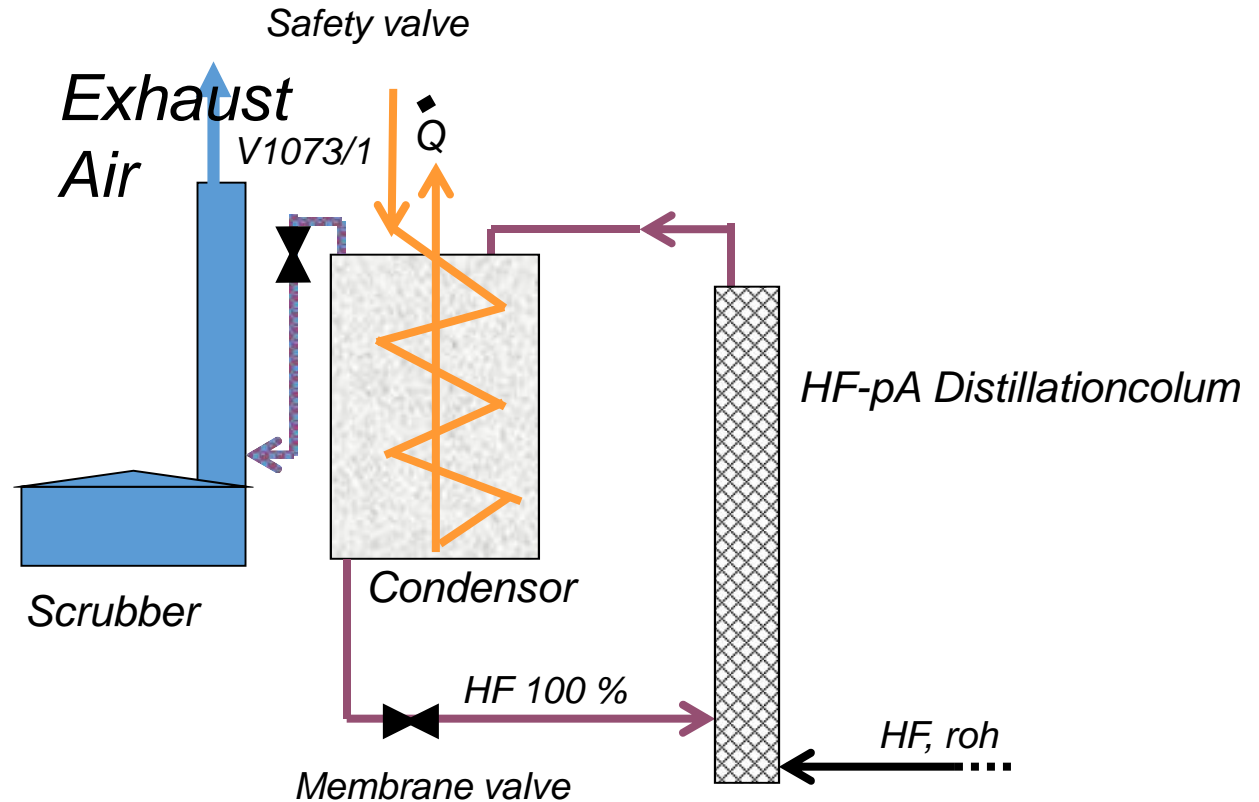
- Situation of the installation
- Picture of the damage
- Scenario (what happened)
- Causes
- Consequences





