

**FRAMEWORK SALES CONTRACT**  
**No. Z/BTS/DTPR/133/2023**

Seller: **UAB ESSPO**  
Seat: Troškūnu st. 1, Anykščiai, Lithuania  
ID Number: 154167210  
Tax ID: LT541672113  
Bank Details: [REDACTED]  
Account Number: [REDACTED]  
Registered in: STATE ENTERPRISE CENTRE OF REGISTERS, 09320 Vilnius, Lithuania  
Represented by: Lukas Pakeltis, Statutory

as the seller (hereinafter referred to as the "Seller")

and

Buyer: **M.R.Stefanik Airport - Airport Bratislava, a.s. (BTS)**  
Seat: M. R. Stefanik Airport, Bratislava II, 823 11  
ID Number: 35 884 916  
Tax ID: SK2021812683  
Bank Details: [REDACTED]  
IBAN: [REDACTED]  
Registered in: Commercial Register of the Municipal Court Bratislava III, Section: Sa, Insert No. 3327/B  
Represented by: Ing. Dusan Keketi - Chairman of the Board  
Ing. Denisa Kontárová - Member of the Board

as the buyer (hereinafter referred to as the "Buyer")

The Buyer and the Seller, hereinafter also referred to as the "Parties", conclude pursuant to Sec. 409 et seq. of the Commercial Code this

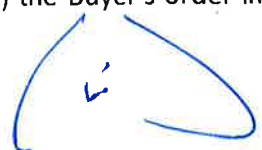
**Framework Sales Contract** (hereinafter referred to as the "Contract"):

**Art. I - Subject Matter of the Contract**

1. By concluding the Contract, the Parties express their will to be governed by the Contract when concluding individual partial purchase contracts, on the basis of which the Seller undertakes to deliver the goods to the Buyer, to transfer the ownership right to the goods to the Buyer, and the Buyer undertakes to pay the agreed purchase price for the goods to the Seller and to agree in advance on part of the content of these purchase contracts.  
Annex 1 to this Contract is the Goods Specification, which contains a more detailed specification of the range of goods, estimated quantities and other terms and conditions for each type of goods.  
The Seller undertakes to deliver to the Buyer only goods of the agreed quality, which corresponds to the successfully tested sample of the goods by the Buyer and the agreed documentation with the Buyer (specification of the goods, analytical certificate, or others as required by the Buyer), meeting the purpose of use.

**Art. II - Conclusion of Individual (Partial) Purchase Contracts**

1. The proposal for the conclusion of an individual purchase contract with the Seller shall be submitted by the Buyer in the form of a written (electronic) order for the delivery of goods. An individual purchase contract is deemed to be concluded when the Seller confirms (accepts) the Buyer's order in





writing.

2. An order must contain:
  - a) Type of goods (identification),
  - b) Quantity of goods,
  - c) Required delivery time,
  - d) Place of delivery,
  - e) The price of the goods.
3. The Buyer undertakes to deliver the order to the Seller no later than 5 working days before the requested delivery date specified in the order, by post to the Seller's address or electronically to the e-mail address:
4. The t \_\_\_\_\_, starting from the day of its delivery to the Seller.

### **Art. III - Basic Conditions Applicable to Individual Purchase Contracts**

1. The Seller undertakes to deliver the ordered goods to the Buyer, to transfer to the Buyer the ownership right to these goods and the Buyer undertakes to accept the ordered goods and to pay the Seller the purchase price in the amount notified by the Seller to the Buyer in accordance with Article IV of this Contract.
2. The Seller undertakes to deliver the goods to the Buyer at the time specified in the confirmed order and at the agreed place of delivery, which is the Buyer's headquarters, the premises of the M.R.Stefanik Airport - Airport Bratislava, a.s. By signing this Contract, the Seller declares that the place of delivery is known to him/her.
3. The Seller's obligation to deliver the goods to the Buyer is fulfilled by allowing the Buyer to dispose of the goods (i.e. take possession of the goods) at the agreed place of delivery.
4. The Buyer undertakes to take delivery of the goods at the agreed place of delivery and to inspect the goods upon receipt for their apparent integrity and to confirm receipt of the delivered goods in writing on the delivery note.
5. The risk of damage to the goods and the title to the goods shall pass to the Buyer at the moment of written confirmation of receipt of the goods by the Buyer on the delivery note.
6. The Seller is liable for defects that the goods have at the moment when the risk of damage to the goods passes to the Buyer as well as for defects that occur after the goods have been received within the warranty period of 2 years.
7. The Buyer is obliged to notify the Seller in writing of any defects in the goods without undue delay after their discovery. In the notification of defects of the goods, the Buyer must specify the defects to the Seller (describe them, state how they manifest themselves and state what claim he claims from the defects).
8. The Seller undertakes to settle the Buyer's complaints without undue delay after its receipt; however, no later than within 30 calendar days. If the Seller is in delay with the processing of the complaint, the Buyer is entitled to claim a contractual penalty in the amount of EUR 50.00 (in words: fifty euros) for each started day of delay. The right to compensation for damages even to the extent exceeding the amount of the contractual penalty is not affected. In the event of a legitimate claim by the Buyer who requests the replacement of defective goods with goods without defects (delivery of replacement goods), the Seller undertakes to deliver the replacement goods to the Buyer as soon as possible and to pay all costs associated with the replacement of the defective goods.

### **Art. IV - Purchase Price and Payment Terms**



1. For the delivered goods, the Buyer undertakes to pay the Seller the agreed purchase price, to which VAT shall be added in accordance with the currently applicable regulations.
  2. The supplier is obliged to notify the Buyer of the current price of the goods on 3rd (third) day of each calendar month. The price is always valid until the new price of the goods is announced. Notification of the new valid price of the goods shall be made by e-mail to the following e-mail address [obstara-vanie@bts.aero](mailto:obstara-vanie@bts.aero). The purchase price does not include the statutory value added tax.
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3. The Seller shall be entitled to payment of the purchase price upon delivery of the goods (fulfilment) ordered under the individual purchase contract concluded on the basis of the Contract to the agreed place of delivery, namely for the goods that have been delivered according to the delivery note confirmed by the Buyer.
4. The purchase price for the goods delivered under the individual purchase contract concluded on the basis of the Contract shall then be payable upon entitlement to payment thereof (clause 2. of this Article) within 30 days from the date of delivery of the Seller's invoice to the Buyer.
5. The Seller's invoice shall contain the details according to the relevant legislation. If the invoice does not contain all the details specified in the provisions of Sec. 74 (1) of Act No. 222/2004 Coll. on VAT as amended, the Buyer is entitled to return such invoice to the Seller. The invoice must be returned no later than the due date of the invoice. The Seller shall be obliged to remedy the deficiencies to which it has been called in connection with the return of the invoice within 3 (in word: three) working days from the date of receipt of the said call. The new due date will begin on the date of delivery of the corrected invoice to the Buyer.
6. The Buyer's monetary obligation to pay the Seller the purchase price through the payment order is fulfilled by debiting the amount paid from the Buyer's account.
7. The Seller, who is a VAT payer, hereby declares and assures the Buyer that prior to the signing of this Contract, the Seller did not have reasons for cancellation of the Seller's registration for value added tax pursuant to Sec. 81(4)(b)(2) of Act No. 222/2004 Coll. as amended. Should the Seller plan to cancel its VAT registration in the future, it shall immediately inform the Buyer of the said fact.
8. The invoice shall be accompanied by a copy of the delivery note relevant to the invoiced subcontract.

#### **Art. V - Contractual Penalties**

1. In the event that the Seller is in delay with the delivery of the goods according to the confirmed order and the Buyer decides to accept the delivery of the goods, the Buyer is entitled to claim a contractual penalty in the amount of 0.3% of the purchase price of the goods for each day of delay.
2. In the event of delay in delivery of the goods by the Seller, the Buyer shall have the right to withdraw from the purchase contract concluded on the basis of the confirmed order and return the delayed goods to the Seller at the Seller's expense and risk.
3. If the Buyer is in default in payment of the purchase price, the Seller shall be entitled to claim interest on the overdue amount at the statutory rate for each day of delay.
4. The Parties agree that the claim for payment of the contractual penalty shall be without prejudice to the right of the Party concerned to claim compensation for damages in excess of the contractual penalty which have arisen as a result of the breach of the obligation of the breaching Party secured by the contractual penalty. The implementation of the replacement purchase is without prejudice to the Buyer's right to contractual penalty, compensation for damages or lost profits.

#### **Art. VI - Other Arrangements**



1. The Parties undertake that for the purpose of exercising their rights and performing their obligations under this Contract, they will provide each other with the necessary cooperation in any form and take all actions necessary to achieve the purpose of this Contract.
  2. The Parties agree that any information which they provide to each other in connection with this Contract which they designate as confidential or the nature of which indicates that it is confidential shall be used only in connection with the performance of their obligations and the exercise of their rights under this Contract or in securing the protection of their rights under this Contract and shall not be used in a manner inconsistent with its purpose; the following shall not be deemed a breach of this obligation:
    - (a) disclosure of information to third parties in the cases and to the extent required by law or to third parties who are or will be (by law or by agreement with the Party providing the information) bound by confidentiality; and
    - b) publication of the Contract in the Central Register of Contracts maintained by the Office of the Government of the Slovak Republic.
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This obligation of confidentiality and secrecy shall survive the termination of this Contract.

### **Art. VII - Duration of the Contract**

1. The Contract is concluded for a definite term - from the effective date until 31/08/2024 or until the financial limit of EUR 140 765,80 excluding VAT is reached, whichever is earlier.
2. The contractual relationship established by this Contract may be terminated by written agreement of the Parties or by withdrawal from this Contract in the event of a material breach of the obligations under this Contract, whereby a material breach of the obligations under this Contract shall be deemed to be, in particular, a delay by the Seller in fulfilling its obligation to deliver the goods in a proper and timely manner pursuant to the individual purchase contract (clause 2. (3) of this contract).
3. Withdrawal from this Contract must be in writing and delivered to the other Party. The effects of the withdrawal shall commence on the date of delivery of the written withdrawal to the other Party. The consequences of withdrawal from this Contract shall be governed by the relevant provisions of the Commercial Code. Termination of this Contract shall not extinguish arrangements which, by the will of the Parties or by their nature, are intended to survive the termination of this Contract.
4. The contractual relationship established by this Contract can also be terminated by written notice without giving a reason. Any of Parties is entitled to terminate the Contract with a 3-month notice period. The notice period begins on the first day of the calendar month following the delivery of the written notice to the other contracting Party.
5. The termination of this Contract shall not affect the rights and obligations of the Parties arising from individual purchase contracts already concluded, nor the rights and obligations of the Parties arising from orders already delivered by the Buyer to the Seller, unless otherwise agreed by the Parties.

