

Handling SF6 Gas

SIEMENS

**Time Start:
10:00 a.m.**

**2018
Jackson, MS**



- *Keep doors, fire equipment, and exits clear*
- Don't prop fire doors open or block exits with furniture or boxes
- Make certain all fire and rescue equipment is unobstructed and accessible.

SF6 Gas Circuit Breaker (GCB)

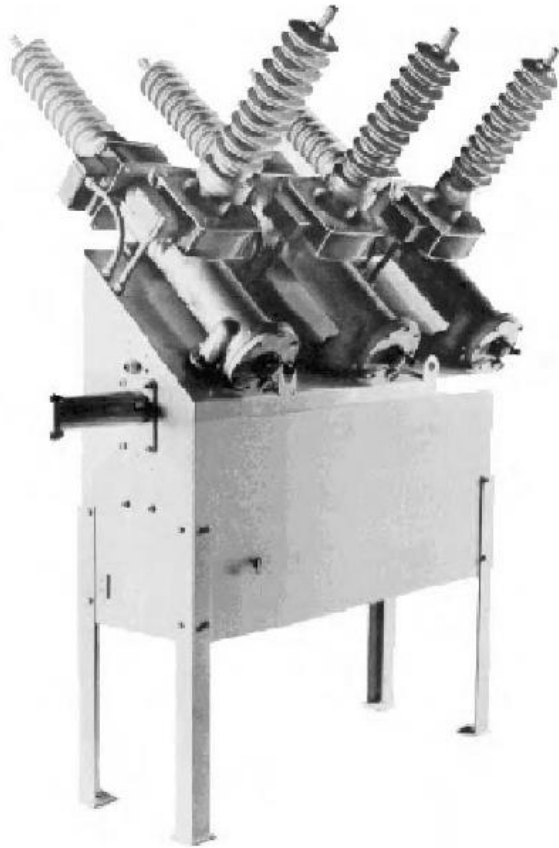
SIEMENS

- Interrupting Medium:
 - Sulfurhexaflouride (SF6)
- SF6 does not require replacement, does have temperature limitations
- Dielectric Strength:
Gas > Oil > Vacuum > Air



SF6 Gas Circuit Breaker (GCB)

SIEMENS



161kV GCB – Courtesy Alliant Energy

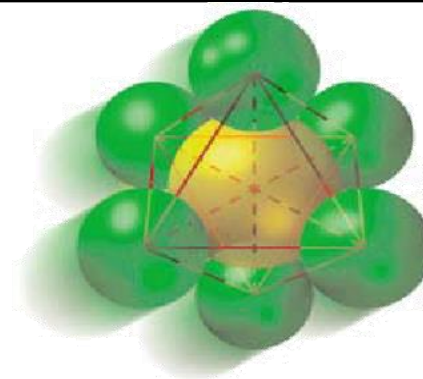


362kV GCB – Siemens

Sulphur Hexafluoride, SF₆

Is a colourless, odourless, nontoxic, non-flammable, insulating and cooling gas. It is five times heavier/denser than air and one of the heaviest known gases.

- 1900 First operation (France)
- 1937 First patent as insulating gas (Cooper)
- 1938 First patent as arc quenching gas (Grosse)
- 1948 Start of technical production (USA)
- 1960 First SF₆-Power circuit breaker (Westinghouse)
- 1964 First Siemens-SF₆-Power circuit breaker (puffer type)
- 1968 First Siemens-GIS with SF₆-Insulation
- 1974 First Siemens-GIL
- 1995 First Siemens-SF₆ —Power circuit breaker (self compression)



- Advantages :
- High dielectric strength
 - Regeneration capacity
 - Low pressure increase in the case of breakdown

Sulphur Hexafluoride, SF₆

	SF ₆
Chemical formular	SF ₆
CO ₂ -equivalent	22.800
Boiling point (°Celsius)	-64°
Carrier gas	Pur or mixed with N ₂ , CF ₄
CO ₂ -equivalent	≤ 22.800
Boiling point (°Celsius)	<- 64° (variable)
Dielectric strength (at same pressure)	1 (normiert)
Dissociation/decomposition	~ 2000 K (reversib.) [1]
Decomposition products	HF, SO ₂ , sulphur compounds



Hazardous Material Information System



Hazardous Material Information System (U.S.A.)