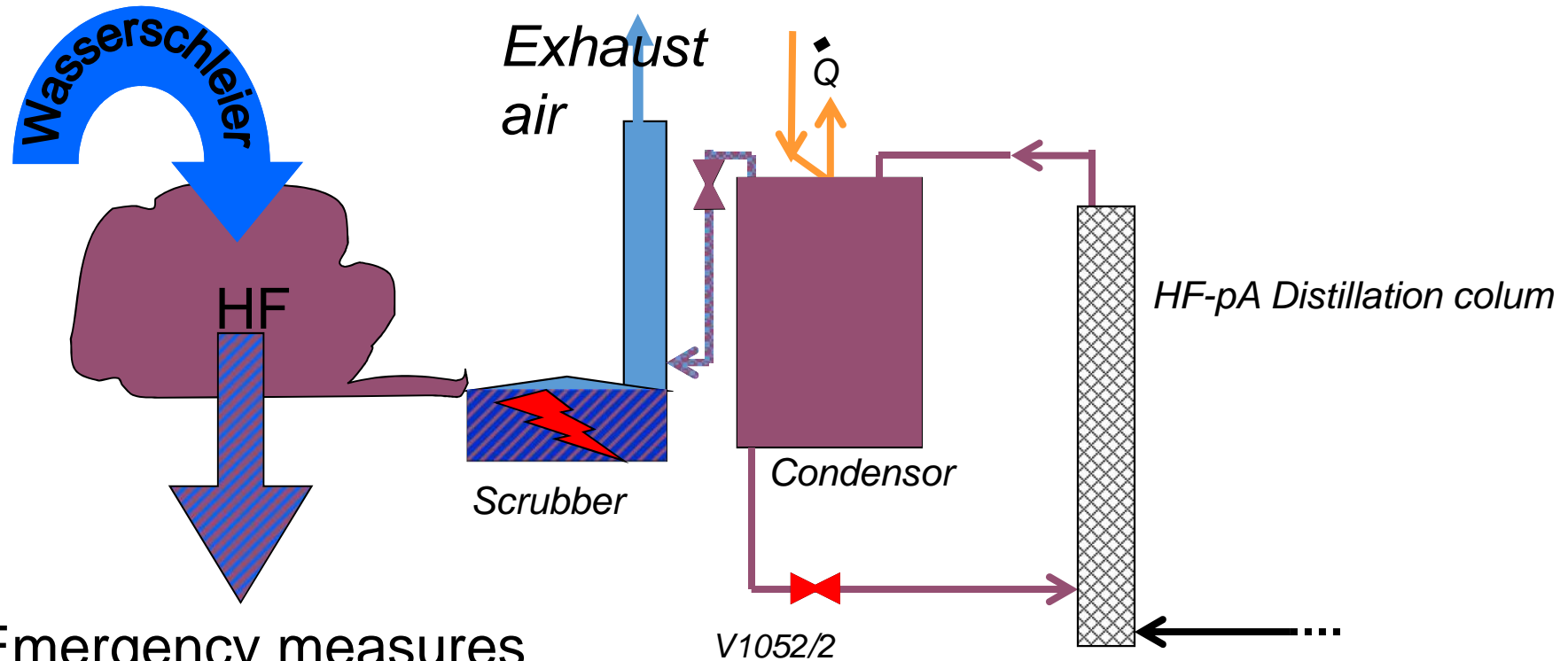
# Simplified Scheme of the Installation

In 2003 a container in the scrubber system burst and 12 kg of HF-Gas are released into the building and over the rooftop