### **Art. VIII - Common and Final Provisions**

1. Delivery of Documents
  - 1.1. The Parties agree to deliver documents containing legally significant facts under the Contract to each other by post, by registered mail, unless otherwise agreed. For the purposes of this Contract, a document containing legally significant facts means, for example, withdrawal from the Contract, demands for payment and any calls for performance.
  - 1.2. For the purposes of postal delivery, the addresses of the registered offices of the Parties or the correspondence addresses specified in the header of the Contract shall be used, unless the addressee of the document has notified the sending Party of a new registered office address or other new correspondence address for the service of documents. In the event of any change of address for the service of documents under the Contract, the Party concerned undertakes to inform the other Party in writing without delay of the change of address or Contact details; in such case, the new address, duly notified to the Party prior to the dispatch of the documents, shall be decisive for the service of documents. The sending Party shall not be liable for any legal consequences arising from the failure of the addressee to comply with the notification obligation under this clause.
  - 1.3. In the case of postal delivery, the consignment shall be deemed to have been delivered on the date of its delivery to the address specified in the header of the Contract.
  - 1.4. The day on which the Party to whom the consignment is addressed refuses to take delivery of the consignment shall also be deemed to be the day on which the consignment is delivered, or 3rd (in words: third) working day from the day of the start of the subscription period for picking up the parcel at the post office.
  - 1.5. For other methods of delivery of messages (delivery by sending an e-mail message), they shall be deemed to have been delivered by displaying a confirmation of the sending of the e-mail message on the sender's technical device.
  2. If the Contract does not provide for an e-mail address or fax number for the purpose of serving only some or even all of the documents under the Contract, or if the Parties wish to serve notices under the Contract on an e-mail address other than that specified in the Contract, they shall complete the following information:
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On the Seller's side:

e-mail address: z

On the Buyer's side:

e-mail address: g

and at the same time shall be delivered

[bts.aero](mailto:bts.aero)

3. This Contract is concluded on the date [redacted] legal effect in accordance with the provisions of Sec. 47a of Act No. 40/1964 Coll., the Civil Code, as amended, and related applicable legislation on the day following the date of its publication in the Central Register of Contracts maintained by the Office of the Government of the Slovak Republic.
4. Any changes and/or additions to this Contract may only be made by agreement of both Parties in the form of written successively numbered amendments to the Contract signed by authorised representatives of both Parties - this does not apply in the case of the electronic notification of changes in the prices of goods agreed by the Parties in Article 2 of the Contract, which is referred to in Article 2 of the Contract. 4 - Purchase price payment terms clause 2.
5. In the event that any provision of this Contract becomes invalid or unenforceable, the validity of this Contract as a whole shall not be affected. In this case, the Parties undertake to replace such invalid or unenforceable provision with another provision that supersedes it in a legal sense.
6. The Parties undertake to use their best endeavours to resolve any disputes arising between them in connection with this Contract, in the first instance and in particular by agreement between the Parties. The Parties expressly agree that the court of the Buyer's place of residence and the Slovak law shall be competent for the settlement of any disputes.
7. The provisions of Act No. 513/1991 Coll., the Commercial Code, as amended, the provisions of Act No. 40/1964 Coll., the Civil Code, as amended, and other related applicable legislation shall apply to the legal relations not specifically regulated in this Contract.
8. This Contract is drawn up in four (4) counterparts, two (2) counterparts for each of the Parties.
9. The Parties declare that they have duly read the Contract, understand its contents, that it has been concluded by mutual consent, and sign it without reservation as a token of their agreement.
10. The annexes are an integral part of the Contract:
  - Annex 1 - Goods Specification
  - Annex 2 - Product Safety Data Sheets and Technical Specification

On behalf of the Seller:

In Anykšciai on 23. 10. 2023

M.R.Štefanik Airport - Airport  
Bratislava, a.s. (BTS)

**bts.aero**  
BRATISLAVA AIRPORT

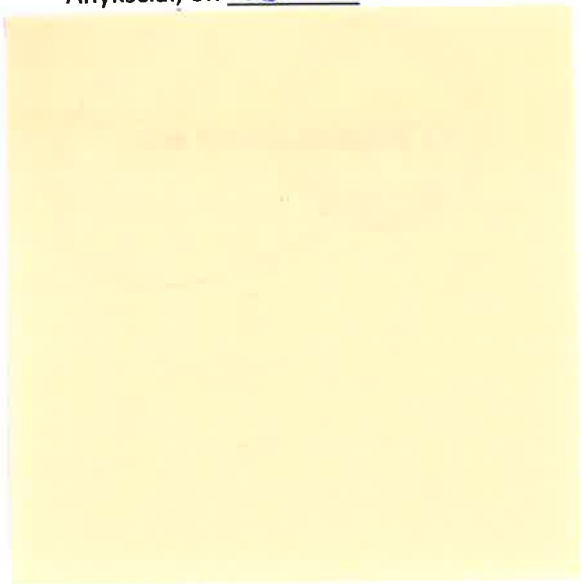
Letisko M. R. Štefánika – Airport Bratislava  
P. O. Box 160, 823 11 Bratislava 216

Annex 1

Goods Specification

Name of goods*	Packaging	Delivery Condition**	Valid for plants
Nordway KF	Tankers	DDP buyer	M.R.Stefanik Airport - Airport Bratislava, a.s.
Nordway NF	Big Bag	DDP buyer	M.R.Stefanik Airport - Airport Bratislava, a.s.

Anykščiai, on 23.10.2023



## Nordway®-KF

### Liquid Runway/Taxiway and Parking Apron De-icer

#### PRODUCT DESCRIPTION

Nordway®-KF is a liquid runway, taxiway and parking apron de-icer based on potassium formate. This is easy applicable, fully biodegradable and environmentally friendly de-/anti-icing product combined with unique formulation of corrosion inhibitors. De-icer is tailored to completely fulfill SAE AMS 1435 standard requirements and is regularly revised/retested according the latest version of the standard at SMI Inc. laboratory. Nordway®-KF performs by decreasing the freezing temperature of water and creates long lasting protection from snow, ice, freezing rain and slush.

#### PROPERTIES

Potassium Formate , %	50.0
Shape	Fluid
Appearance	Light fluid
pH value	9.5 – 11.5
Freezing temperature	-58±2
BOD <sub>5</sub>	0,05 kg O2/kg fluid
COD	0,11 kg O2/kg fluid
<b>AQUATIC TOXICITY:</b>	
Acute Toxicity to Daphnia Magna	48 hour LC50: 1,250 mg/l
Acute Toxicity to Fish	96 hour LC50: 2,125 mg/l

#### PERFORMANCE

Nordway®-KF can be applied directly onto the pavement surface where is desirable both preventive and/or reactive treatment. Product does not cause any corrosion to metals and is FREE OF:

- Chlorides
- Phosphates
- Nitrites and nitrates
- Triazoles.

#### CERTIFICATION

- Nordway®-KF is certified and approved by the latest version of SAE AMS 1435C standard at SMI Inc.
- LFV tests of impact for asphalt/concrete pavements are done at VTI Institute (Sweden)
- AIR tests are done at LIMA-AMIL (Canada) and SMI Inc. (USA)
- Tests of impact for soil, water and waste water are done following particular local requirements

# Nordway®-KF

## Liquid Runway/Taxiway and Parking Apron De-icer

### APPLICATION

Using Nordway®-KF is needed to take into account current weather conditions and deeply know the surface structure, content of surface materials and usage method. It is able to consult and assist upon request in all treatment cases. It is highly recommended preventive treatment when it starts snowing, freezing or freezing rain. If the thickness of ice is above 3 mm, it is recommended to use liquid runway deicer Nordway®-KF together with a solid runway/taxiway and parking apron deicer Nordway®-NF. Nordway®-KF is compatible with all regular deicer spreading machinery. In particular weather conditions - before snowing/light snow, snowing or after snowing/icing, dosage certain amounts of Nordway®-KF which are referred in the following table. Application rates are only reference for application and it should not be considered as recommended.

Pavement surface conditions	Temperature 0 to -10 oC	Temperature -10 to -15 oC	Temperature -15 to -20°C	Temperature below -20°C
<b>Before snowing / light snow, below 1 mm</b>	20 g/m <sup>2</sup>	25 g/m <sup>2</sup>	30 g/m <sup>2</sup>	40 g/m <sup>2</sup>
<b>Snowing / after snowing / icing</b>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>	60 g/m <sup>2</sup>	≥60 g/m <sup>3</sup>

### STORAGE AND HANDLING

Nordway®-KF deicers are prepared and delivered for final usage. Nordway®-KF is able to be offered in a bulk or in 1000 litres IBC containers. For safety, Nordway®-KF is highly recommended to be stored away from extreme heat and away from strong oxidizing agents. When storage liquid Nordway®-KF deicer under conditions and requirements presented above – the shelf-life of the product is minimum 24 months from its date of manufacture.

### Contact

ESSPO, UAB                      Call: +370 381 584 33  
 Troskunu 1, 29100              Fax: +370 381 584 55  
 Anyksciai, Lithuania        Email: info@esspo.lt





## Safety Data Sheet

according to Regulation 1907/2006/EC (REACH)  
and amendment 2020/878/EU

### Liquid de-icer „Nordway-KF“

Page 1 of 7

Issue date: 03-04-2017

Revision date: 28-12-2022

Version 5 (EN version)

## SECTION 1. Identification of the substance/mixture and of the company/undertaking

### 1.1. Product identifier

Product name: **Liquid de-icers “NORDWAY-KF”**

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

**Relevant identified uses:** For ice and snow melting on the airport's arrival and maneuvering trails, parking areas.

**Uses advised against:** not available.

### 1.3. Details of the supplier of the safety data sheet

**Supplier:** UAB “ESSPO”

**Address:** Troskunu str. 1, LT-29100 Anyksciai, Lithuania

**Telephone:** +370 381 58466, fax: +370 381 58455

**E-mail:** info@esspo.lt www.esspo.lt

**E-mail of the responsible person for the safety data sheet:**

[info@esspo.lt](mailto:info@esspo.lt)

### 1.4. Emergency telephone number

Lithuanian Poison Information Bureau, phone: + 370~5 236 20 52 - available 24/7

General emergency : 112 - available 24/7

## SECTION 2. Hazards identification

### 2.1. Classification of the substance or mixture

#### 2.1.1. Classification according to Regulation (EC) No. 1272/2008 [CLP]

Not applicable – the mixture is not classified as hazardous.

### 2.2. Label elements

**Label according to Regulation (EC) No. 1272/2008 [CLP]**

**Information about hazardous ingredients:** Not applicable.

**Hazard pictograms:** Not applicable.

**Signal word:** Not applicable.

**Hazard statements:** Not applicable.

**Precautionary statements.** Not applicable.

**Supplemental Hazard information:** Not applicable.

### 2.3. Other hazards

Product does not meet classification criteria for PBT and vPvB according to Regulation (EC) No. 1907/2006.

Product does not contain substances identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.


## SECTION 3. Composition/information on ingredients

### 3.1. Substances

Not applicable.

### 3.2. Mixtures

The product is an aqueous solution.

	<b>Safety Data Sheet</b> according to Regulation 1907/2006/EC (REACH) and amendment <b>2020/878/EU</b> <b>Liquid de-icer „Nordway-KF“</b>	Page 2 of 7 Issue date: 03-04-2017 Revision date: 28-12-2022 Version 5 (EN version)

<i>Substance, REACH Reg. No.</i>	<i>CAS No.</i>	<i>EC No.</i>	<i>Classification according to 1272/2008/EC</i>	<i>Concentration vol. (%)</i>
Potassium formate 01-2119486456-26-XXXX	590-29-4	209-677-9	Not classified.	50

**Note:** The mixture contains  $\leq 1\%$  corrosion inhibitors, which does not affect the classification of the mixture.

## SECTION 4. First aid measures

### 4.1. Description of first aid measures

**General information.** In all cases of doubt, or when symptoms persist, immediately seek medical attention. Never give anything by mouth to an unconscious person.

**Following inhalation:** when used as intended - there is no real risk.

**Following skin contact:** wash contact areas with water and soap. Remove contaminated clothing and wash before reuse.

**Following eye contact:** rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If irritation persists, get medical attention.

**Following ingestion:** rinse out mouth and then drink plenty of water. Get medical assistance if you feel unwell.

**Self-protection of the first aider:** to care for their own safety. Avoid contact with skin, eyes or clothing.

### 4.2. Most important symptoms and effects, both acute and delayed

The solution has slightly alkaline properties. Contact with eyes may cause irritation, pain, tearing. Skin contact - large quantities may cause mild irritation. If larger quantity is ingested - irritates the oesophagus, pain in the abdomen. Potential cardiac disorders due to the high potassium content. Possible delayed period - medical care is necessary.

### 4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically. In case an intoxication is suspect, National Poisons Information Centre should be called immediately.

## SECTION 5. Firefighting measures

### 5.1. Extinguishing media

**General information.** The product is not flammable. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. At temperatures higher than 100 °C boiling starts, and, after evaporation of the water - thermal destruction of components begins.

**Suitable extinguishing media:** use water spray, foam, sand, dry powder, carbon dioxide (CO<sub>2</sub>).

**Unsuitable extinguishing media:** do not use water jet, as it may cause fire to spread.

### 5.2. Special hazards arising from the substance or mixture

**Hazardous combustion products:** thermal decomposition can release corrosive formic acid vapours and toxic gases - formaldehyde, carbon monoxide.

### 5.3. Advice for firefighters

**Special protective equipment for firefighters:** Do not attempt to take action without suitable protective equipment. Firefighters must use appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face positive pressure mask. Clothing for firefighters (including helmets, safety boots and gloves) must comply with the European standard EN 469, which provides basic protection in case of fire.

**Special firefighting procedures:** use water mist for cooling unopened containers, and to isolate leaking products of thermal destruction.

**SECTION 6. Accidental release measures****6.1. Personal precautions, protective equipment and emergency procedures**

**For non-emergency personnel:** if the product spilled, stop any work not related to emergency response. Avoid contact with skin, eyes and clothing. Ensure adequate ventilation. Evacuate personnel to safe areas. If undesirable symptoms occur and persist, seek medical attention.

