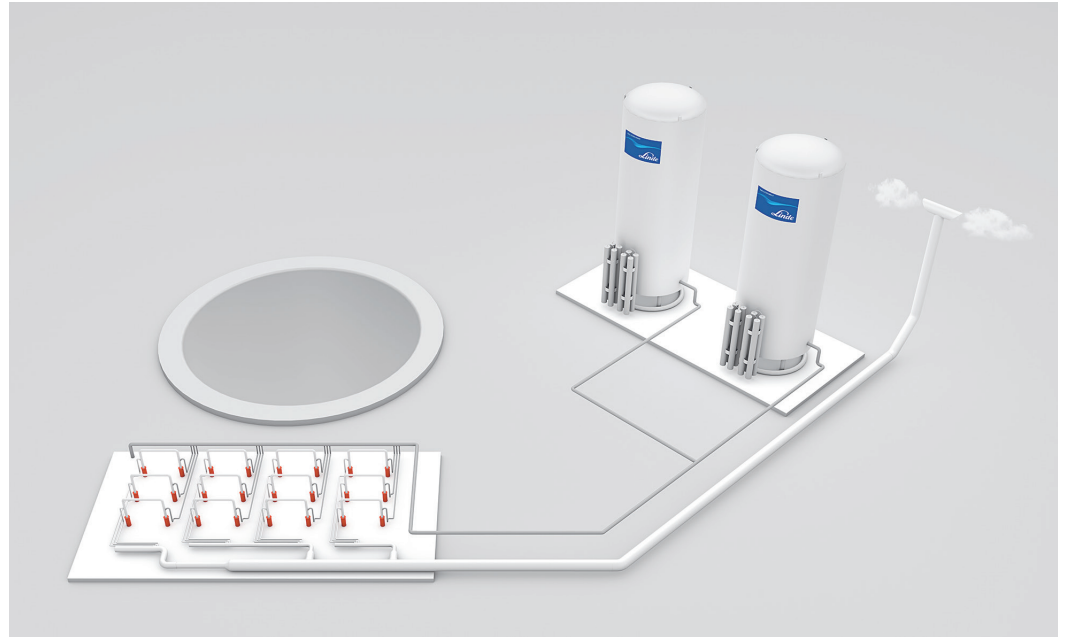




AGF Eco. Optimising freezing performance and safety in ground freezing.



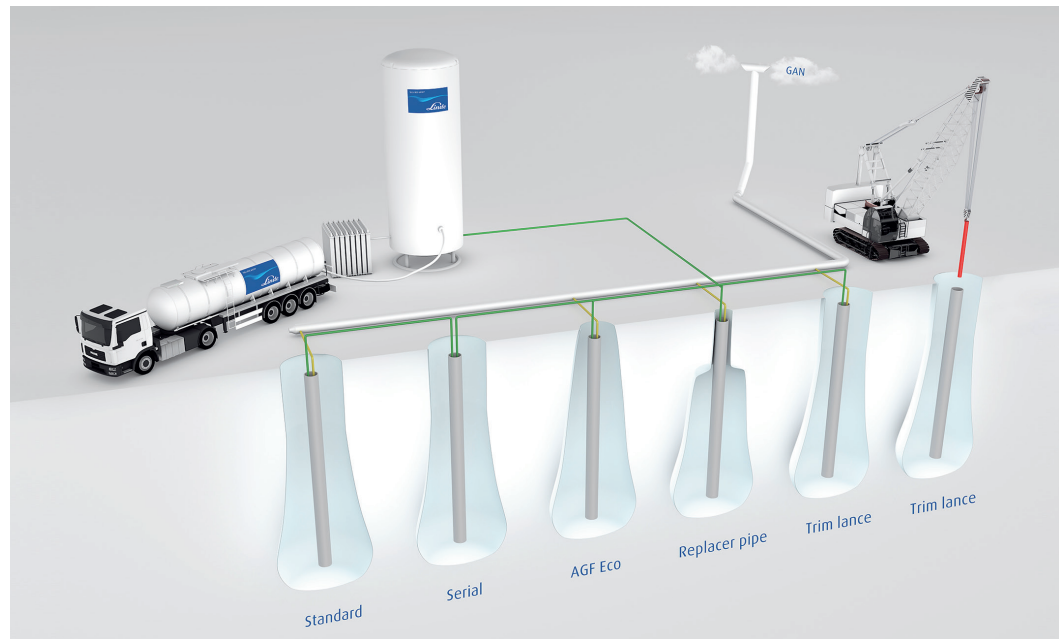
Linde offers a range of nitrogen supply schemes to support all ground-freezing applications, scaling from mobile LIN tanks to two or more on-site tanks for larger projects.

Challenge During excavation and tunnelling work, it may be necessary to protect the surrounding area against the risk of subsidence and collapse. Ground freezing with liquid nitrogen is a well-established and safe way of stabilising the surrounding soil and structures. However, in densely populated urban areas or busy streets, the release of cold gaseous nitrogen (GAN) can be problematic. In addition, gas vented to the atmosphere at the point of use can drive up costs. Linde decided to develop a special delivery method to overcome these ground-freezing challenges.

Solution Building on its in-depth knowledge and experience in ground-freezing applications, Linde developed the AGF Eco process to control the temperature profile at the point of use. Rather than wasting cold energy that would otherwise be vented to the atmosphere, AGF Eco captures the “fade-out” cooling power to extend the frost body between the area of interest and the surface. This extended chill zone reduces the amount of heat that can permeate from the surface down to the area of interest. It also warms up the exhaust gas that is vented at the point of use so there is less build-up of cryogenic fog. By utilising the liquid nitrogen more efficiently and extending the frost body, AGF Eco reduces the volume of liquid nitrogen needed.

AGF Eco in a nutshell With AGF Eco, the frost body develops along the full length of the freeze lance inserted into the ground. More specifically, the residual GAN is not vented directly but instead used to extend the frost body from the area of interest (perimeter) to the GAN lance outlet. Fading in strength and thickness towards the surface, this extended frost body does not require any additional cooling energy. As a result, the GAN vented at the surface is warmer and will produce less fog. In addition, a colder temperature profile at the surface reduces liquid nitrogen requirements.

End-to-end service AGF Eco is only one element of a complete package of artificial ground freezing solutions and services from Linde. The entire package also includes the LIN supply scheme, installation of the system, handling support and safety instructions.



To suit all ground freezing and excavation challenges, Linde offers a wide portfolio of lances with different freezing zone profiles – including the AGF Eco with its distinctive fade-out zone towards the top of the lance.

Key facts AGF Eco improves ground stability by developing a frost body over the full length of the freeze lance

Key data

Length	Up to 50 m per lance
Diameter	54 mm per lance
Fade-out length	Distance between surface and required frost body
Safety	Failsafe design thanks to integration of a second, redundant standard sensor

Benefits at a glance

- Efficient utilisation of liquid nitrogen with less wastage and lower coolant requirements
- Less fog development due to warmer exhaust gas temperatures
- Improved visibility and lower safety risk due to reduced fog development
- End-to-end service spanning project set-up, installation, gas supply, handling and safety
- Support in customising and positioning the lances for most effective freezing performance

Questions?

For more information, go to www.linde-gas.com/AGF or contact the AGF team at info@linde.com.

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