# The Scenario

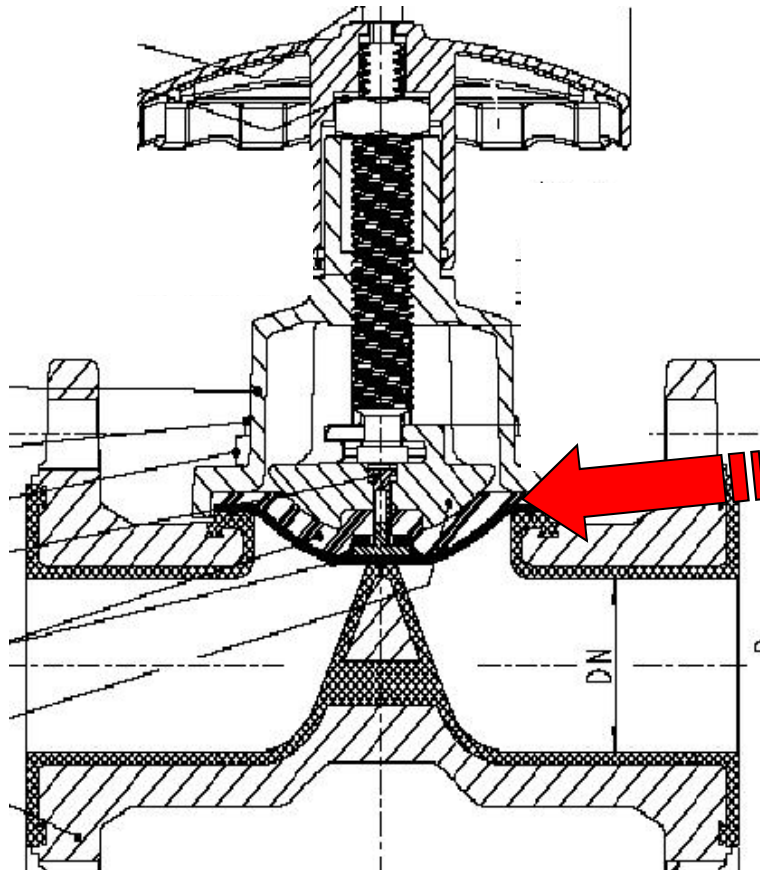


Emergency measures  
by the fire brigade of  
the installation





# Membrane valve

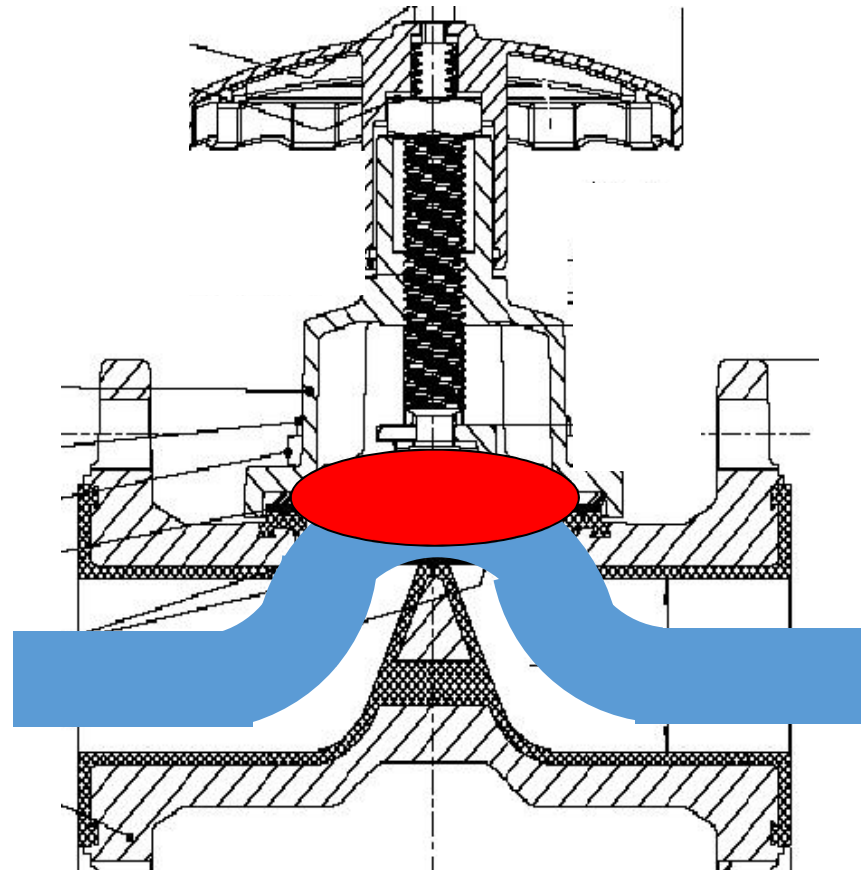


- The closed valve
- The protection layer of the membrane became leaky
- The highly concentrated HF lead to a swelling of the membrane
- The valve seems to be opened but in real the flow was reduced





## Real flow through the valve





# Reasons of the damage

- The trigger: defect membrane valve
- Lack of level meters in the gas system,  
(„no liquids in the gas system“)
- Enthalpie of mixing (Exothermie) when mixing HF  
with water or HF of different concentration





# Deep analyses „membrane valve“

- Lack in maintenance

*Why?*

- Lacks in the PID

- Lacks in change management

- Overload of the maintenance team

- Lack in communication







# Analysys „Levelmeter-Overfill safety“

- Missing Levelmeter (overfill) in the gas system

Why?



- Wrong approach for the design/planning:  
„No liquids in the gas system“

Other reasons for this problem?



