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INTERNATIONAL ULC
A CLARK-RELIANCE COMPANY

AN ISO 9001:2015 CERTIFIED COMPANY

CASE STUDY

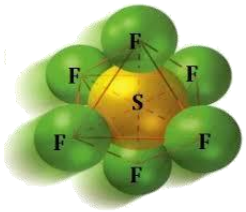
TOPIC: **SF_6 Reclamation & Purification for Reuse in the Electrical Transmission & Distribution Network**
LOCATION: **Powerlink Australia**
DATE: **November 2020**

Problem: **Sulfur hexafluoride** (SF_6) is an inorganic, colorless, odorless, non-flammable, non-toxic but extremely potent greenhouse gas, and an excellent electrical insulator. More than 10,000 tons of SF_6 are produced per year, most of which (over 8,000 tons) is used as a gaseous dielectric medium in the electrical industry. However, SF_6 can get contaminated with air, nitrogen and other elements that cannot be easily removed with standard filtration systems, making it unusable.

Powerlink had approximately 4.5 tons of SF_6 gas contaminated with air and nitrogen in storage. They also expect to receive 2 tons of contaminated SF_6 gas annually. They needed a cost-effective solution to efficiently remove air, nitrogen and other contaminants from their SF_6 gas that would meet or exceed IEC 60480 standards for used SF_6 gas.

Solution: To effectively remove air, nitrogen and other contaminants from used SF_6 gas to meet IEC 60480 specifications for used SF_6 gas, so it can be reused in the electrical transmission and distribution network. Our customer used the Enervac SF_6 Gas Separation System which uses our proprietary gas separation process. Our process utilizes a closed loop cryogenic system which is very cost-effective and does not require costly consumables such as liquid nitrogen to separate contaminants from the SF_6 gas.

IEC specifications (standards) for sulphur hexafluoride per **IEC 60376:2018** and **IEC 60480:2019**



	IEC 60376 Specification for new SF_6 gas	IEC 60480 Specification for used SF_6
SF_6	> 98.5 vol.-% For gas mixtures: > 99.7 Vol.-%	> 97 Vol.-% For gas mixtures: ±5 % from the nominal value
Air/CF_4	Air: < 10.000 µl/l (i.e. 1 Vol.-%) for pure SF_6 gas For gas mixtures: < 2,000 µl/l (i.e. 0.2 vol.-%) CF_4: < 4,000 µl/l (i.e. 0.4 Vol.-%) for pure SF_6 gas For gas mixtures: < 800 µl/l (i.e. 0.08 vol.-%)	< 30,000 µl/l (i.e. 3 % vol.) For gas mixtures: SF_6/N_2 mixtures: < 30,000 µl/l (air and/or CF_4) SF_6/CF_4 mixtures: < 30,000 µl/l (air and/or N_2)
Moisture (dew point)	< 200 µl/l (.i.e. 200 ppm_v; -36 °C frost point @ atm)	< 200 µl/l (i.e. 200 ppm_v, -36 °C frost point @ atm.)
Oil	< 10 mg/kg (i.e. 10 ppm_w)	< 10 mg/kg (i.e. 10 ppm_w)
HF, SO_2	< 7 µl/l (i.e. 7 ppm_v) total	< 50 µl/l total (i.e. 50 ppm_v) or 12 µl/l (i.e. 12 ppm_v) For (SO_2+SOF_2) or 25 µl/l (i.e. 25 ppm_v) HF

Results: With contaminated gas supplied to the system at the gas purity levels per the below table and with the possibility of processing SF_6 with purity as low as 40 Vol. % the system will process approximately 300 kg of gas every 24 hours.

Incoming Gas Properties

	Acceptable Limit	Test Results
SF_6	> 97 Vol. %	82.5 Vol. %
Air	< 1 Vol. %	3.2 Vol. %
CF4	< 0.4 Vol. %	Non-Detectable
Moisture (dew point)	< 200 ppm or < -36 C frost point	-30 C frost point
Total Decomposition Products	< 50 ppm total	Non-Detectable

Processed Gas Properties

	Acceptable Limit	Test Results
SF_6	> 97 Vol. %	> 99.7 Vol. %
Air	< 1 Vol. %	< 0.2 Vol. %
CF4	< 0.4 Vol. %	Non-Detectable
Moisture (dew point)	< 200 ppm or < -36 C frost point	> -50 C frost point
Total Decomposition Products	< 50 ppm total	Non-Detectable

Conclusion: The Enervac SF_6 Gas Separation System effectively processed the used SF_6 gas and the processed SF_6 gas was well below the IEC 60480 specifications for used gas. Powerlink is currently processing approximately 300- 500 KG of contaminated SF_6 gas per week. This process was both cost-effective and environmentally friendly, and eliminated the need to dispose of the used SF_6 gas and purchase new SF_6 gas.

Enervac International is an innovative company committed to safety, quality, customer satisfaction and support. Our mission is to exceed market expectations through customer driven service, technical expertise and innovative solutions. We are committed to the continuous improvement of our team and resources and the formation of strategic partnerships with our clients, staff and vendors.

Contact us today to discuss your application solution:

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