

Established Product Stewardship for SF₆:

- Anchoring in the company

Target: To continue to improve the quality of products and services

- Safety and environmental protection as goals

Risk management: SF₆ ReUse concept

- Communication

Voluntary commitment:

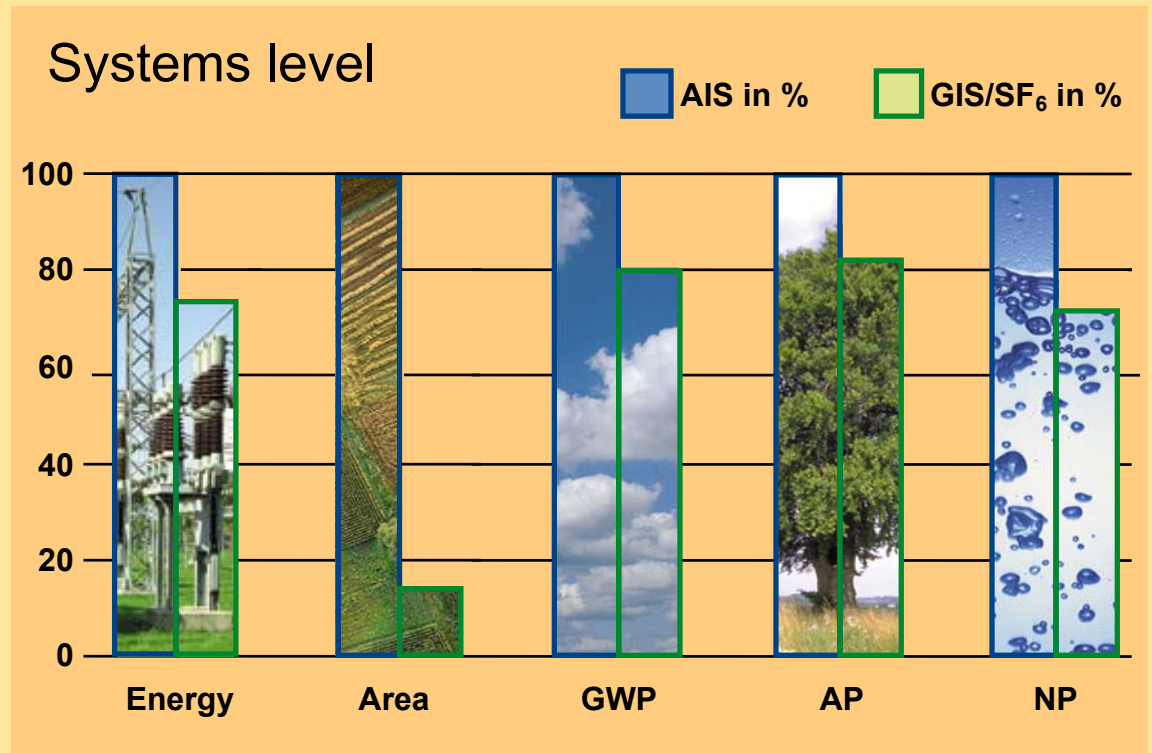
“Use of SF₆ in Switchgears and GIS (gas insulated substations)”

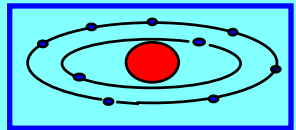
- Co-operation

Life cycle assessment study “Electricity Supply Using SF₆ Technology”

Result of the LCA on SF₆

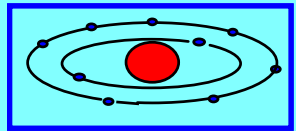
Reduction of potential environmental impacts studied by use of GIS (SF₆) switchgear in the power supply system considered compared to AIS switchgear technology





Concept for the Reduction of SF₆ Emissions in Magnesium Foundries in Comparison to SO₂

1. Step measurements of the gaseous decomposition products of SF₆ and SF₆ concentration in the exhaust gas
2. Detection of all emission sources of the melting pot
(for SO₂ as well)
3. Installation of exhaust connections and suction
(for SO₂ as well)
4. Installation of filters for the SF₆ decomposition products in the suction stream
(for SO₂ as well)
5. Installation of the SF₆ adsorbers to remove SF₆
(for SO₂ as well)
6. Transfilling the desorbed SF₆ in the ReUse cylinder of Solvay
7. The SF₆ ReUse cylinders go back to the SF₆ production plant and are reintroduced into the production process
8. Purification up to new quality standard