**For emergency responders:** unnecessary personnel should keep away. Use personal protective equipment as recommended in Safety Data Sheet section 8.

**6.2. Environmental precautions**

Avoid large amounts entering into soil, surface water and drains.

**6.3. Methods and material for containment and cleaning up**

**For containment:** liquid-binding material (sand, vermiculite, earth, sawdust).

**For cleaning up:** vacuum up as much as possible the spilled product into the sealed (PE, PP, steel) containers, scoop up residue mixed with absorbent material (sand, vermiculite, earth, sawdust) into waste containers. The collected uncontaminated product can be used for an intended purpose. Wipe floor of the room with a damp cloth or wash off with water.

**Other information:** not available.

**6.4. Reference to other sections**

Personal protective equipment: see section 8. Disposal considerations: see section 13.

**SECTION 7. Handling and storage****7.1. Precautions for safe handling**

**Advice on safe handling:** avoid contact with skin, clothing, particularly avoid contact with face and eyes. Do not eat, drink or smoke in the workplace. Wash hands after use. Remove contaminated clothing and used contaminated protective equipment before entering eating areas.

**Measures to prevent fire:** keep containers away from heat and ignition sources.

**7.2. Conditions for safe storage, including any incompatibilities**

**Storage requirements:** do not store containers with the product near heat sources. Store in a clean, tightly closed container in unheated rooms or in the open air and protected from direct sunlight and atmospheric precipitation. If the product is stored in metal drums in an open area, shelter is needed that protects from atmospheric precipitation. Lowest permissible temperature for keeping in open location: -40°C. Protect container from mechanical damage. Incompatible chemical substances: strong oxidizing agents, acids, alkalis. Requirements for packaging - plastic or steel tanks. The product should not be kept for a long-term in zinc, aluminium or painted containers susceptible to alkali.

**7.3. Specific end use(s)**

End uses specified in Section 1. Identified uses are provided in the technical descriptions.

**SECTION 8. Exposure controls/personal protection****8.1. Control parameters**

**Occupational exposure limits:** no exposure limits noted for the ingredient(s).

*DNEL - Derived-No-Effect-Levels - Potassium formate (CAS 590-29-4)*

<i>Population</i>	<i>Exposure</i>	<i>Effect</i>	<i>Value</i>
Workers	Dermal	long term, systemic	12,35 mg/kg bw / day
Workers	Inhalation	long term, systemic	43.55 mg/m <sup>3</sup>
Gen. population	Inhalation	long term, systemic	10,74 mg/m <sup>3</sup>
Gen. population	Dermal	long term, systemic	6.175 mg/kg bw / day
Gen. population	Oral	long term, systemic	6.175 mg/kg bw / day

*PNEC - Predicted No Effect Concentrations - Potassium formate (CAS 590-29-4)*

Freshwater – 2 mg/l;

Intermittent releases – 10 mg/l;

Marine water – 0.2 mg/l;

STP – 1,8 mg/l;  
Soil – 1,5 mg/kg dw;  
Sediment (freshwater) – 13.4 mg/kg sediment dw;  
Sediment (marine water) – 1.34 mg/kg sediment dw.

**Recommended monitoring procedures.** Follow standard monitoring procedures.

## 8.2. Exposure controls

**Appropriate engineering controls:** avoid spillage.

**Individual protection measures, such as personal protective equipment:**

**Eyes/face protection:** if product could get into eyes - hermetic protective glasses according to EN 166.

**Respiratory protection:** if used as intended, in case of spillage - unnecessary.

**Hand protection:** protective gloves, impenetrable of water, according to EN 374.

**Other protection measures (work clothing, shoes, etc.):** footwear covering the entire foot. Working clothes.

**Thermal hazards:** not applicable.

**Hygiene measures:** after handling chemical products, before eating, smoking and before breaks and at the end of work wash hands, forearms and face. Do not wear soiled clothes.

## Environmental exposure controls

Avoid spillage, the product does not pose special environmental risks.

## SECTION 9. Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

<b>Appearance (the physical state, color):</b>	clear yellowish liquid
<b>Odour:</b>	odourless
<b>Odour threshold:</b>	not applicable
<b>Hydrogen ion concentration value, pH:</b>	9.0 to 11.5 (20 °C temp.)
<b>Melting point/freezing point, °C:</b>	≤ (-60 )
<b>Initial boiling point, °C:</b>	> 100
<b>Flash point, °C:</b>	not applicable
<b>Evaporation rate:</b>	not available
<b>Flammability (solid, gas):</b>	not applicable
<b>Upper/lower flammability or explosive limits, vol. %</b>	not applicable
<b>Relative evaporation rate</b>	as water
<b>Vapour pressure, kPa:</b>	as water
<b>Vapour density:</b>	not available
<b>Relative density, g/cm<sup>3</sup>:</b>	1.30 – 1.38 (20 °C temp.)
<b>Solubility:</b>	in water – unlimited; in hydrocarbons – insoluble
<b>Partition coefficient n-octanol/water:</b>	log Pow = -0,54 (formic acid)
<b>Auto-ignition temperature, °C:</b>	not applicable
<b>Decomposition temperature, °C:</b>	> 110 – boiling, 167 °C – potassium formate melts, decomposed > 200 °C temp.
<b>Viscosity, mPa.s:</b>	≤ 3 (20 °C temp.); ≤ 5 (0 °C temp.).
<b>Explosive properties:</b>	not classified as explosive chemicals
<b>Oxidizing properties:</b>	not classified as the substances with oxidizing properties. Oxidized by running strong oxidizing agents.
<b>Particle characteristics:</b>	not applicable

### 9.2. Other information

None.

**SECTION 10. Stability and reactivity****10.1. Reactivity**

In reaction with strong acids releases formic acid.

**10.2. Chemical stability**

Stable. Boiling temperature higher than 110 °C.

**10.3. Possibility of hazardous reactions**

None known.

**10.4. Conditions to avoid**

Heat.

**10.5. Incompatible materials**

Strong acids, strong oxidizing agents, alkalis.

**10.6. Hazardous decomposition products**

After water evaporation – formic acid, formaldehyde and carbon monoxide.

**SECTION 11. Toxicological information****11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008**

**Acute toxicity:** based on available data, potassium formate toxicity is low. Ingestion, LD50 = 5500 mg/kg (mouse). Inhalation LC50 >0,67 mg/l (rat). Dermal LD50 >2000 mg/kg (rat).

**Skin corrosion/irritation:** potassium formate not determined (OECD 404).

**Serious eye damage/eye irritation:** potassium formate- does not meet criteria for classification.

**Respiratory or skin sensitisation:** potassium formate- does not meet criteria for classification.

**Germ cell mutagenicity, carcinogenicity, reproductive toxicity:** based on available data, the classification criteria are not met.

**STOT (single exposure):** based on available data the classification criteria are not met.

**STOT (repeated exposure):** based on available data the classification criteria are not met.

**Aspiration hazard:** not applicable.

**Information on likely routes of exposure:** specified in Section 4. Only thermal destruction products may present real danger.

**Delayed and immediate effects as well as chronic effects from short and long-term exposure:** none known.

**11.2 Information on other hazards**

The product does not contain substances identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

**SECTION 12. Ecological information****12.1. Toxicity**

Potassium formate is of low ecotoxicity - acute toxicity data:

- Fish - LC<sub>50</sub>: 1720 mg/l/96h. - *Scopthalmus maximus*;
- Invertebrates - LC<sub>50</sub>: >1000 mg/l/48h. – daphnia (*Daphnia magna*);
- Activated sludge - NOEC: >= 18 mg/l/28d. – according to OECD 301D.

**12.2. Persistence and degradability**

Soluble in water (dissociates), disperses. Formates are biodegradable - by active sludge - 92% per 28 days (as determined by OECD 301 D test method). Biological and chemical oxygen demand (test data):

BDS<sub>5</sub> (BOD<sub>5</sub>) = 0.05 kg O<sub>2</sub> / kg of the solution; ChDS (COD) = 0.11 kg O<sub>2</sub> / kg of solution.

**12.3. Bioaccumulative potential**

Bioaccumulation is not expected (log Pow <0).

**12.4. Mobility in soil**

Potassium formate has a low potential for adsorption due to high water solubility coupled with a very low octanol-water partition coefficient.

**12.5. Results of PBT and vPcB assessment**

Not applicable.

**12.6. Endocrine disrupting properties**

Not listed.

**12.7. Other adverse effects**

Not available.

**SECTION 13. Disposal considerations****13.1. Waste treatment methods**

Special requirements not applicable. The collected waste can be used for its intended purpose. Large amounts of waste should be disposed in accordance with local requirements. Recommended waste code: 07 01 99 wastes not otherwise specified from the manufacture, formulation, supply and use (MFSU) of basic organic chemicals. Codes of properties determining the hazards - none.

The producer of the waste must dispose the product according to its use, specific to the industry and the process, in cooperation with the local waste management company based on local waste disposal regulations and national regulations and laws.

Contaminated packaging should be disposed according to local and national regulations and in consultation with the local waste management companies.

For Europe, the waste producer sets the waste code in accordance with the European Waste List (Decision 2000/532/EC).

**SECTION 14. Transport information**

The product is not classified as a dangerous substance/mixture and is not subject to the requirements of the European Convention on the International Carriage of Dangerous Goods by Road ADR / RID / ADNR / IMDG / ICAO / IATA.

**14.1. UN number or ID number:**

Not applicable.

**14.2. UN proper shipping name:**

Not applicable.

**14.3. Transport hazard class(es):**

Not applicable.

**14.4. Packing group:**

Not applicable.

**14.5. Environmental hazards:**

Not applicable.

**14.6. Special precautions for user:**

Protect the packaging against mechanic damage.

Read safety instructions, SDS and emergency procedures before handling.

**14.7. Maritime transport in bulk according to IMO instruments:** Not applicable.

**SECTION 15: Regulatory information****15.1. Safety, health and environmental regulations/legislations specific for the substance or mixture**

- Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No.793/93, Commission Regulation (EC) No. 1488/94, Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (Official Journal of the European Union No. L 396, 30-12-2006, error correction – No. L 136/3, 2007-5-29);

- Commission Regulation (EU) 2020/878 of 18 June 2020 amending Annex II to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (OJ L 203, 26.6.2020, p. 28-58).

- On 16 December 2008 the Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of chemical substances and mixtures was undersigned. The said Regulation amended and repealed the directives 67/548/EEC and 1999/45/EC and Regulation (EC) No. 1907/2006 (the REACH Regulation). The Regulation has been published in the Official Journal of the European Union No. L353, volume 51 on 31 December, 2008;
- COMMISSION REGULATION (EU) 2016/918 of 19 May 2016 amending for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (OJ L 156, 14.6.2016, p. 1–102);
- Regulation (EC) No. 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents;
- Commission Regulation (EC) No. 907/2006 amending Regulation (EC) No. 648/2004 of the European Parliament and of the Council on detergents, in order to adapt Annexes III and VII thereto.
- The European Agreement concerning International Carriage of Dangerous Goods by Road (ADR).

### 15.2. Chemical safety assessment

For this product a chemical safety assessment has not been carried out.

## SECTION 16. Other information

### Indication of changes

Updated on the basis of the Commission Regulation (EU) No. 2020/878.

### Acronyms:

ADR – European Agreement concerning the International Carriage of Dangerous Goods by Road.  
ADN – European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.  
RID – Regulations concerning the International Carriage of Dangerous Goods by Rail.  
IMDG – International Maritime Dangerous Goods.  
IATA – International Air Transport Association.  
IMO – International Maritime Organization.  
vPvB – Very Persistent and Very Bioaccumulative.  
PBT – Persistent, Bioaccumulative and Toxic substance.  
LC50 – Lethal Concentration to 50 % of a test population.  
LD50 – Lethal Dose to 50% of a test population (Median Lethal Dose).  
CAS – Chemical Abstracts Service number.  
CEN – European Committee for Standardisation.  
STOT – Specific Target Organ Toxicity.  
PNEC(s) – Predicted No Effect Concentration(s).  
DNEL – Derived no-effect level.  
SDS – Safety Data Sheet.

### KEY LITERATURE REFERENCES AND SOURCES FOR DATA:

Safety Data Sheets issued by manufacturer's or supplier's of the same products and other technical information.  
European Chemicals Agency (ECHA) - <http://echa.europa.eu/>.