Health	1
Flammability	0
Physical hazards	3

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

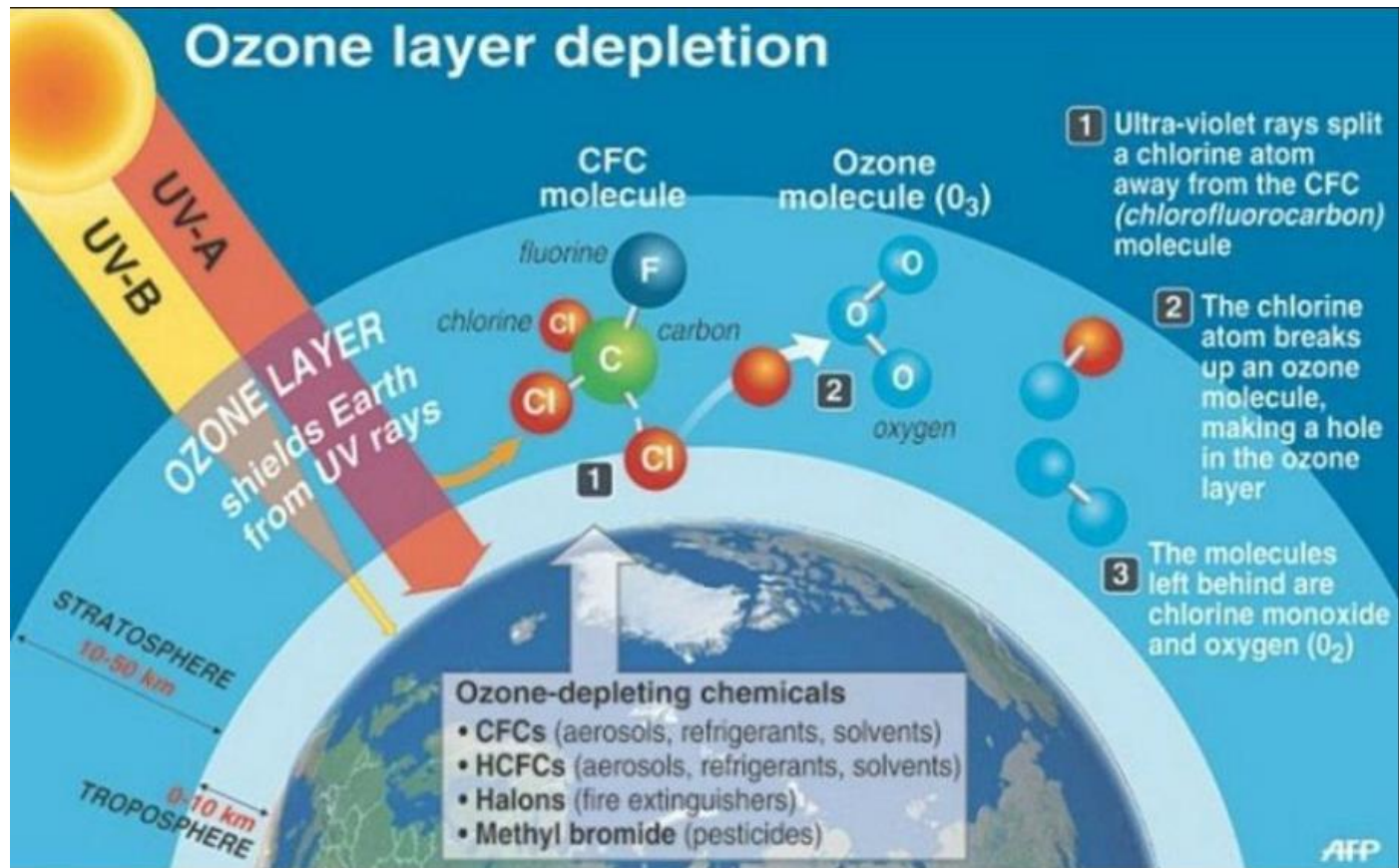


CAUTION



CONFINED SPACE

ENVIRONMENTAL EFFECTS



- “It is now known to have a global warming potential that is 25,000 times greater than that of CO_2 ”
- <https://www.tandfonline.com/doi/pdf/10.1080/10473289.2000.10463996>

For More Information...

