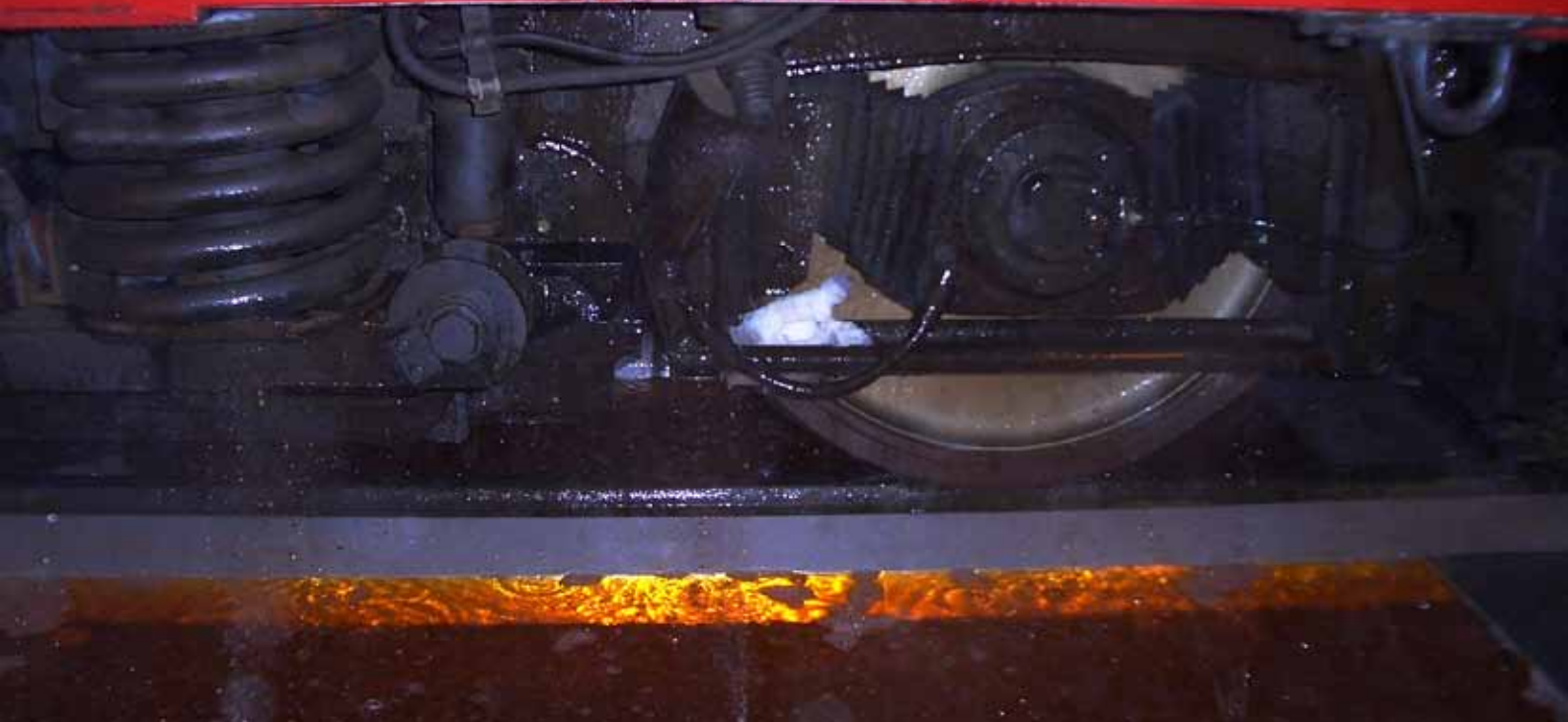


It will be winter again
- Do you want to risk this?