*This information is furnished without warranty of any kind, expressed or implied. It is intended solely to assist in evaluating the suitability and proper use of the product and in implementing safety precautions and procedures.*

*Information contained herein may be combined with other information obtained by the User to determine the applicability of federal, state, and local laws and regulations.*

*Users of the product should consider this information as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials.*

**End of Safety Data Sheet**

# SMI, Inc.

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Esspo, Ltd  
Troškūnų 1  
LT29100 Anyksciai  
Lithuania

Date: 12-Apr-2023

SMI/REF: 2301-952

Product: **NORDWAY-KF (KF-12-20221219KL)** (received 17-Jan-2023)

Dilution: As received

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*Periodic testing in accordance with*  
**AMS 1435D** (Revised 2018-11)  
**LIQUID RUNWAY DEICING/ANTI-ICING PRODUCT**

#### 4.2.2 Periodic Tests

3.2.4	Freezing Point	Conforms
3.2.5	Effect on Aircraft Metals	
3.2.5.1	Sandwich Corrosion	Conforms
3.2.5.2	Total Immersion Corrosion	Conforms
3.2.5.3	Low Embrittling Cadmium Plate	Conforms
3.2.5.3.1	Cyclic Immersion Corrosion of Cadmium Plate	Informational
3.2.5.4	Hydrogen Embrittlement	Conforms
3.2.5.5	Stress-Corrosion Resistance	
	AMS 4911	Conforms
	AMS 4916	Informational
3.2.6	Effect on Transparent Plastics	
	MIL-P-25690 (Type C)	Conforms
	MIL-P-83310 (Polycarbonate)	Conforms
3.2.7	Effect on Painted Surfaces	Conforms
3.2.8	Effect on Unpainted Surfaces	Conforms
3.2.9	Rinsibility	Conforms
3.2.10	Effect on Runway Pavements	
3.2.10.1	Runway Concrete Scaling Resistance	Conforms
3.2.10.2	Asphalt Concrete Degradation Resistance	*Not performed by SMI

**\*Testing required for deicer /anti-icer products used in Europe. This test is not performed by SMI.**



Jeff Nottebaum, SMI Inc.  
Director

Respectfully submitted,



Rae-anne Nottebaum, SMI Inc.  
Chemist



4.2.2 Periodic Tests: Freezing point (3.2.4), effect on aircraft metals (3.2.5), effect on transparent plastic (3.2.6), effect on painted surfaces (3.2.7), effect on unpainted surfaces (3.2.8), rinsibility (3.2.9), runway concrete scaling resistance (3.2.10.1) and asphalt concrete degradation resistance (3.2.10.2 Appendix A, valid for deicing/anti-icing products used in Europe) are periodic tests and shall be performed on or just prior to the second anniversary of initial testing and thereafter every four calendar years.

3.2.4 Freezing Point:

3.2.4.1 Freezing point of product diluted 1:1 by weight with ASTM D1193, Type IV, water shall be reported and shall be lower than +6°F (-14.5°C) determined in accordance with ASTM D1177.

**Freezing point (1:1 dilution): -15 °C**

Result Conforms

3.2.4.2 Shall be reported and shall be within 7°F (4°C) of the preproduction value established in 4.2.3, determined in accordance with ASTM D1177.

**Freezing point (1:1 dilution): -15 °C**

Result Informational

3.2.5 Effect on Aircraft Metals:

3.2.5.1 Sandwich Corrosion: Specimens, after testing in accordance with ASTM F 1110, shall show a rating not greater (worse) than one.

	2024-T3 Bare Anodized	2024-T3 Alclad	7075-T6 Bare Anodized	7075-T6 Alclad
PRODUCT (AS RECEIVED)	1	1	1	1
CONTROL	1	1	1	1

Result Conforms

Client: Esspo, Ltd  
 Product: **NORDWAY-KF (KF-12-20221219KL)**  
 Dilution: As received

Date: 12-Apr-2023  
 SMI/REF: 2301-952

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3.2.5.2 Total Immersion Corrosion: The product, tested in accordance with ASTM F483 (except that panels of AMS4376 shall be tested for 24 hours), shall neither show evidence of corrosion of panels, nor cause a weight change of any test panel greater than shown in Table 1.

TEST PANEL	WEIGHT CHANGE (mg/cm <sup>2</sup> /24hrs)	
	ALLOWABLE	RESULTS
AMS 4037 aluminum alloy, anodized as in AMS 2470	0.3	< 0.01
AMS 4041 aluminum alloy	0.3	< 0.01
AMS 4049 aluminum alloy	0.3	0.01
AMS 4376 magnesium alloy, dichromate treated as in AMS 2475 (tested for 24 hours only)	0.2	0.09
AMS 4911 titanium alloy	0.1	< 0.01
AMS 5045 Carbon Steel	0.8	0.01

**"+" indicates weight gain**

Result Conforms

3.2.5.3 Low-Embrittling Cadmium Plate: Test panels, coated with low-embrittling cadmium plate, shall not show a weight change greater than 0.3 mg/cm<sup>2</sup> per 24hrs, determined in accordance with ASTM F1111.

**As received: < 0.01 mg/cm<sup>2</sup>/24hrs**

Result Conforms

3.2.5.3.1 The product shall be tested for cyclic immersion corrosion of cadmium plate in accordance with AIR6130 and the results reported as specified in Section 6 of AIR6130A.

Initial pH of solution: 10.7

Final pH of solution: 10.0

PANEL WEIGHTS	REPLICATE #	Weight (g)		Weight change
		Initial	Final	
	1	16.0879	16.0871	0.0008
	2	16.8997	16.8990	0.0007
	3	16.0953	16.0951	0.0002
Average weight change = 0.0006 g (0.02 mg/cm <sup>2</sup> )				
Note: "+" indicates weight gain				

**AIR6130A: A runway deicing fluid or solid compound tested in accordance with this document that exhibits a weight loss of more than 0.3 mg/cm<sup>2</sup> may cause undesirable corrosion effects to airplane equipment and/or airport equipment.**

Result: **\*Informational**

See separate report for complete data tables

Client: Esspo, Ltd  
Product: **NORDWAY-KF (KF-12-20221219KL)**  
Dilution: As received

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SMI/REF: 2301-952

AMS 1435D Periodic Tests

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**3.2.5.4 Hydrogen Embrittlement:** The product shall be non-embrittling, determined in accordance with ASTM F519, utilizing Type 1a, 1c or 2a specimens cadmium plated in accordance with MIL-STD-870 Class 1 Type I. Type 1a and Type 1c, specimens shall be loaded to 45% of the predetermined notch fracture strength, and Type 2a specimens loaded to 80% of the yield strength. The entire 2a stressed specimen, or just the notched area of the 1a and 1c stressed specimen, shall be immersed continuously in the solution under test for 150 hours at a temperature of 77°F ± 9°F (25°C ± 5°C).

*Specimens: Type 1c:*

**As received: #1: No failures occurred within 150 hours.**

**#2: No failures occurred within 150 hours.**

**#3: No failures occurred within 150 hours.**

**#4: No failures occurred within 150 hours.**

Result Conforms

**3.2.5.5 Stress-Corrosion Resistance:** The product shall not cause cracks in AMS 4911 titanium alloy specimens, determined in accordance with ASTM F945, Method A.

**As received: No cracking evident.**

Result Conforms

**3.2.5.5.1** The product shall be tested in accordance with ASTM F945, Method A using AMS4916 specimens. Report shall detail the effect of the product and the effect of control solution. The results shall be reported for informational purposes only.

**As received: Cracking evident.**

Result Informational

**3.2.6 Effect on Transparent Plastics:**

**3.2.6.1** The product, at 77°F ± 4°F (25°C ± 2°C), shall not craze, stain, or discolor MIL-PRF-25690 stretched acrylic plastic, determined in accordance with ASTM F484.

Result Conforms

**3.2.6.2** The product, at 77°F ± 4°F (25°C ± 2°C), shall not craze, stain, or discolor AMS-P-83310 polycarbonate plastic, determined in accordance with ASTM F484, except that the specimens shall be stressed for 30 minutes ± 2 minutes to an outer fiber stress of 2000 psi (13.8 MPa).

Result Conforms

**3.2.7 Effect on Painted Surfaces:** The product, at 77°F ± 4°F (25°C ± 2°C), shall neither decrease the paint film hardness by more than two pencil hardness levels nor shall it produce any streaking, discoloration, or blistering of the paint film, determined in accordance with ASTM F502.

Result Conforms

3.2.8 Effect on Unpainted Surfaces: The product, tested in accordance with ASTM F485, shall neither produce streaking nor leave any stains requiring polishing to remove.

Result Conforms

3.2.9 Rinsibility: The product shall be completely rinsible in tap water, determined in accordance with 3.2.9.1

3.2.9.1 A 3 x 8 inch (75 x 200 mm) panel of clear glass shall be cleaned to provide a surface free of waterbreak, dried, and coated with the deicer/anti-icer product by pouring the product over the panel while it is held in a horizontal position. The coated panel shall be inclined at an angle of approximately 45 degrees for 10 minutes  $\pm$  0.5 minute, then placed in a horizontal position for 24 hours  $\pm$  0.25 hour at room temperature. After the 24 exposure, the panel shall be rinsed in tap water for 5 to 6 minutes, followed by a rinse with ASTM D1193, Type IV, water, allowed to air dry at ambient temperature, and examined for visible traces of deicer/anti-icer product.

Result Conforms

3.2.10 Effect on Runway Pavements

3.2.10.1 Runway Concrete Surface Scaling Resistance: The condition of the runway concrete surface shall have a rating not greater than one for 50 freeze-thaw cycles, determined in accordance with ASTM C672 except that concrete shall:

- a. Be air-entrained with an air content as specified in ASTM C 672
- b. Have a minimum cement content of  $510 \text{ lb/yd}^3 \pm 10 \text{ lb/yd}^3$  ( $302 \text{ kg/m}^3 \pm 6 \text{ kg/m}^3$ )
- c. Have a slump, 1.5 inches  $\pm$  0.5 inch (38 mm  $\pm$  13 mm).

A 25 % by volume solution of the deicer/anti-icing product, as supplied by the manufacturer in commercial concentration, in tap water shall be substituted for calcium chloride. Performing more than one freeze-thaw cycle per day is acceptable.

**Rating: 1**

Result Conforms

3.2.10.2 Asphalt Concrete Degradation Resistance (Appendix A, valid for deicer/anti-icer products used in Europe)

Result \*Not performed by SMI

**\*Testing required for deicer /anti-icer products used in Europe. This test is not performed by SMI.SMI.**

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Attn: Kipras Pakeltis  
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Troškūnų 1  
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Lithuania

Date: 12-Apr-2023

SMI/REF: 2301-952

Product: **NORDWAY-KF (KF-12-20221219KL)** (received 17-Jan-2023)

Dilution: As received

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Testing in accordance with  
**SAE AIR6130A**  
**CADMIUM PLATE CYCLIC CORROSION TEST (2017-05)**

### Cadmium Plate Cyclic Corrosion Test

Initial pH of solution: 10.7 Final pH of solution: 10.0

Replicate	Initial (g)	Final (g)	Weight change (grams)
1	16.0879	16.0871	0.0008
2	16.8997	16.8990	0.0007
3	16.0953	16.0951	0.0002
Average weight change = 0.0006 g (0.02 mg/cm <sup>2</sup> ) Note: "+" indicates weight gain			

*AIR6130A states: A runway deicing fluid or solid compound tested in accordance with this document that exhibits a weight loss of more than 0.3 mg/cm<sup>2</sup> may cause undesirable corrosion effects to airplane equipment and/or airport equipment.*

Result Informational

Client: Esspo, Ltd  
Product: **NORDWAY-KF (KF-12-20221219KL)**  
Dilution: As received

Date: 12-Apr-2023  
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SAE AIR6130A, Cadmium Plate Cyclic Corrosion Test

### Cadmium Plate Cyclic Corrosion Test

**AMS 1431 Compound, Solid Runway and Taxiway Deicing/Anti-Icing**

**AMS 1435 Fluid, Generic, Deicing/Anti-Icing Runways and Taxiways**

### 3 Test Specimen Preparation

Substrate: 4130 Steel

Size: 1" x 2" x 0.04" x 0.048" (25.40 mm x 50.80 mm x 1.22 mm)

Finish: Cadmium plating in accordance with AMS QQ-P-416., Type I Class I, (0.0005" - 0.0008" inch plating per side).

There shall be no supplementary chromate treatment.