See Safety Data Sheet for “Sulfur Hexafluoride” or “SF6”

SAFETY DATA SHEET


Sulfur Hexafluoride

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier	: Sulfur Hexafluoride
Chemical name	: sulphur hexafluoride
Other means of identification	: Sulfur fluoride (SF6), (OC-6-11)-; Sulfur fluoride (SF6); Sulfur hexafluoride; Sulfur fluoride
Product use	: Synthetic/Analytical chemistry.
Synonym	: Sulfur fluoride (SF6), (OC-6-11)-; Sulfur fluoride (SF6); Sulfur hexafluoride; Sulfur fluoride
SDS #	: 001048
Supplier's details	: Airgas USA, LLC and its affiliates 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
24-hour telephone	: 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	: GASES UNDER PRESSURE - Liquefied gas
GHS label elements	
Hazard pictograms	: 
Signal word	: Warning
Hazard statements	: Contains gas under pressure; may explode if heated. May cause frostbite. May displace oxygen and cause rapid suffocation.
Precautionary statements	
General	: Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position.
Prevention	: Not applicable.
Response	: Not applicable.
Storage	: Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.
Disposal	: Not applicable.
Hazards not otherwise classified	: In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

For More Information...



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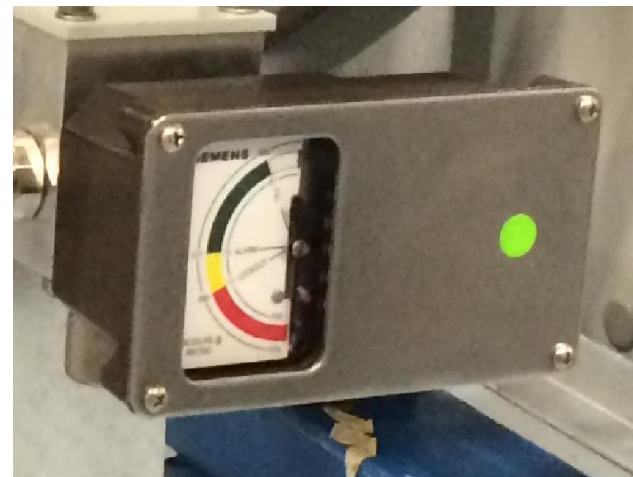
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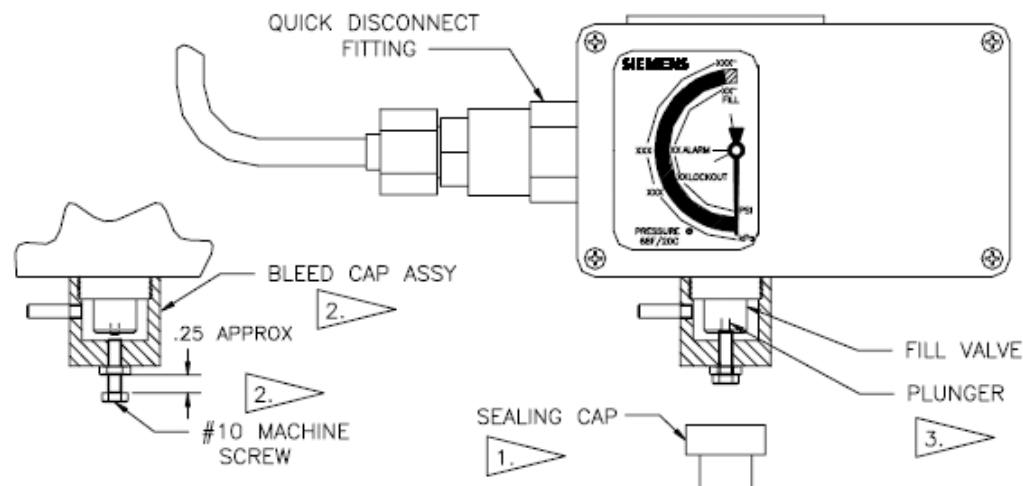
DANGEROUS BYPRODUCTS