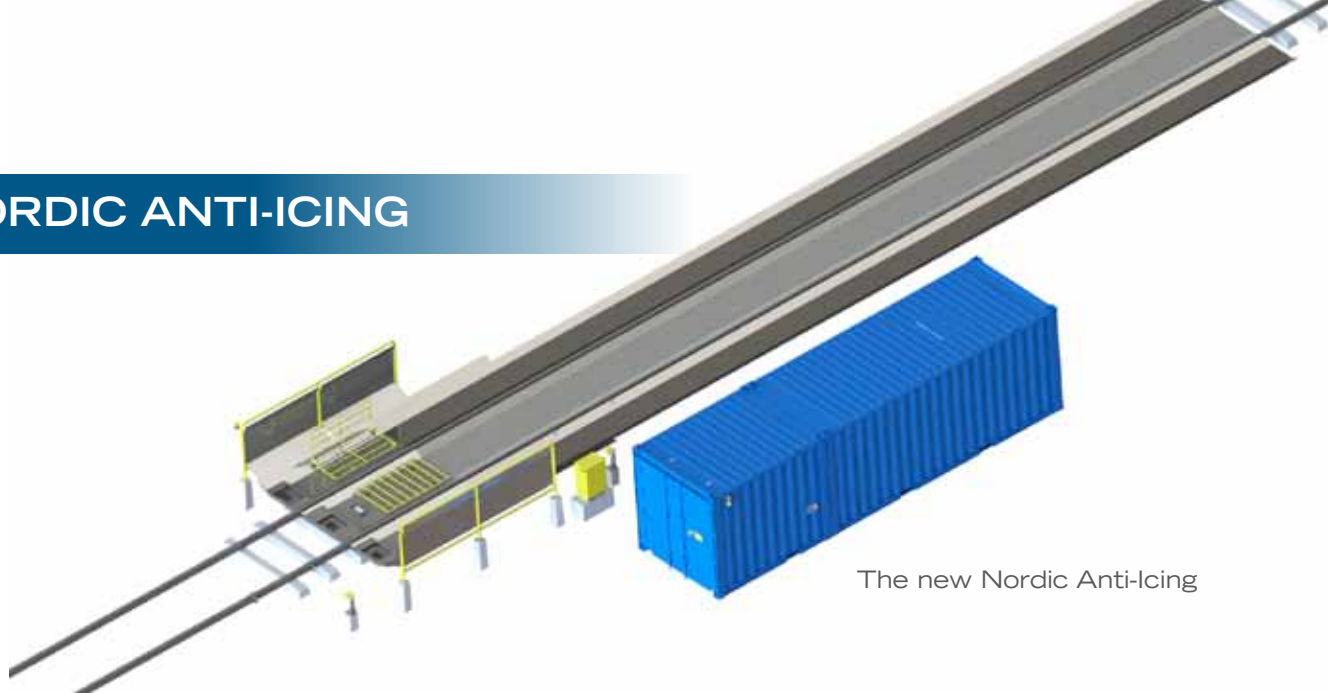
Or use the solution that prevents ice build-ups?:

Nordic Anti-Icing



Nordic
GROUND SUPPORT EQUIPMENT

NORDIC ANTI-ICING



The new Nordic Anti-Icing

NORDIC ANTI-ICING

The Nordic Anti-Icing is a unique system for anti-icing service for all train types.

A heated, anti-icing formulated liquid is sprayed onto the bogies or other selected sections. The liquid stays on the sprayed surface as a protective layer and prevents ice-build-ups.

Excess fluid and melted water are collected on trays. The liquid is then purified in an automated and environmentally friendly process to be re-used in the next treatment. In addition, the system can be customized to optimally handle various train types.

The system applies the liquid under low pressure onto the selected parts. The method has been approved by various train manufacturers. The Nordic Anti-Icing system is equipped with several advanced IT functions, which facilitate service, maintenance and monitoring.

The flexible Nordic Anti-Icing is easy to install and can be placed almost anywhere on a short stretch of a straight track.

KEY BENEFITS

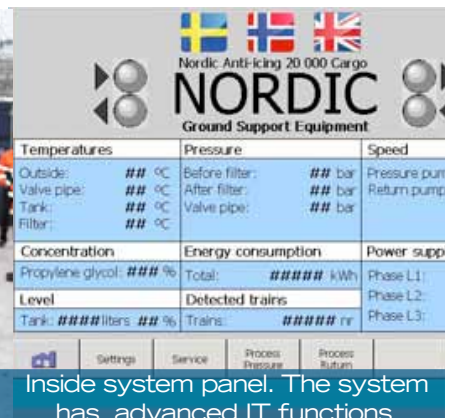
- Prevents ice build-ups
- Anti-icing treatment for selected parts through fast, efficient and fully automated operation
- Customized for various train types
- Recycles and purifies the liquid
- Environmentally friendly – reduces significantly the need for energy-consuming de-icing
- Easy to install in both existing and new infrastructure
- Advanced software for monitoring, communication and control
- User-friendly



Nordic Anti-Icing Cargo. System in operation at Alnabru, Norway.