- a. Three cadmium plated test specimens shall be used for each fluid to be tested
- b. Sample of AMS1435 Runway Deicing Fluid shall be tested as received from the supplier.
- c. Sample of AMS1431 Runway Deicing Solid Compound shall be tested in a diluted form – diluted with ASTM D 1193, Type IV, water to 15% by weight solids.
- d. Procure soft flexible brushes for test (paintbrush type, 1.5 inches (3.8 cm) wide, with synthetic bristles approx 1.5 inches (3.8 cm) long

### 4 Environmental Exposure Preparation

Preset humidity chamber to  $90 \pm 5^\circ\text{F}$  and  $30 \pm 5\%$  humidity. Affix plastic ties or other inert material as hangers (hangers shall be made from an inert material that will not react with the sample; plastic, plastic coated metals, monofilament fishing line or stainless steels are acceptable) in the chamber to hold specimens during the environmental exposure period.

### 5 Test Procedure

- a. Measure and record pH of solution(s) to be tested (record to one decimal place).
- b. Solvent clean cadmium plated specimens with acetone; wipe gently with an acetone-soaked wiper. Without allowing the acetone to evaporate, gently remove excess acetone with a dry wiper. Allow samples to dry for 10 minutes in a desiccator. Do not accelerate drying of samples with oven drying.

**Note:** Care should be taken not to touch the cleaned specimens with bare hands; use tweezers, clean gloves or equivalent tool.

- c. Weigh and record initial specimen weight in grams. Record all weights throughout the test to the nearest 0.0001 gram. Return specimens to desiccator until Day 3.

Monday	Tuesday	Wednesday	Thursday	Friday
				Friday Start – Day 0
Day 3	Day 4	Day 5	Day 6	Day 7
Day 10	Day 11	Day 12	Day 13	Day 14

Client: Esspo, Ltd  
Product: **NORDWAY-KF (KF-12-20221219KL)**  
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SAE AIR6130A, Cadmium Plate Cyclic Corrosion Test

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- d. FRIDAY START - Fill glass containers with solution to be tested, one container for each coupon. Refer to 3b or 3c for solution being used (consider filling one extra container to have extra conditioned fluid available). Container shall be large enough so the solution completely covers the specimens. Cover the container with loose fitting cover and place filled container into the humidity chamber to environmentally condition the solution for a minimum of  $24 \pm 1$  hours before the start of test, up to  $72 \pm 1$  hours.
- e. Day 3 – Remove the solution container from the humidity chamber and the specimens from the desiccator. Place specimens in container oriented such that the specimens are not resting flush against the bottom or side of the container. Place the container with cover back into the humidity chamber for  $24 \pm 1$  hours.
- f. Day 4 - After the 24 hour immersion in the solution, remove the specimens, but do not rinse them. Place them into the humidity chamber by hanging for  $22.5 \pm 0.5$  hours. Hangers shall be made from an inert material that will not react with the sample (such as plastic, plastic coated metals and stainless steels are acceptable).
- g. Day 5 /Day 10 /Day 12 – Remove the specimens from the humidity chamber. Rinse the specimens with deionized water. Lightly brush (12 strokes per side) the specimen surface with the soft flexible brush while rinsing to remove loose corrosion products. Immerse samples into acetone for 10 seconds while agitating specimen. Allow samples to dry for 10 minutes in a desiccator. Weigh and record the specimen weights. Do not accelerate drying of samples with oven drying.

**Note:** If multiple solutions are being tested, use different brushes for each solution to avoid cross contamination.

Immediately after weighing the specimens, return them to their test solution container to soak for  $90 \pm 5$  minutes in the humidity chamber. Specimens shall be oriented such that they not resting flush against the bottom or side of the container. After 90 minutes, remove the specimens but do not rinse them. Place them in the humidity chamber by hanging for  $22.5 \pm 0.5$  hours, maintaining the specimen in the initial orientation throughout the cycle.

- h. Day 6 /Day 11 /Day 13 - Return the specimen to the test solution container to soak for  $90 \pm 5$  minutes in the humidity chamber. Specimens shall be oriented such that it is not resting flush against the bottom or side of the container. After 90 minutes, remove the specimen but do not rinse it. Replace it in the humidity chamber by hanging for  $22.5 \pm 0.5$  hours, maintaining the specimen in the initial orientation throughout the cycle.
- i. Day 7 – Remove specimens from the humidity chamber. Rinse the specimens with deionized water. Lightly brush (12 strokes per side) the specimens surface with a soft flexible brush while rinsing to remove loose corrosion products. Immerse samples into acetone for 10 seconds while agitating specimen. Allow samples to dry for 10 minutes in a desiccator. Weigh and record the specimen weights. Do not accelerate drying of samples with oven drying.

**Note:** If multiple solutions are being tested, use different brushes for each solution to avoid cross contamination.

Immediately after weighing the specimens, return them to their test solution container in the humidity chamber. Specimens shall be oriented such that they are not resting flush against the bottom or side of the container. Specimens shall be left in the test solution container in the humidity chamber from DAY 7 to DAY 10.

Client: Esspo, Ltd  
 Product: **NORDWAY-KF (KF-12-20221219KL)**  
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**SAE AIR6130A, Cadmium Plate Cyclic Corrosion Test**

j. Day 14 – Remove specimens from the humidity chamber. Rinse the specimens with deionized water. Lightly brush (12 strokes per side) the specimen surface with a soft flexible brush while rinsing to remove loose corrosion products. Immerse samples into acetone for 10 seconds while agitating specimen. Allow samples to dry for 10 minutes in a desiccator. Weigh and record the specimen weights. Do not accelerate drying of samples with oven drying.

**Note:** If multiple solutions are being tested, use different brushes for each solution to avoid cross contamination.

k. Measure and record final pH of solution (record to one decimal place).

l. Report the initial weight of the specimen, the weight after each periodic weighing, and the final weight. Calculate and report the value of the cumulative weight lost from each specimen after each periodic weighing procedure.

Test Data:

**pH at start of test: 10.7**  
**pH at end of test: 10.0**

INITIAL PANEL WEIGHTS	REPLICATE #	Weight (g)
	1	16.0879
	2	16.8997
	3	16.0953

WEEK #1 PANEL WEIGHTS	REPLICATE #	Weight (g)		
		Monday	Wednesday	Friday
	1	----	16.0898	16.0879
	2	----	16.9023	16.9002
	3	----	16.0988	16.0966

WEEK #2 PANEL WEIGHTS	REPLICATE #	Weight (g)		
		Monday	Wednesday	Friday
	1	16.0865	16.0885	16.0871
	2	16.8983	16.9005	16.8990
	3	16.0946	16.0967	16.0951



Client: Esspo, Ltd  
 Product: **NORDWAY-KF (KF-12-20221219KL)**  
 Dilution: As received

Date: 12-Apr-2023  
 SMI/REF: 2301-952  
 Page 5 of 5

SAE AIR6130A, Cadmium Plate Cyclic Corrosion Test

TEST DATA (continued)

REPLICATE #1	INITIAL WEIGHT (grams)	WEEK 1 WED (grams)	WEEK 1 FRI (grams)	WEEK 2 MON (grams)	WEEK 2 WED (grams)	WEEK 2 FRI (grams)
	16.0879	16.0898	16.0879	16.0865	16.0885	16.0871
CUMULATIVE WEIGHT CHANGE ("+" indicates weight gain)	--	+ 0.0019	0	0.0014	+ 0.0006	<b>0.0008 (FINAL)</b>

REPLICATE #2	INITIAL WEIGHT	WEEK 1 WED	WEEK 1 FRI	WEEK 2 MON	WEEK 2 WED	WEEK 2 FRI (FINAL WEIGHT)
	16.8997	16.9023	16.9002	16.8983	16.9005	16.8990
CUMULATIVE WEIGHT CHANGE ("+" indicates weight gain)	--	+ 0.0026	+ 0.0005	0.0014	+ 0.0008	<b>0.0007 (FINAL)</b>


REPLICATE #3	INITIAL WEIGHT	WEEK 1 WED	WEEK 1 FRI	WEEK 2 MON	WEEK 2 WED	WEEK 2 FRI (FINAL WEIGHT)
	16.0953	16.0988	16.0966	16.0946	16.0967	16.0951
CUMULATIVE WEIGHT CHANGE ("+" indicates weight gain)	--	+ 0.0035	0.0013	0.0007	+ 0.0014	<b>0.0002 (FINAL)</b>

SUMMARY:

WEIGHT CHANGE	REPLICATE #	Weight Change (g)	Average Weight Change	Informational
	1	<b>0.0008</b>	<b>0.02mg/cm<sup>2</sup> (0.0006 g)</b>	
	2	<b>0.0007</b>		
	3	<b>0.0002</b>		

Note: "+" indicates a weight gain.

**AIR6130A: A runway deicing fluid or solid compound tested in accordance with this document that exhibits a weight loss of more than 0.3 mg/cm<sup>2</sup> may cause undesirable corrosion effects to airplane equipment and/or airport equipment.**

  
 Jeff Nottebaum, SMI Inc.  
 Director

Respectfully submitted,

  
 Rae-anne Nottebaum, SMI Inc.  
 Chemist



# TEST REPORT

**VTI No.: 23-003A**

Client

ESSPO  
Kipras Pakeltis  
Troškūnų str. 1, Anykščiai  
LT-29100, Lithuania

Commission  
Test material  
Date of sample arrival  
Test period  
Marking of sample

Laboratory analysis  
De-icing agent  
2023-01-13  
2023-01-24 – 2023-04-06  
Nordway-KF  
Batch number: KF-12-20221219KL

## Test material

*The test material consists of Nordway-KF liquid runway de-icing agent.*

## Analysis

Asphalt Concrete Degradation Resistance has been tested according to LFV Method 2-98 as specified in Appendix A (and in EN 12697-41:2023) and § 3.2.10.2 of the SAE Aerospace Material Specification AMS1435D, revised 11/2018.

## Result

The reduction in adhesion value was 5% \* for asphalt concrete specimens stored in the liquid de-icing agent Nordway-KF compared to the dry reference specimens. Detailed information on the test results is given in Appendix 1 of this report.

The pH value of the liquid de-icing agent was 11 # and the density at 20 °C was 1,350 g/cm<sup>3</sup>.

\*The adhesion value for specimens stored in the liquid de-icing agent shall not be reduced by more than 50% compared to the dry reference specimens to meet the requirement of the specification AMS1435D.

# The reported pH value is for indicative purposes only, and its measurement uncertainty is undetermined.

Report issued by

2023-04-06

X

Jiqinq Zhu  
Senior Researcher  
Signerat av: Jiqinq Zhu

Reviewed by

2023-04-06

X

Björn Kalman  
Research Director  
Signerat av: Björn Kalman

*"The results relate only to the tested items. This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. Uncertainty of measurements are calculated according to EA-4/16 and stated with the coverage factor k=2.*



# TEST REPORT

VTI No.: 23-003A

## Appendix 1

*Effect on asphalt concrete of the runway de-icing agent according to AMS1435D, Appendix A (LFV Method 2-98) for the liquid de-icing product*

The test has been performed on dense asphalt concrete (ABT16) with a 16 mm maximum size of the aggregate. The aggregate, a granite, came from the Skärlunda quarry, located outside Norrköping, Sweden. The asphalt concrete was made with paving grade bitumen 160/220 manufactured of crude oil from Venezuela. Binder content was 5,7 % by mass. The air voids content was 7%±1% by volume. The samples were stored in the liquid de-icing agent for 70 days at 40 °C and the tensile tests were performed at 23 °C.

### Runway de-icing product Nordway-KF

The unit for the surface tensile strength is MPa in the tables below.

Surface tensile strength, dry samples		Type of failure (adhesion between the epoxy resin and the asphalt concrete in %)		Mean value and standard deviation of surface tensile strengths (dry samples)	Density, dry samples (g/cm <sup>3</sup> )		Mean value of density, dry samples (g/cm <sup>3</sup> )	Mean value of air voids, dry samples (%)
1,038	1,087	100	100		1,06 ± 0,22	2,246		
1,096	1,021	100	100	2,251		2,249		

Surface tensile strength, wet samples		Type of failure (adhesion between the epoxy resin and the asphalt concrete in %)		Mean value and standard deviation of surface tensile strengths (wet samples)	Density, wet samples (g/cm <sup>3</sup> )		Mean value of density, wet samples (g/cm <sup>3</sup> )	Mean value of air voids, wet samples (%)
0,984	0,969	95	100		1,01 ± 0,22	2,246		
1,046	1,031	100	100	2,250		2,251		

The expanded uncertainty is the product of the reproducibility standard deviation  $\sigma_R$ , and the coverage factor  $k = 2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The reproducibility standard deviation determined in interlaboratory comparisons and are indirectly specified in the method  $2 \sigma_R = R / 2^{0.5}$ .