- Disulfur Decafluoride
 $S_2F_{10}(SF_5)$
 - Eye, nose, throat, skin irritation
 - Gray, white or tan powder
 - Toxic to cells
 - Heavily acidic
- Higher contamination risk the higher the arc
- Use respiratory device, rubber gloves, goggles
- Work in well ventilated area
- Acid can be diluted with base such as baking soda
- Gas can be returned to gas supplier for filtering

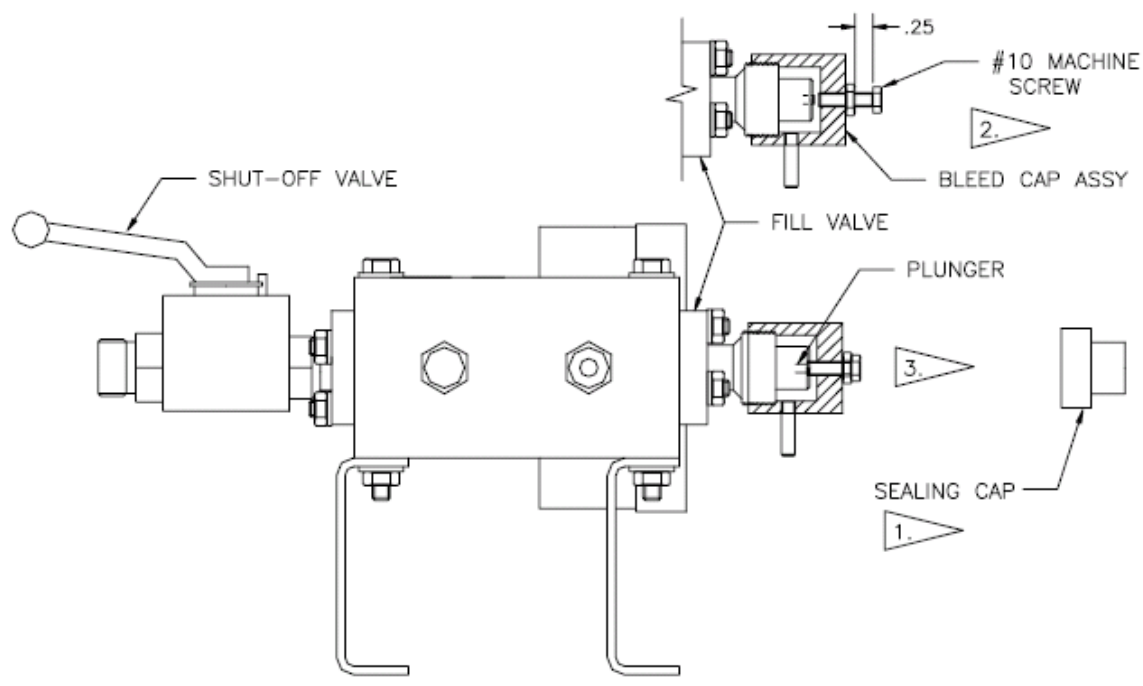
Filling with SF6

- Check psi first – often shipped with some level of pressure
 - If no gas, product has experienced leak and needs to be returned
- If re-using gas, purity needs to be checked
- Connect SF6 bottle with hose and quick connect to fill port
- Purge hose
- Open cylinder slowly to prevent from freezing of bottle
- Observe gauge to confirm fully