- Wrong decline in piping
- „Sacks“ in piping





## Consequences on technical level

- Exchange of all membrane valves at least every two years if HF > 60 %
- Installation of level meters (overflow safety)
  - In the gas pipings
  - In the condensers
  - In case of alarm shut down of the distillation
- Update of the PID
- Elaboration of isometric piping diagrams





## Results of further investigation

- Old fashioned philosophie in maintenace (sparepartss)
- Ongoing changes in the maintenance system
- Overload of workers and management
- Interruptions between safety management system and praxis
- Safety analysis was not „practised“
- Lack of awareness of obligations in the management



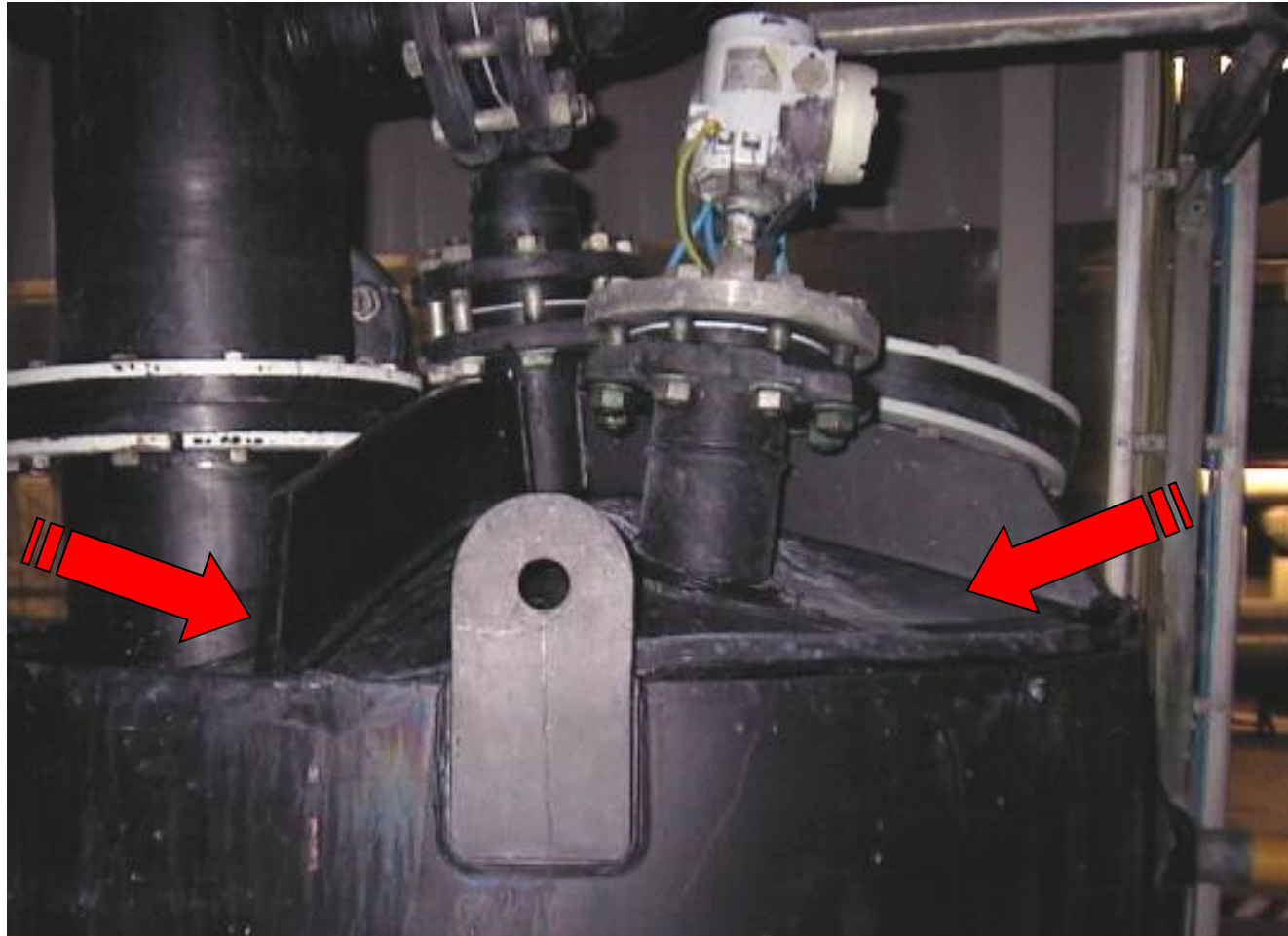


## Damaged vessel in the scrubber system





## Damaged vessel in the scrubber system





## Damaged membrane valve





## Durchfluss bei geöffnetem Membranventil