The reduction in surface tensile strength of the wet samples compared to the dry samples is: **5%**.

*"The results relate only to the tested items. This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. Uncertainty of measurements are calculated according to EA-4/16 and stated with the coverage factor  $k=2$ ."*

## Nordway®-NF

### Solid Runway/Taxiway and Parking Apron De-icer

#### PRODUCT DESCRIPTION

Nordway®-NF is a solid runway, taxiway and parking apron de-icer based on sodium formate. This is easy applicable, fully biodegradable and environmentally friendly de-/anti-icing product combined with unique formulation of corrosion inhibitors. De-icer is tailored to completely fulfill SAE AMS 1431 standard requirements and is regularly revised/retested according the latest version of the standard at SMI Inc. laboratory. Nordway®-NF performs by decreasing the freezing temperature of water and creates long lasting protection from snow, ice, freezing rain and slush.

#### PROPERTIES

<b>Sodium Formate , %</b>	Minimum 98.0
<b>Shape</b>	Irregular Granules
<b>Appearance</b>	White
<b>pH value (15% solution)</b>	10.0 – 13.0
<b>Granular size, %;</b>	
<b>&lt; 2 mm</b>	2%
<b>2-4 mm</b>	93%
<b>&gt; 4 mm</b>	5%
<b>BOD<sub>5</sub></b>	0,04 kg O <sub>2</sub> /kg solid
<b>COD</b>	0,27 kg O <sub>2</sub> /kg solid
<b>AQUATIC TOXICITY:</b>	
<b>Acute Toxicity to Daphnia Magna</b>	48 hour LC <sub>50</sub> : 4,250 mg/l
<b>Acute Toxicity to Fish</b>	96 hour LC <sub>50</sub> : 4,325 mg/l

#### PERFORMANCE

Nordway®-NF can be applied directly onto the pavement surface where is desirable both preventive and/or reactive treatment. Product does not cause any corrosion to metals and is FREE OF:

- Chlorides
- Phosphates
- Nitrites and nitrates
- Triazoles.

#### CERTIFICATION

- Nordway®-NF is certified and approved by the latest version of SAE AMS 1431 standard at SMI Inc.
- LFV tests of impact for asphalt/concrete pavements are done at VTI Institute (Sweden)
- AIR tests are done at LIMA-AMIL (Canada) and SMI Inc. (USA)
- Tests of impact for soil, water and waste water are done following particular local requirements

# Nordway®-NF

## Solid Runway/Taxiway and Parking Apron De-icer

### APPLICATION

Using Nordway®-NF is needed to take into account current weather conditions and deeply know the surface structure, content of surface materials and usage method. It is able to consult and assist upon request in all treatment cases. It is highly recommended preventive treatment when it starts snowing, freezing or freezing rain. If the thickness of ice is above 3 mm, it is recommended to use solid runway deicer Nordway®-NF together with a liquid runway/taxiway and parking apron deicer Nordway®-KF. Nordway®-NF is compatible with all regular deicer spreading machinery. In particular weather conditions - before snowing/light snow, snowing or after snowing/icing, dosage certain amounts of Nordway®-NF which are referred in the following table. Application rates are only reference for application and it should not be considered as recommended.

Pavement surface conditions	Temperature 0 to -5°C	Temperature -5 to -10°C	Temperature -10 to -15°C	Temperature below -15°C
<b>Before snowing / light snow</b>	20 g/m <sup>2</sup>	25 g/m <sup>2</sup>	35 g/m <sup>2</sup>	40 g/m <sup>2</sup>
<b>Snowing</b>	35 g/m <sup>2</sup>	45 g/m <sup>2</sup>	50 g/m <sup>2</sup>	55 g/m <sup>2</sup>
<b>After snowing / icing</b>	40 g/m <sup>2</sup>	50 g/m <sup>2</sup>	55 g/m <sup>2</sup>	60 g/m <sup>2</sup>


### STORAGE AND HANDLING

Nordway®-NF deicers are prepared and delivered for final usage. Nordway®-NF is offered in various packaging – either in 1000Kg/500Kg commercial big bags or 25Kg/50Kg retail bags. We highly recommend to storage deicer in its original package on a pallet in a cool, dry and well-ventilated place because of its high absorption of water. Keep packages tightly closed. For safety, it is also highly recommended to store Nordway®-NF away from extreme heat and away from strong oxidizing agents. When storage solid runway deicer Nordway®-NF under conditions and requirements presented above – in a cool, dry and well-ventilated place, packages tightly closed, the shelf-life of the product is minimum 24 months from its date of manufacture.

### Contact

ESSPO, UAB  
Troškunu str 1, 29100  
Anyksciai, Lithuania

Call: +370 381 512 26  
Fax: +370 381 584 55  
Email: info@esspo.lt

	<p style="text-align: center;"><b>Safety Data Sheet</b></p> <p style="text-align: center;">according to Regulation 1907/2006/EC (REACH) and amendment <b>2020/878/EU</b></p> <p style="text-align: center;"><b>Powdery de-icer „Nordway-NF“</b></p>	<p>Page 1 of 7</p> <p>Issue date: 03-04-2017 Revision date: 28-12-2022 Version 4 (EN version)</p>
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## SECTION 1. Identification of the substance/mixture and of the company/undertaking

### 1.1. Product identifier

Product name: **Powdery de-icers “NORDWAY-NF”**

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

**Relevant identified uses:** For ice and snow melting on the airport's arrival and maneuvering trails, parking areas.

**Uses advised against:** not available.

### 1.3. Details of the supplier of the safety data sheet

**Supplier:** UAB “ESSPO”  
**Address:** Troskunu str. 1, LT-29100 Anyksciai, Lithuania  
**Telephone:** +370 381 58466, fax: +370 381 58455  
**E-mail:** info@esspo.lt www.esspo.lt

### E-mail of the responsible person for the safety data sheet:

[info@esspo.lt](mailto:info@esspo.lt)

### 1.4. Emergency telephone number

Lithuanian Poison Information Bureau, phone: + 370-5 236 20 52 - available 24/7  
 General emergency : 112 - available 24/7

## SECTION 2. Hazards identification

### 2.1. Classification of the substance or mixture

#### 2.1.1. Classification according to Regulation (EC) No. 1272/2008 [CLP]

Not applicable – the mixture is not classified as hazardous.

### 2.2. Label elements

#### Label according to Regulation (EC) No. 1272/2008 [CLP]

**Information about hazardous ingredients:** Not applicable.

**Hazard pictograms:** Not applicable.

**Signal word:** Not applicable.

**Hazard statements:** Not applicable.

**Precautionary statements:** Not applicable.

**Supplemental Hazard information:** Not applicable.

### 2.3. Other hazards

Product does not meet classification criteria for PBT and vPvB according to Regulation (EC) No. 1907/2006.  
 Product does not contain substances identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

## SECTION 3. Composition/information on ingredients

### 3.1. Substances

Not applicable.

### 3.2. Mixtures

<i>REACH Reg. No.</i>	<i>CAS Nr.</i>	<i>EC Nr.</i>	<i>Substance</i>	<i>Concentration vol. (%)</i>	<i>Classification according to 1272/2008/EC</i>
01-2119486468-21-XXXX	141-53-7	205-488-0	Sodium formate	≥ 97	Not classified.

**Note:** The mixture contains ≤ 2% of the corrosion inhibitor, which does not affect the classification of the mixture.

## SECTION 4. First aid measures

### 4.1. Description of first aid measures

**General information.** In all cases of doubt, or when symptoms persist, immediately seek medical attention. Never give anything by mouth to an unconscious person.

**Following inhalation:** provide fresh air, rest, breathe deeply. If you have breathing problems, call a physician immediately.

**Following skin contact:** wash contact areas with water and soap. Remove contaminated clothing and wash before reuse.

**Following eye contact:** immediately wash the eyes, lifting eyelids or gently lifting and lowering them under running water or eyes wash baths. If possible, remove contact lenses. If dust from the eyes failed to wash or symptoms persist, consult a doctor.

**Following ingestion:** rinse out mouth and then drink plenty of water. If a large quantity has been ingested or you feel unwell, get medical advice/attention.

**Self-protection of the first aider:** to care for their own safety. Avoid contact with skin, eyes or clothing.

### 4.2. Most important symptoms and effects, both acute and delayed

Aqueous solutions have slightly alkaline properties. Inhalation of dust may cause airway irritation and coughing. Eye contact may cause irritation, pain, tearing. Eyes can be particularly affected, if closed. Possibility of mechanical eye damage. Skin contact - large quantities may cause irritation, dry skin. If a larger amount is ingested - irritates the oesophagus, pain in the abdomen, vomiting, diarrhoea. Large doses may cause stomach and intestinal inflammation, shock.

### 4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically. In case intoxication is suspected, National Poisons Information Centre should be called immediately.

## SECTION 5. Firefighting measures

### 5.1. Extinguishing media


**General information.** The product is difficult to ignite. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Suitable extinguishing media:** use water spray, foam, sand, dry powder, carbon dioxide (CO<sub>2</sub>).

**Unsuitable extinguishing media:** do not use water jet, as it may cause fire to spread.

### 5.2. Special hazards arising from the substance or mixture

**Hazardous combustion products:** thermal decomposition can release corrosive gases – carbon monoxide, formaldehyde.

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### 5.3. Advice for firefighters

**Special protective equipment for firefighters:** Do not attempt to take action without suitable protective equipment. Firefighters must use appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face positive pressure mask. Clothing for firefighters (including helmets, safety boots and gloves) must comply with the European standard EN 469, which provides basic protection in case of fire.

**Special firefighting procedures:** use water mist for cooling unopened containers, and to isolate leaking products of thermal destruction.

## SECTION 6. Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel:** if the product has been spilled, stop any work not related to emergency response. Avoid dusting – spillages of the product are recommended to be moistened with water, avoid contact with skin, eyes and clothing and use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. If undesirable symptoms occur and persist, seek medical attention.

**For emergency responders:** unnecessary personnel should keep away. Use personal protective equipment as recommended in Safety Data Sheet section 8.

### 6.2. Environmental precautions

Avoid large amounts entering soil, surface water and drains.

### 6.3. Methods and material for containment and cleaning up

**For containment:** stop spillages.

**For cleaning up:** sweep up or shovel, while avoiding the generation of dust, and place in sealed bags, plastic or metal containers. Clean places of spillage with a damp cloth or rinse with water. The collected waste can be used for an intended purpose.

**Other information:** not available.

### 6.4. Reference to other sections

Personal protective equipment: see section 8. Disposal considerations: see section 13.

## SECTION 7. Handling and storage

### 7.1. Precautions for safe handling

**Advice on safe handling:** avoid dust formation, contact with skin, clothing, particularly avoid contact with face and eyes. Do not eat, drink or smoke in the workplace. Wash hands after use. Remove contaminated clothing and used contaminated protective equipment before entering eating areas.

**Measures to prevent fire:** keep containers away from heat and ignition sources.

### 7.2. Conditions for safe storage, including any incompatibilities

**Storage requirements:** hygroscopic, it absorbs humidity from the air and clumps up. Store in tightly sealed containers or plastic bags in a dry place. Container must be protected from mechanical damage. Incompatible chemical substances: strong acids, strong oxidizing agents. Packaging requirements - plastic containers, bags or big bags with a polyethylene or polypropylene film inserts, laminated bags, steel containers.

### 7.3. Specific end use(s)

End uses specified in Section 1. Identified uses are provided in the technical descriptions.

## SECTION 8. Exposure controls/personal protection

### 8.1. Control parameters

**Occupational exposure limits:** no exposure limits noted for the ingredient(s).

*DNEL - Derived-No-Effect-Levels - Sodium formate (CAS 141-53-7)*

<i>Population</i>	<i>Exposure</i>	<i>Effect</i>	<i>Value</i>
Workers	Dermal	long term, systemic	10 mg/kg bw / day
Workers	Inhalation	long term, systemic	35.26 mg/m <sup>3</sup>
Gen. population	Inhalation	long term, systemic	8.7 mg/m <sup>3</sup>
Gen. population	Dermal	long term, systemic	5 mg/kg bw / day



Gen. population	Oral	long term, systemic	5 mg/kg bw / day
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**PNEC - Predicted No Effect Concentrations - Sodium formate (CAS 141-53-7)**

Freshwater – 2 mg/l;  
Intermittent releases – 10 mg/l;  
Marine water – 0.2 mg/l;  
STP – 2.21 mg/l;  
Sediment (freshwater) – 13.4 mg/kg sediment dw;  
Sediment (marine water) – 1.34 mg/kg sediment dw;  
Soil – 1.5 mg/kg soil dw.