1. Step measurements of the gaseous decomposition products of SF_6 and SF_6 concentration in the exhaust gas
 - Solvay detects via mobile GC the decomposition products
 - SO_2 , SOF_2 , SO_2F , and HF via HF monitor

Remove the decomposition products:

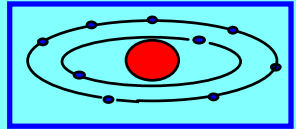
It is necessary to determine the concentration of the decomposition products in order to design the filters for adsorption of the decomposition products

A, via adsorber, e.g., Al_2O_3 pellets filter

- advan.: is for local application, e.g., each melting pot with one cartridge
- disadvantage: limited adsorption capacity

B, alkaline gas scrubber

- advantage: higher capacity, e.g., several melting pots are purified through one gas scrubber
- disadvantage: introduction of humidity into the system

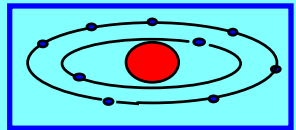


**2. Detection of all emission sources of the melting pot
(for SO_2 as well)**

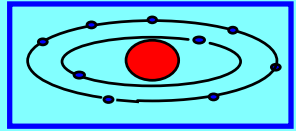
**3. Installation of exhaust connections and suction
(for SO_2 as well)**

**4. Installation of filters for the SF_6 decomposition
products in the suction stream (for SO_2 as well)**

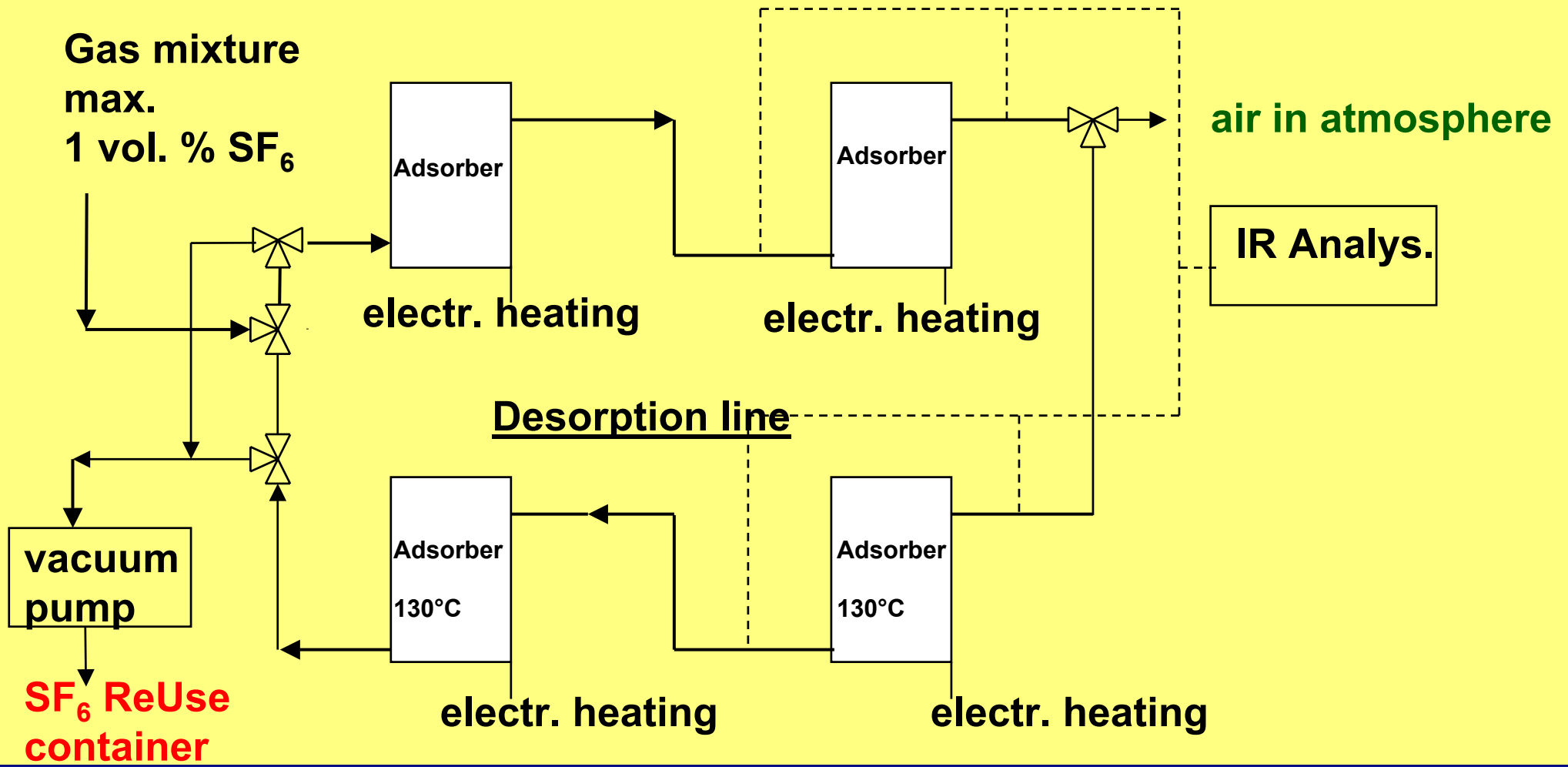
**Is to be done by the customer, if necessary in
consultation with Solvay or other companies**