Lodal, Norway. Systems in operation by Mantena.



Temperatures			Pressure		Speed	
Outside:	## °C	Before filter:	## bar	Pressure pump		
Valve pipe:	## °C	After filter:	## bar	Return pump		
Tank:	## °C	Valve pipe:	## bar			
Filter:	## °C					
Concentration		Energy consumption		Power supply		
Propylene glycol:	### %	Total:	##### kWh	Phase L1:		
Level		Detected trains		Phase L2:		
Tank:	##### liters ## %	Trains:	##### rr	Phase L3:		
Settings		Service		Process Pressure		
				Process Return		

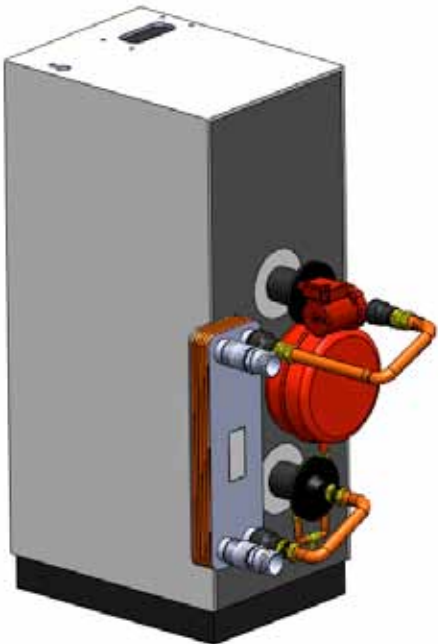
Inside system panel. The system has advanced IT functions.

NORDIC ANTI-ICING



TECHNICAL INFO

- Electrically driven membrane pumps
- Cleaning system separates particles down to 50 micron
- Stainless steel liquid tank and collector trays
- Monitoring via customer portal
- Service systems that provide information and alerts via e-mail
- Automatic and manual security system
- Activation by wheel sensors
- Customizable spray nozzles



Operating panel by the track.



Successful winter installation in Alnabru, Norway.

CASE MANTENA

Mantena, a service company to the Norwegian Railways, had major problems with severe ice build-ups, like many of our customers. The trains were de-iced indoors in a conventional manner, which took plenty of time and consumed a lot of energy.

In order to significantly enhance winter operations, Mantena invested in the Nordic Anti-Icing systems. Several systems that effectively prevent ice build-ups were placed in strategic locations around the Oslo metropolitan area, which made it logistically possible to carry out regular anti-icing treatment throughout the entire winter season.

Mantena's need for costly and time-consuming de-icing was dramatically reduced.

MANTENA DRAMMEN

Mantena has been using the early Nordic Anti-Icing systems in the Norwegian town of Drammen since 2005. To keep the trains running, the service company carries out a preventive treatment with the systems about once a week throughout the winter season.

Tommy Thygesen, technical manager of Mantena, describes the great advantages of the Nordic Anti-Icing systems:

- In general, ice problems have been decreased by 50 percent.
- The amount of ice on a normal train set has been reduced by 50-60 percent.
- The amount of ice on a heavily iced train has been reduced by 60-70 percent.
- The ice comes off easier.
- The need for de-icing has been sharply reduced: 60 percent fewer trains need to be de-iced.
- Faster de-icing: with anti-icing treatment, eventual de-icing takes less than half the time.

ABOUT NORDIC GSE

The company has supplied anti-icing systems to several customers in Europe. The company has many years of experience in advanced customized systems for anti-icing. We have developed our solutions in close cooperation with our customers. We are constantly investing to R&D to find even more advanced solutions to our customers' winter-time challenges.



Costly. Before the installation of the Nordic systems. Several tons of ice to de-ice. It will take several hours before the train is back in service.



Headache. Before the installation of the Nordic systems. A local train out of service because of ice.



The solution. The Nordic Anti-Icing system prevent ice build-ups.



Anti-icing treatment as a final measure before the train goes into traffic.