**Recommended monitoring procedures.** Follow standard monitoring procedures.

**8.2. Exposure controls**

**Appropriate engineering controls:** appropriate ventilation, avoid spillage and dust formation.

**Individual protection measures, such as personal protective equipment:**

**Eyes/face protection:** if contact with the eyes is possible - hermetic protective glasses according to EN 166.

**Respiratory protection:** for protection against dust use half masks with a filter - P1 according to EN 143, respirators FFP1 according to EN 149.

**Skin protection:**

**Hand protection:** protective gloves according to EN 374.

**Other protection measures (work clothing, shoes, etc.):** footwear covering the entire foot. Appropriate working clothes.

**Thermal hazards:** not applicable.

**Hygiene measures:** after handling chemical products, before eating, smoking and before breaks and at the end of work wash hands, forearms and face. Do not wear soiled clothes.


**8.3. Environmental exposure controls**

Avoid spillage, releases to drains or the soil.

**SECTION 9. Physical and chemical properties**

**9.1. Information on basic physical and chemical properties**

<b>Appearance (the physical state, color):</b>	white or grey granules, powder
<b>Odour:</b>	odourless
<b>Odour threshold:</b>	not applicable
<b>Hydrogen ion concentration value, pH:</b>	8,5 - 13 (15 % aqueous solution, 20 °C temp.)
<b>Melting point/freezing point, °C:</b>	~ 253
<b>Initial boiling point, °C:</b>	not applicable - components decompose before boiling
<b>Flash point, °C:</b>	not applicable
<b>Evaporation rate:</b>	not available
<b>Flammability (solid, gas):</b>	may be ignited by flame
<b>Upper/lower flammability or explosive limits, vol. %</b>	accurate data not available - dispersion of dust in the air may be explosive
<b>Vapour pressure, kPa:</b>	not applicable
<b>Vapour density:</b>	not applicable
<b>Relative density, kg/m<sup>3</sup>:</b>	850 - 950
<b>Solubility:</b>	not available
<b>Partition coefficient n-octanol/water:</b>	not available
<b>Auto-ignition temperature, °C:</b>	not applicable
<b>Decomposition temperature, °C:</b>	not available
<b>Viscosity, mPa.s:</b>	not applicable
<b>Explosive properties:</b>	not available

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<b>Oxidizing properties:</b>	oxidizes under the influence of strong oxidizing agents
<b>Particle characteristics:</b>	no data

## 9.2. Other information

None.

## SECTION 10. Stability and reactivity

### 10.1. Reactivity

In reaction with strong acids may release formic and acetic acids.

### 10.2. Chemical stability

Stable under normal conditions. Decomposes above 250 °C to sodium oxide with water, carbon dioxide, carbon monoxide. May release formaldehyde, acetaldehyde.

### 10.3. Possibility of hazardous reactions

None known.

### 10.4. Conditions to avoid

Air humidity - hygroscopic material.

### 10.5. Incompatible materials

Strong acids, strong oxidizing agents.

### 10.6. Hazardous decomposition products

Formaldehyde, carbon monoxide.

## SECTION 11. Toxicological information

### 11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

**Acute toxicity:** based on available data, the classification criteria components are not met as „harmful“.

	<b>Sodium formate</b>
Oral, LD50	>3000 mg/kg (rat)
Dermal, LD50	>2000 mg/kg (rat)
Inhalation, LC50	>0,67 mg/l (rat, 4 h)

**Skin corrosion/irritation:** slight irritation. Does not meet criteria for classification.

**Serious eye damage/eye irritation:** medium irritation. Does not meet criteria for classification.

**Respiratory or skin sensitisation:** does not meet the criteria for classification.

**Germ cell mutagenicity, carcinogenicity, reproductive toxicity:** based on available data, the classification criteria are not met.

**STOT (single exposure):** based on available data the classification criteria are not met.

**STOT (repeated exposure):** based on available data the classification criteria are not met.

**Aspiration hazard:** none.

**Information on likely routes of exposure:** specified in Section 4.

**Delayed and immediate effects as well as chronic effects from short and long-term exposure:** none known.

### 11.2 Information on other hazards

The product does not contain substances identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

## SECTION 12. Ecological information

### 12.1. Toxicity

The components are low ecotoxicity: LC50 (fish) – >1000 mg/l/96h.; EC50 (daphnia) – >1000 mg/l/48h.; EC50 (algae) - >1000 mg/l/48h.

**12.2. Persistence and degradability**

Soluble in water. Dissociates into ions and disperses. Formate ions are biodegradable. Formate ion's data: BOD<sub>5</sub> 0,01 kg O<sub>2</sub>/kg solid, COD 0,27 mg O<sub>2</sub>/kg solid.

Degradability in marine water, sodium formate: 86% in 28 days (OECD 306) - the material is biodegradable.

**12.3. Bioaccumulative potential**

Not applicable (log Pow <-1.8).

**12.4. Mobility in soil**

Sodium formate has a low potential for adsorption due to high water solubility coupled with a very low octanol-water partition coefficient.

**12.5. Results of PBT and vPcB assessment**

Not applicable.

**12.6. Endocrine disrupting properties**

Not listed.

**12.7. Other adverse effects**

Not available.

**SECTION 13. Disposal considerations****13.1. Waste treatment methods**

Special requirements not applicable. The collected waste can be used for its intended purpose. Large amounts of waste should be disposed in accordance with local requirements. Recommended waste code: 07 01 99 wastes not otherwise specified from the manufacture, formulation, supply and use (MFSU) of basic organic chemicals. Codes of properties determining the hazards - none. Empty packaging can be reused repeatedly or recycled.

The producer of the waste must dispose of the product according to its use, specific to the industry and the process, in cooperation with the local waste management company based on local waste disposal regulations and national regulations and laws.

Contaminated packaging should be disposed of according to local and national regulations and in consultation with the local waste management companies.

For Europe, the waste producer sets the waste code in accordance with the European Waste List (Decision 2000/532/EC).

**SECTION 14. Transport information**

The product is not classified as a dangerous substance/mixture and is not subject to the requirements of the European Convention on the International Carriage of Dangerous Goods by Road ADR / RID / ADNR / IMDG / ICAO / IATA.

**14.1. UN number or ID number**

Not applicable.

**14.2. UN proper shipping name**

Not applicable.

**14.3. Transport hazard class(es)**

Not applicable.

**14.4. Packing group**

Not applicable.

**14.5. Environmental hazards**

Not applicable.


**14.6. Special precautions for user**

Protect the packaging against mechanic damage.

Read safety instructions, SDS and emergency procedures before handling.

**14.7. Maritime transport in bulk according to IMO instruments** Not applicable.**SECTION 15. Regulatory information****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**

- Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No.793/93, Commission Regulation (EC) No. 1488/94, Council Directive 76/769/EEC and Commission Directives

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91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (Official Journal of the European Union No. L 396, 30-12-2006, error correction – No. L 136/3, 2007-5-29);

- Commission Regulation (EU) 2020/878 of 18 June 2020 amending Annex II to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (OJ L 203, 26.6.2020, p. 28-58).

- On 16 December 2008 the Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of chemical substances and mixtures was undersigned. The said Regulation amended and repealed the directives 67/548/EEC and 1999/45/EC and Regulation (EC) No. 1907/2006 (the REACH Regulation). The Regulation has been published in the Official Journal of the European Union No. L353, volume 51 on 31 December, 2008;

- COMMISSION REGULATION (EU) 2016/918 of 19 May 2016 amending for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (OJ L 156, 14.6.2016, p. 1–102);

- Regulation (EC) No. 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents;

- Commission Regulation (EC) No. 907/2006 amending Regulation (EC) No. 648/2004 of the European Parliament and of the Council on detergents, in order to adapt Annexes III and VII thereto.

- The European Agreement concerning International Carriage of Dangerous Goods by Road (ADR).

## 15.2. Chemical safety assessment

For this product a chemical safety assessment has not been carried out.

## SECTION 16. Other information

### Indication of changes

The information provided is in accordance with the requirements of REACH Regulation No. 1907/2006EC and Regulation (EU) No. 2020/878 as amended.

### Acronyms:

ADR – European Agreement concerning the International Carriage of Dangerous Goods by Road.

ADN – European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.

RID – Regulations concerning the International Carriage of Dangerous Goods by Rail.

IMDG – International Maritime Dangerous Goods.

IATA – International Air Transport Association.

IMO – International Maritime Organization.

vPvB – Very Persistent and Very Bioaccumulative.

PBT – Persistent, Bioaccumulative and Toxic substance.

LC50 – Lethal Concentration to 50 % of a test population.

LD50 – Lethal Dose to 50% of a test population (Median Lethal Dose).

CAS – Chemical Abstracts Service number.

CEN – European Committee for Standardisation.

STOT – Specific Target Organ Toxicity.

PNEC(s) – Predicted No Effect Concentration(s).

DNEL – Derived no-effect level.

SDS – Safety Data Sheet.

### KEY LITERATURE REFERENCES AND SOURCES FOR DATA:

Safety Data Sheets issued by manufacturer's or supplier's of the same products and other technical information.

European Chemicals Agency (ECHA) - <http://echa.europa.eu/>.

*This information is furnished without warranty of any kind, expressed or implied. It is intended solely to assist in evaluating the suitability and proper use of the product and in implementing safety precautions and procedures.*

*Information contained herein may be combined with other information obtained by the User to determine the applicability of federal, state, and local laws and regulations.*

*Users of the product should consider this information as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials.*

**End of Safety Data Sheet**

# SMI, Inc.

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Attn: Kipras Pakeltis  
Esspo, Ltd  
Troškūnų 1  
LT29100 Anyksciai  
Lithuania

Date: 12-Apr-2023

SMI/REF: 2301-953

Product: **NORDWAY NF (2022121601SV)** (received 17-Jan-2023)

Dilution: Per specification

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**AMS 1431E**  
**SOLID RUNWAY DEICING/ANTI-ICING PRODUCT**  
**Periodic Tests**


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4.2.2 Periodic Tests

3.2.5	Effect on Transparent Plastics	<u>Conforms</u>
3.2.6	Effect on Painted Surfaces	<u>Conforms</u>
3.2.7	Effect on Unpainted Surfaces	<u>Conforms</u>
3.2.8	Effect on Runway Pavements	
3.2.8.1	Runway Concrete Surface Scaling Resistance	<u>Conforms</u>
3.2.8.2	Asphalt Concrete Degradation Resistance	<u><sup>1</sup>Not performed by SMI</u>
3.2.9	Effect on Aircraft Metals:	
3.2.9.1	Sandwich Corrosion	<u>Conforms</u>
3.2.9.2	Total Immersion Corrosion	<u>Conforms</u>
3.2.9.3	Low Embrittling Cadmium Plate	<u>Conforms</u>
3.2.9.3.1	Cyclic Immersion Corrosion of Cadmium Plate	<u>Informational</u>
3.2.9.4	Hydrogen Embrittlement	<u>Conforms</u>
3.2.9.5	Stress Corrosion Resistance	
	AMS 4911	<u>Conforms</u>
	AMS 4916	<u>Informational</u>

<sup>1</sup>Testing required for deicer /anti-icer products used in Europe. This test is not performed by SMI.

Respectfully submitted,

  
Jeff Nottebaum, SMI Inc.  
Director

  
Rae-anne Nottebaum, SMI Inc.  
Chemist

Client: Esspo, Ltd  
Product: **NORDWAY NF (2022121601SV)**  
Dilution: Per specification  
AMS 1431E Periodic Tests

Date: 12-Apr-2023  
SMI/REF: 2301-953

4.2.2 Periodic Tests: Effect on transparent plastics (3.2.5), effect on painted surface (3.2.6), effect on unpainted surfaces (3.2.7), runway concrete scaling resistance (3.2.8.1), asphalt concrete degradation resistance (3.2.8.2, Appendix A, valid for runway deicing/anti-icing products used in Europe) and effect on aircraft metals (3.2.9) are periodic tests and shall be performed on or just prior to the second anniversary of initial testing and thereafter every four calendar years.