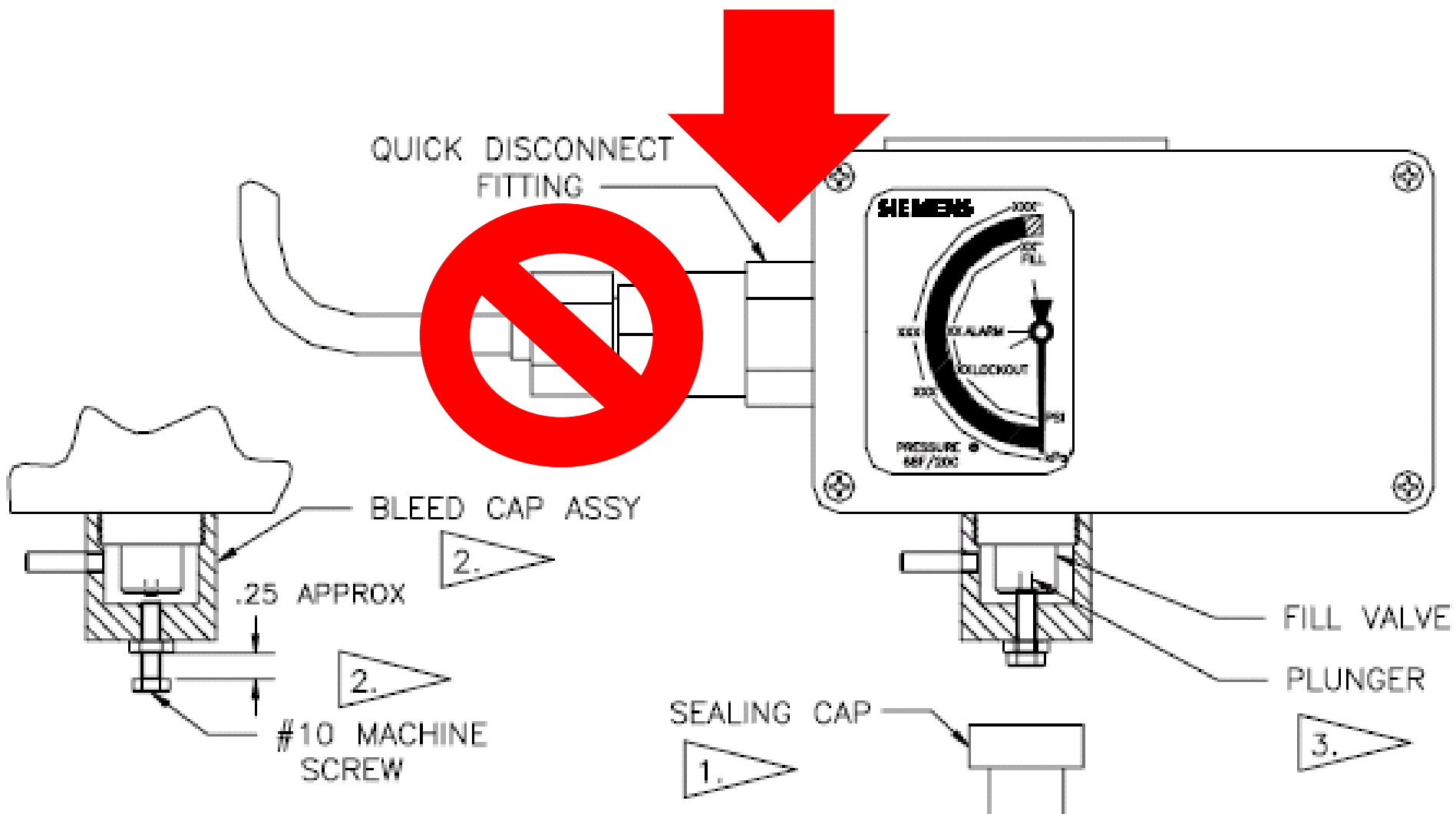




DENSITY SWITCH W/INTEGRAL GAUGE, EXTERNALLY MOUNTED



MANIFOLD ASSY, INSIDE CABINET



Checking for Leaks

- SF6 Sniffer
 - Device specifically designed to detect SF6 particles
 - Checking most likely leak areas = near seals
- Soap & Water + Spray bottle
 - Allows for visual confirmation of leak
- SF6 Camera
 - Visual Confirmation, but difficult to target unless leak is extreme

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Removing Gas

- Tools required:
 - Gas cart
 - Hose from fill kit
- Check connection points
- Use cart to pump gas back into cylinders
- Store cylinder safely or return to gas supplier

Opening The Pole Units

Place the breaker in the open position before removing SF₆ in preparation for opening the pole units. Remove SF₆ from the breaker through the fill valve. Disconnect and plug the SF₆ manifold from the pole unit to be opened. Plugs are included in the installation tool kit. This isolates an individual pole from the rest of the breaker and allows opening the pole unit without contaminating the rest of the breaker.

Contact Information

SIEMENS



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Thank You for Your Time!!

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