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AirPlus Technology Webinar

Questions and answers

When converting products from SF_6 to AirPlus, what have been the key challenges?

All alternative technologies to SF_6 come with challenges.

For AirPlus, the areas of dielectric performance and thermal behavior have been challenging, as they are lower than SF_6.

ABB came up with innovative designs to secure an identical switchgear footprint as for SF_6.

Another challenge was the load break switch (LBS) applications. In conventional Ring Main Units with SF_6, an LBS is typically a simple knife-type switch. When switching to eco-efficient alternatives, the knife-type switches do not perform well.

To meet this challenge, ABB offers now an LBS based on puffer interruption technology that works with AirPlus.

Has the condition of the installed AirPlus pilots been checked? What was the result?

Yes, from all primary and secondary switchgear pilots, gas samples have been taken and analyzed.

The results are positive and confirm our expectations, as there were no performance issues or deterioration of the gas or of the material of the panel.

More information can be found in the CIRED paper 0658 from 2017 and CIRED paper 1031 from 2019.

Is it possible to replace SF_6 with AirPlus in installed base?

The answer is clear: no, it cannot be replaced.

As with all alternative gases, the dielectric and thermal performance is lower than for SF_6. That is why type tests would become invalid and test voltages could not be withstood.

Design modifications would be required to compensate for the lower performance.

Do we need special training to handle AirPlus?

No, there is no official gas handling training required (e.g. like the certified SF_6 training).

Of course, when it comes to operation and safety rules, the same training as for SF_6 is applicable.

Are there toxic by-products in case of an internal arc?

An internal arc creates high temperatures (more than 10,000°C), which burns and evaporates material. This always creates toxic products, irrespective of the insulation gas used (SF6, AirPlus, Air, Dry Air, etc.).

With AirPlus it is significantly less toxic compared to using SF_6, as AirPlus does not contain Sulphur, which creates some very toxic by-products.

Can the existing SF_6 DILO equipment be used to handle AirPlus?

No, because other materials are used, especially for seals and filters. Therefore SF_6-service devices cannot be used for AirPlus handling.

In addition, the pressures have been adapted to the according gas mixture. As a rule, no gas work is required during the entire life of an AirPlus switchgear since they are factory sealed.

How far do the safety procedures differ when using Novec 5110/AirPlus versus SF_6?

Decomposition products should be considered for any arced gas. Decomposition products of arced Novec 5110/AirPlus have a better toxicity profile than arced SF_6.

Overall, similar safety procedure as when handling SF_6 is recommended.

Is AirPlus technology for load break switch functions in medium-voltage secondary switchgear used for both insulation and arc quenching medium? If so, is this solution commercially available today?

Yes, it can be used for both. The puffer LBS is a device moved in a linear way. The current is interrupted in a nozzle with a controlled gas flow in the first part of the movement.

When moving the switch to the fully open position, it fulfils the requirements for a disconnector.

This product is fully type tested and first deliveries will start in December 2020.

Until now, SF_6 gas free compact switchgear ≤ 24 kV are available for the wind turbine market. We are looking for 36 (42) kV solutions as wind turbines are getting bigger. Is AirPlus now available at a 36 kV voltage level?

For primary gas-insulated switchgear we already have 36 kV AirPlus solutions available.

ABB understands the requirement from the wind turbine market for 36kV AirPlus secondary GIS solution, but this is not yet available.

However, it is part of our product development plan and will be available in the coming years.

Are the sizes of medium-voltage switchgear for SF_6 and AirPlus the same?

Yes. In general, AirPlus switchgear panels have the same footprint as SF_6 switchgear panels.

Is AirPlus available in ZX2 with 40.5 kV rating?

ZX2 AirPlus is available for 40.5/95/185 kV up to 2000 A, 31.5 kA in selected panel variants.

Where can I get additional details/an overview on Health & Safety Aspects of Novec 5110

The first go-to-document would be the Safety Data Sheet of Novec 5110 which is available via this link.

Secondly, 3M has established a Health & Safety Bulletin which further summarizes the available data and conclusions: link.

Is there a danger for users if AirPlus is leaking? Is it like SF_6, heavier than air?

No, there is no danger for personnel. AirPlus is a mixture of air (~85%) and Novec 5110.

Even if Novec 5110 itself is heavier than air, it is part of a mixture with air.

Will this new gas be used in circuit breakers and replace the vacuum technology for 36 kV level?

No, circuit breakers in medium-voltage gas-insulated switchgear are based on vacuum technology.

If on rare occasions gas handling or gas checks during lifetime is needed, can the equipment still be considered as a sealed system in terms of EU regulations?

Yes, AirPlus gas is always kept in a closed system. Sealed pressure system doesn't require gas handling over the lifetime. In case of defects, repair is permitted.

If gas quality checks are required by a customer, they can be done as well.

What about an extension of an SF_6 SafePlus by an AirPlus one?

We are working on converting the SF_6 portfolio including SF_6 SafePlus variants.

Find out more information on abb.com/airplus and do not hesitate to contact your ABB representatives for additional details.