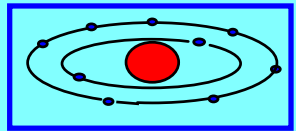


- 5. Installation of the SF₆ adsorbers to remove SF₆ (for SO₂ as well)**
- technical parameters recommended via IMA for one square meter of melt surface with an enclosure volume of 100 liters
 - 10 l/min gas flow
 - 0.2 vol.% SF₆
 - relates to 20 ml/min SF₆ or 1.2 l/h SF₆ or 9.6 l/d SF₆ (8 h a d)
 - relates to 7.5 g/h SF₆ or 59.4 g/d SF₆
(density 6.18 g/l at 1 bar and 15°C)
 - Adsorption coefficient is between 2.5% and 3% by weight
 - Adsorber quantity is 2376 g per day, 11.8 kg per week
 - SF₆ outlet steam is below 10 ppm
 - Adsorber material is rechargeable, e.g., once a week via psa techn.
 - Desorption of SF₆ achieves concentrations above 90 vol.% SF₆
 - almost no adsorption of air



Separation of SF₆/N₂ Mixtures

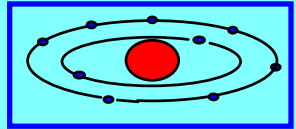




6. Transfilling the desorbed SF₆ in the ReUse cylinder of Solvay via compressor into a SF₆ ReUse cylinder



<p>Schwefelhexafluorid aus elektrischen Anlagen, kann giftige und ätzende Zersetzungsprodukte enthalten</p> <p>Hexafluorure de soufre provenant d'installations électriques, peut contenir des produits de décomposition toxiques et corrosifs</p> <p>Zwafelhexafluoride uit elektrische installaties, kan giftige en etsende ontledingsproducten bevatten</p> <p>Sulphur hexafluoride from electrical installations, may contain toxic and corrosive decomposition products</p> <p>Hexafluoruro de azufre procedente de instalaciones eléctricas, puede contener productos de descomposición tóxicos y corrosivos</p> <p>Esaffluoruro di zolfo proveniente d'installazioni elettriche può contenere prodotti di decomposizione tossici e corrosivi</p>		
<p>Kann Erstickung verursachen. Giftig beim Einatmen. Bottlier en civeus gas geflihuus On aushwahren.</p> <p>Peut causer des gelures. Toxique par inhalation. Conserver le récipient dans un endroit bien ventilé.</p> <p>Kan hervringingsverschijnselen veroorzaken. Giftig bij inademing. Op een goed geventileerde plaats bewaren.</p>	<div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: center;">Made in Germany UN 3308</p>	<p>May cause frostbite. Toxic by inhalation. Keep containers in a well-ventilated place.</p> <p>Puede provocar quemaduras por frío. Tóxico por inhalación. Conservar el recipiente en lugar bien ventilado.</p> <p>Può provocare ustioni per frodo. Tossico per inalazione. Conservare il recipiente in luogo ben ventilato.</p>



7. The SF₆ ReUse cylinders go back to the SF₆ production plant and are reintroduced into the production process

8. Purification up to new IEC 376 quality standard

ADVANTAGES FOR MAGNESIUM INDUSTRY:

- Production remaining under SF₆ atmosphere**
- Joining an experienced closed loop concept for SF₆**
- the material magnesium is more competitive, e.g., in cars compared via life cycle assessment studies**

MINIMIZED SF₆ EMISSION INTO THE ATMOSPHERE