

## Clearway de-icers

The fast and effective way to melt ice and snow

**kemira**





## Kemira – a partner you can rely on

For more than 80 years, Kemira has worked in close cooperation with its customers to develop effective solutions that improve their performance and competitiveness.

Kemira's product solutions can be found in many industries and dozens of countries around the globe. The technical competence and focused commitment of the company towards finding effective, environmentally sustainable solutions to the needs of its customers, has been proven time and again over the years.

To improve performance, companies in a wide range of industries around the world just add Kemira!

## Clearway de-icers

Kemira's de-icers are marketed under the brand name Clearway®. Clearway® is acknowledged as the market leader in airport runway de-icers, and the product range has been developed and expanded to include both acetate and formate based liquids, along with a complimentary solid product range.

### Liquid runway de-icers

Clearway F1 Potassium Formate based  
Clearway 1 Potassium Acetate based  
Clearway 3 Potassium Acetate based

### Solid runway de-icers

Clearway SF3 Sodium Formate based  
Clearway 6s Sodium Acetate based

# Improving safety through effective ice and snow melting

De-icing and anti-icing both describe ice control strategies that are based on the chemical freezing point depression. Anti-icing is a preventative strategy, while de-icing is a reactive strategy for ice control. Anti-icing is carried out to prevent the formation of an ice sheet, and de-icing operations are intended to break the bindings of already bonded snow and ice.

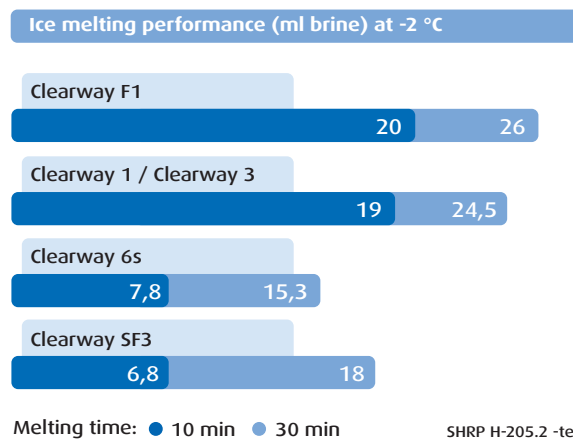
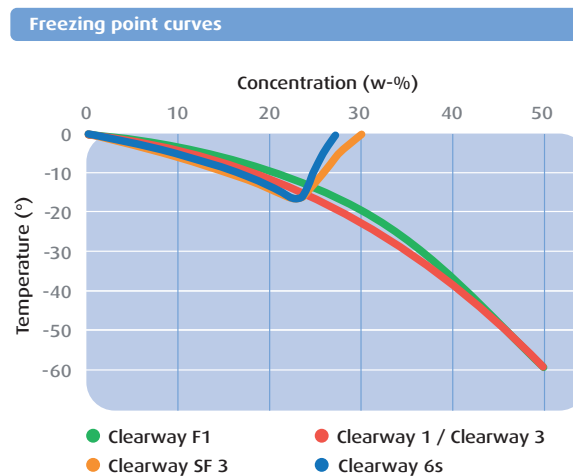
The most important objectives of de-icing and anti-icing operations are:

- to clear airport runways of snow and ice, and to prevent the bonding of ice on runways and aprons.
- to improve safety and traffic flows at airports and on runways
- to improve road safety and increase traffic flows
- to help transport equipment and emergency vehicles to run more smoothly

Novel de-icing chemicals should be:

- effective
- biodegradable and environmentally friendly
- safe and easy to use
- have a good price/quality ratio.

Clearway® meets these requirements in full. Designed to meet the challenges of combating ice and snow in all weather conditions, there is no better solution than these proven products.





# Clearway F1 formate

## Ecological, fast acting and long lasting de-icing solution

Based on a unique formulation of potassium formate and corrosion inhibitors, Clearway® F1 is an effective and environmentally friendly de-icer for airport runways, taxiways and aprons. The product meets not only all relevant environmental and ecological requirements, but also the AMS 1435A specification as well.

When applied with the mechanical facilities of airport maintenance departments, Clearway® F1 acts to remove snow and ice quickly and economically. Its high level of active ingredients and outstanding viscosity enables the product to work fast, and to stay active over a long period of time.

Clearway® F1 melts ice by depressing the freezing point of water. Due to the extremely low freezing point of potassium formate, the solution has a much lower freezing point.

Clearway® de-icers are classified WGK1\*, both for their excellent biodegradability and because of their low aquatic toxicity.

## Storage & handling

Clearway® F1 is delivered ready for use and needs no further diluting or concentrating. It is available in bulk tankers, 1000 litre IBC's or 200 litre drums.

Clearway® F1 meets the requirements of AMS 1435A for storage stability, and shows no sign of deterioration when stored for extended periods of time.

Clearway® F1 is compatible with most known materials used in airport storage equipment and the equipment used to apply the product.

Clearway® F1 has a moderately corrosive effect on zinc, galvanized material and soft solders. We recommend painting or otherwise protecting such items, or replacing them with compatible materials.

Clearway F1	
Active ingredient	Potassium formate
Appearance	Clear liquid
Freezing point	Less than -50°C
pH	9.5 - 11.5
Density / 20°C	1.33 - 1.35 g/cm <sup>3</sup>
Viscosity / 0°C	5 mPas.s max
BOD <sub>5</sub>	90 mg O <sub>2</sub> /g
COD <sub>5</sub>	110 mg O <sub>2</sub> /g
EC <sub>50</sub> (Daphnia magna)	> 2000 mg/l
LD <sub>50</sub> (rat, oral)	> 2000 mg/kg

\*WGK is a German method of classifying chemicals into three (1-3) Water Hazard Classes. According to several tests the Clearway® products are in the Class 1 meaning that they have low hazard to waters.

# Clearway 1 & Clearway 3 acetates

## Effective and environmentally-friendly de-icing alternatives

Based on a unique formulation of potassium acetate and corrosion inhibitors, Clearway® 1 and Clearway® 3 are runway de-icers with notable environmentally friendly characteristics. Both liquid de-icers meet the AMS 1435A standard.

Clearway® 1 was developed in 1987, and was the first acetate-based runway de-icer to offer an environmentally friendly alternative to conventional de-icers such as glycol, urea and salt.

Clearway® 3 was developed in co-operation with the BAA (UK) and MOD (UK). By increasing viscosity without reducing friction effect, it achieves extended hold against freezing rain or ice build-up on runway surfaces. This is clearly an advantage compared to conventional de-icers.

Neither Clearway® 1 nor Clearway® 3 are harmful to users, animals or fish, and are fully biodegradable in aqueous systems without causing oxygen depletion problems. Both products are assigned as Class 1 (WGK), meaning that they are not generally water endangering.

	Clearway 1	Clearway 3
Active ingredient	Potassium acetate	Potassium acetate
Appearance	Clear liquid	Clear to slight hazy liquid
Freezing point	Less than -50°C	Less than -50°C
pH	9.5 - 11.5	9.5 - 11.5
Density / 20°C	1.25 - 1.30 g/cm <sup>3</sup>	1.25 - 1.30 g/cm <sup>3</sup>
Viscosity / 0°C	10 mPas.s max	50 mPas.s max
BOD <sub>5</sub>	210 mg O <sub>2</sub> /g	250 mg O <sub>2</sub> /g
COD <sub>5</sub>	330 mg O <sub>2</sub> /g	320 mg O <sub>2</sub> /g
EC <sub>50</sub> (Daphnia magna)	> 10 000 mg/l	> 10 000 mg/l
LD <sub>50</sub> (rat, oral)	> 2000 mg/kg	> 2000 mg/kg

## Storage & handling

Clearway® 1 and Clearway® 3 are delivered ready for use and need no further diluting or concentrating. Both products are available in bulk tankers, 1000 litre IBC's or 200 litre drums.

Clearway® 1 and Clearway® 3 meet the requirements of AMS 1435A for storage stability, and show no sign of deterioration when stored for extended periods of time.

Clearway® 1 and Clearway® 3 are compatible with most known materials used in airport storage equipment and the equipment used to apply the product.

They have a moderately corrosive effect on zinc, galvan-ized material and soft solders. We recommend painting or otherwise protecting such items, or replacing them with compatible materials.



# Clearway SF3 formate & Clearway 6s acetate

## Environmentally friendly solid de-icing solutions

Sodium formate based Clearway® SF3 and sodium acetate based Clearway® 6s are new and effective solid runway de-icers. Both products have superior environmentally friendly properties.

Clearway® SF3 and Clearway® 6s melt ice by depressing the freezing point of water, and are active at temperatures to -15° C. Due to their irregular granular shapes, they will remain where spread.

Both products can be used pre-wetted in combination with corresponding liquid Clearway® de-icers to obtain a rapid initial de-icing effect. They can also be applied alone to give a long residual anti-icing effect under extreme weather conditions.

These products meet all the requirements of the international AMS 1431B specification, and are assigned as Class 1 (WGK), meaning that they are not generally water endangering. Furthermore, they are not harmful to users or animals.

## Storage & handling

Clearway® SF3 and Clearway® 6s are delivered ready for use. Under dry conditions they can be used pre-wetted with one of the liquid Clearway® products. Clearway® SF3 and Clearway® 6s are available in 500 kg big-bags and 25 kg bags. Both products have been specially formulated to prevent caking in the bags. We advise storing them in their original bags, protected from the weather.

Clearway® SF3 and Clearway® 6s are compatible with most known materials used in airport storage equipment and the equipment used to apply the product.

They have a moderately corrosive effect on zinc, galvanized material, solder and soft solders, and these materials should, therefore, be avoided.



	Clearway	Clearway 6s
Active ingredient	Sodium formate	Sodium acetate
Appearance	White irregular granule	White irregular granule
Bulk density	700 - 800 kg/m <sup>3</sup>	600 - 800 kg/m <sup>3</sup>
Particle size	1.5 - 4 mm	0.5 - 4 mm
pH (10 w-% solution)	8.0 - 11.0	8.0 - 11.0
BOD <sub>5</sub>	100 mg O <sub>2</sub> /g	320 mg O <sub>2</sub> /g
COD <sub>5</sub>	210 mg O <sub>2</sub> /g	560 mg O <sub>2</sub> /g
EC <sub>50</sub> (Daphnia magna)	> 5000 mg/l	> 10 000 mg/l
LD <sub>50</sub> (rat, oral)	> 2000 mg/kg	> 2000 mg/kg







## Material compatibility

Clearway® products are compatible with most known materials used in airport storage equipment and the equipment used to apply the product.

The table below lists materials that have been shown to be compatible with Clearway® products.

Metals	Polymers
Stainless steel	Polyethylene plastics
Carbon steel	Glass fiber reinforced polyester (high pH resistant resin)
Aluminium alloys (bare & anodized)	Polymethacrylate
Magnesium alloys (wrought, dichromate treated and epoxy coated)	Acrylic plastic
Titanium	Polychloroprene
Cadmium plated steel	Silicone
Copper (acid pickled)	Vulcanized butadiene-acrylonitrile
Bronze (copper/tin)	Vulcanized butadiene-propylene
	Painted surfaces
	Bitumen



# A general guide to application amounts

Liquid Clearway® products are used both for anti-icing and de-icing applications. The table on the next page gives a guide to application rates. However, it is important that consideration is given to factors such as surface material, surface structure, application method, and the prevailing weather conditions when using these products. The table, therefore, represents a guide to applications and not recommended dosages. Kemira Oyj will, upon request, offer advice for specific applications.

In the case of thick layers of ice (>3mm), it is recommended to use liquid Clearway® in combination with a solid Clearway® product.

When de-icing, the surface should be mechanically treated before applying liquid Clearway®. This will reduce the amount of liquid used, thereby minimizing the environmental impact as well as costs.

In the event of freezing rain, a preventive treatment to runways, ramps and taxiways is highly recommended. When applied before the onset of light snow or ice, liquid Clearway® prevents accumulations of frozen precipitation. Since liquid Clearway® is both an anti-icing agent as well as a de-icer, timely application is essential to the continuous usability of operative surfaces. Successful preventive applications can be aided by the careful monitoring of meteorological conditions.

Liquid Clearway® can be used with all known existing spraying equipment.

Clearway F1	Dry conditions Ice thickness <1mm Light frost		Wet conditions Ice thickness <1mm Heavy frost		Wet conditions Snow Packed snow		Wet conditions Freezing rain Ice thickness 1-3 mm	
	Anti-icing	De-icing	Anti-icing	De-icing	Anti-icing	De-icing	Anti-icing	De-icing
Temperature (°C)								
0 to -5	20 g/m <sup>2</sup>	20 g/m <sup>2</sup>	20 g/m <sup>2</sup>	30 g/m <sup>2</sup>	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>
-5 to -10	25 g/m <sup>2</sup>	30 g/m <sup>2</sup>	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>	50 g/m <sup>2</sup>	60 g/m <sup>2</sup>
-10 to -15	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>	50 g/m <sup>2</sup>	60 g/m <sup>2</sup>	60 g/m <sup>2</sup>	60 g/m <sup>2</sup>

Clearway 1	Dry conditions Ice thickness <1mm Light frost		Wet conditions Ice thickness <1mm Heavy frost		Wet conditions Snow Packed snow		Wet conditions Freezing rain Ice thickness 1-3 mm	
	Anti-icing	De-icing	Anti-icing	De-icing	Anti-icing	De-icing	Anti-icing	De-icing
Temperature (°C)								
0 to -5	20 g/m <sup>2</sup>	20 g/m <sup>2</sup>	20 g/m <sup>2</sup>	30 g/m <sup>2</sup>	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>
-5 to -10	25 g/m <sup>2</sup>	30 g/m <sup>2</sup>	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>	50 g/m <sup>2</sup>	60 g/m <sup>2</sup>
-10 to -15	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>	50 g/m <sup>2</sup>	60 g/m <sup>2</sup>	60 g/m <sup>2</sup>	60 g/m <sup>2</sup>

Clearway 3	Dry conditions Ice thickness <1mm Light frost		Wet conditions Ice thickness <1mm Heavy frost		Wet conditions Snow Packed snow		Wet conditions Freezing rain Ice thickness 1-3 mm	
	Anti-icing	De-icing	Anti-icing	De-icing	Anti-icing	De-icing	Anti-icing	De-icing
Temperature (°C)								
0 to -5	15 g/m <sup>2</sup>	20 g/m <sup>2</sup>	20 g/m <sup>2</sup>	30 g/m <sup>2</sup>	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>
-5 to -10	20 g/m <sup>2</sup>	30 g/m <sup>2</sup>	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>
-10 to -15	25 g/m <sup>2</sup>	35 g/m <sup>2</sup>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>	50 g/m <sup>2</sup>	60 g/m <sup>2</sup>	50 g/m <sup>2</sup>	60 g/m <sup>2</sup>

Clearway SF3	No mechanical snow clearing			After / During mechanical snow clearing	
	Frost or freezing rain	Frost / Thin Ice	Frost / Snow	Wet conditions	Heavy wet conditions
Temperature (°C)					
0 to -15	30 g/m <sup>2</sup>	30 g/m <sup>2</sup>	60 g/m <sup>2</sup>	45 g/m <sup>2</sup>	60 g/m <sup>2</sup>

Clearway 6S	No mechanical snow clearing			After / During mechanical snow clearing	
	Frost or freezing rain	Frost / Thin Ice	Frost / Snow	Wet conditions	Heavy wet conditions
Temperature (°C)					
0 to -15	30 g/m <sup>2</sup>	30 g/m <sup>2</sup>	60 g/m <sup>2</sup>	45 g/m <sup>2</sup>	60 g/m <sup>2</sup>

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