3.2.5 Effect on Transparent Plastics:

3.2.5.1 The product, diluted with ASTM D1193, Type IV, water to 15% by weight of solids taking into account water contained in the product, shall not craze, stain or discolor Type C stretched acrylic plastic conforming to MIL-P-25690, determined in accordance with ASTM F484

Result                      Conforms                     

3.2.5.1 The product, diluted with ASTM D1193, Type IV, water to 15% by weight of solids taking into account water contained in the product, shall not craze, stain, or discolor AMS-P-83310 polycarbonate plastic, determined in accordance with ASTM F484, except that the specimens shall be stressed for 30 minutes  $\pm$  2 minutes to an outer fiber stress of 2000 psi (13.8 MPa).

Result                      Conforms                     

3.2.6 Effect on Painted Surfaces: Product, diluted with ASTM D1193, Type IV, water to 15% by weight of solids taking into account water contained in the product, shall neither decrease the paint film hardness by more than two pencil hardness levels nor shall it produce any streaking, discoloration, or blistering of the paint film, determined in accordance with ASTM F502.

Result                      Conforms                     

3.2.7 Effect on Unpainted Surfaces: Product, diluted with ASTM D1193, Type IV, water to 15% by weight of solids taking into account water contained in the product, shall neither produce streaking nor leave any stains which require polishing to remove, determined in accordance with ASTM F485.

Result                      Conforms

Client: Esspo, Ltd  
 Product: **NORDWAY NF (2022121601SV)**  
 Dilution: Per specification  
 AMS 1431E Periodic Tests

Date: 12-Apr-2023  
 SMI/REF: 2301-953

3.2.8 Effect on Runway Pavements

3.2.8.1 Runway Concrete Surface Scaling Resistance The condition of the runway concrete surface shall have a rating not greater than 1 for 50 freeze-thaw cycles, determined in accordance with ASTM C672, except that concrete shall

- a. Be air-entrained with an air content as specified in ASTM C 672.
- b. Have a minimum cement content of 510 lb/yd<sup>3</sup> ± 10 lb/yd<sup>3</sup> (302 kg/m<sup>3</sup> ± 6 kg/m<sup>3</sup>).
- c. Have a slump, 1.5 inches ± 0.5 inches (38 mm ± 13 mm).

A 25% by volume solution of the deicing/anti-icing product as supplied by the manufacturer in commercial concentration in tap water shall be substituted for calcium chloride. Performing more than one freeze-thaw cycle per day is acceptable.

**Rating: 1**

Result Conforms

3.2.8.2 Asphalt Concrete Degradation Resistance (Appendix A, valid for deicer/anti-icer products used in Europe)

Result <sup>1</sup>Not performed by SMI

<sup>1</sup>Testing required for deicer /anti-icer products used in Europe. This test is not performed by SMI.

3.2.9 Effect on Aircraft Metals: Product, diluted with ASTM D1193, Type IV, water to 5% and 15% by weight solids taking into account water contained in the product, shall meet the following requirements:

3.2.9.1 Sandwich Corrosion: Specimens, after testing in accordance with ASTM F1110, shall not have a rating greater (worse) than 1.

	2024-T3 Bare Anodized	2024-T3 Alclad	7075-T6 Bare Anodized	7075-T6 Alclad
<b>5 percent</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>15 percent</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Control	1	1	1	1

Result Conforms

Client: Esspo, Ltd  
 Product: **NORDWAY NF (2022121601SV)**  
 Dilution: Per specification  
 AMS 1431E Periodic Tests

Date: 12-Apr-2023  
 SMI/REF: 2301-953

3.2.9.2 Total Immersion Corrosion: The product, tested in accordance with ASTM F483, except that panels shall be AMS4376 tested for 24 hours, shall neither cause corrosion of test panels nor a weight change of any test panel greater than shown in Table I.

Table I

ALLOY	WEIGHT LOSS mg/cm <sup>2</sup> /24hrs		
	Allowed	5%	15 %
AMS 4037 Aluminum anodized per AMS 2470	0.3	< 0.01	< 0.01
AMS 4041 Aluminum	0.3	< 0.01	+ 0.01
AMS 4049 Aluminum	0.3	< 0.01	+ 0.01
AMS 4376 Magnesium, dichromate (AMS 2475)	0.2	< 0.01	0.19
AMS 4911 Titanium	0.1	0.01	< 0.01
AMS 5045 Carbon Steel	0.8	0.12	0.01

"+" indicates a weight gain

Result Conforms

3.2.9.3 Low-Embrittling Cadmium Plate: Test panels, coated with low-embrittling cadmium plate, shall not show a weight change greater than 0.3 mg/cm<sup>2</sup> 24 hours, determined in accordance with ASTM F1111.

5%: < 0.01 mg/cm<sup>2</sup>/24hrs

15%: 0.01 mg/cm<sup>2</sup>/24hrs

Result Conforms



Client: Esspo, Ltd  
 Product: **NORDWAY NF (2022121601SV)**  
 Dilution: Per specification  
 AMS 1431E Periodic Tests

Date: 12-Apr-2023  
 SMI/REF: 2301-953

3.2.9.3.1 The product shall be tested for cyclic immersion corrosion of cadmium plate in accordance with AIR6130 and the results reported as specified in Section 6 of AIR6130.

Cadmium Plate Cyclic Corrosion Test

Initial pH of solution: 11.8 Final pH of solution: 11.0

**Note: Solution tested = 15% w/w**

The weight loss shall be no more than 0.3 mg/cm<sup>2</sup>.

PANEL WEIGHTS	REPLICATE #	Weight (g)		
		Initial	Final	Weight change
	1	16.1339	16.1341	+ 0.0002
	2	16.9592	16.9594	+ 0.0002
	3	16.0444	16.0445	+ 0.0001
Average weight change = + 0.0002 g (+ 0.01 mg/cm <sup>2</sup> ) Note: "+" indicates weight gain				
<i>AIR6130A: A runway deicing fluid or solid compound tested in accordance with this document that exhibits a weight loss of more than 0.3 mg/cm<sup>2</sup> may cause undesirable corrosion effects to airplane equipment and/or airport equipment.</i>				
Result: <b><u>Informational</u></b>				
See separate report for complete data tables				

3.2.9.4 **Hydrogen Embrittlement:** The diluted product shall be non-embrittling, determined in accordance with ASTM F 519, Type 1a, 1c, or 2a specimens, cadmium plated in accordance with MIL-STD-870, Class 1 Type I. Type 1a and Type 1c specimens shall be loaded to 45% of the predetermined notch fracture strength and the 2a specimens loaded to 80% of the yield strength. The entire 2a stressed specimen or just the notched area of the 1a and 1c stressed specimen shall be immersed continuously in the solution under test for 150 hours at a temperature of 77°F ± 9°F (25°C ± 5°C)

Specimens: Four Type 1c, cadmium plated per MIL-STD-870 Class 1 Type I.  
 Load: 45%, immersed for duration, 150 hours, temperature 25°C ± 5°C.

**Type 1c @ 5%: No failures occurred within 150 hours.**  
**Type 1c @ 15%: No failures occurred within 150 hours.**

Result                      Conforms

Client: Esspo, Ltd  
Product: **NORDWAY NF (2022121601SV)**  
Dilution: Per specification  
AMS 1431E Periodic Tests

Date: 12-Apr-2023  
SMI/REF: 2301-953

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3.2.9.5 Stress-Corrosion Resistance: The diluted product shall not cause cracks in AMS 4911 titanium alloy specimens, determined in accordance with ASTM F945, Method A.

**AMS 4911: 5%: *No cracking evident.***  
**15%: *No cracking evident.***

Result Conforms

3.2.9.5.1 Stress Corrosion Resistance: The diluted product shall be tested in accordance with ASTM F945, Method A using AMS 4916 specimens. The results obtained from AMS 4916 shall be reported for informational purposes only.

**AMS 4916: 5 %: *Cracking evident.***  
**15%: *Cracking evident.***

Result Informational

# SMI, Inc.

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Lithuania

Date: 12-Apr-2023

SMI/REF: 2301-953

Product: **NORDWAY NF (2022121601SV)** (received 17-Jan-2023)

Dilution: 15% w/w

Page 1 of 5

Testing in accordance with  
**SAE AIR6130A**  
**CADMIUM PLATE CYCLIC CORROSION TEST (2017-05)**

### Cadmium Plate Cyclic Corrosion Test

Initial pH of solution: 11.8 Final pH of solution: 11.0

Replicate	Initial (g)	Final (g)	Weight change (grams)
1	16.1339	16.1341	+ 0.0002
2	16.9592	16.9594	+ 0.0002
3	16.0444	16.0445	+ 0.0001
<b>Average weight change = + 0.0002 g (+ 0.01 mg/cm<sup>2</sup>)</b> Note: "+" indicates weight gain			

*AIR6130A states: A runway deicing fluid or solid compound tested in accordance with this document that exhibits a weight loss of more than 0.3 mg/cm<sup>2</sup> may cause undesirable corrosion effects to airplane equipment and/or airport equipment.*

Result Informational

**Cadmium Plate Cyclic Corrosion Test**

**AMS 1431 Compound, Solid Runway and Taxiway Deicing/Anti-Icing**

**AMS 1435 Fluid, Generic, Deicing/Anti-Icing Runways and Taxiways**

**3 Test Specimen Preparation**

Substrate: 4130 Steel

Size: 1" x 2" x 0.04" x 0.048" (25.40 mm x 50.80 mm x 1.22 mm)

Finish: Cadmium plating in accordance with AMS QQ-P-416., Type I Class I, (0.0005"- 0.0008" inch plating per side).

There shall be no supplementary chromate treatment.

- a. Three cadmium plated test specimens shall be used for each fluid to be tested
- b. Sample of AMS1435 Runway Deicing Fluid shall be tested as received from the supplier.
- c. Sample of AMS1431 Runway Deicing Solid Compound shall be tested in a diluted form – diluted with ASTM D 1193, Type IV, water to 15% by weight solids.
- d. Procure soft flexible brushes for test (paintbrush type, 1.5 inches (3.8 cm) wide, with synthetic bristles approx 1.5 inches (3.8 cm) long

**4 Environmental Exposure Preparation**

Preset humidity chamber to 90 ± 5°F and 30 ± 5% humidity. Affix plastic ties or other inert material as hangers (hangers shall be made from an inert material that will not react with the sample; plastic, plastic coated metals, monofilament fishing line or stainless steels are acceptable) in the chamber to hold specimens during the environmental exposure period.

**5 Test Procedure**

- a. Measure and record pH of solution(s) to be tested (record to one decimal place).
- b. Solvent clean cadmium plated specimens with acetone; wipe gently with an acetone-soaked wiper. Without allowing the acetone to evaporate, gently remove excess acetone with a dry wiper. Allow samples to dry for 10 minutes in a desiccator. Do not accelerate drying of samples with oven drying.

**Note:** Care should be taken not to touch the cleaned specimens with bare hands; use tweezers, clean gloves or equivalent tool.

- c. Weigh and record initial specimen weight in grams. Record all weights throughout the test to the nearest 0.0001 gram. Return specimens to desiccator until Day 3.

Monday	Tuesday	Wednesday	Thursday	Friday
				Friday Start – Day 0
Day 3	Day 4	Day 5	Day 6	Day 7
Day 10	Day 11	Day 12	Day 13	Day 14

Client: Esspo, Ltd  
Product: **NORDWAY NF (2022121601SV)**  
Dilution: 15% w/w

Date: 12-Apr-2023  
SMI/REF: 2301-953

SAE AIR6130A, Cadmium Plate Cyclic Corrosion Test Page 3 of 5

- d. FRIDAY START - Fill glass containers with solution to be tested, one container for each coupon. Refer to 3b or 3c for solution being used (consider filling one extra container to have extra conditioned fluid available). Container shall be large enough so the solution completely covers the specimens. Cover the container with loose fitting cover and place filled container into the humidity chamber to environmentally condition the solution for a minimum of  $24 \pm 1$  hours before the start of test, up to  $72 \pm 1$  hours.
- e. Day 3 – Remove the solution container from the humidity chamber and the specimens from the desiccator. Place specimens in container oriented such that the specimens are not resting flush against the bottom or side of the container. Place the container with cover back into the humidity chamber for  $24 \pm 1$  hours.
- f. Day 4 - After the 24 hour immersion in the solution, remove the specimens, but do not rinse them. Place them into the humidity chamber by hanging for  $22.5 \pm 0.5$  hours. Hangers shall be made from an inert material that will not react with the sample (such as plastic, plastic coated metals and stainless steels are acceptable).
- g. Day 5 /Day 10 /Day 12 – Remove the specimens from the humidity chamber. Rinse the specimens with deionized water. Lightly brush (12 strokes per side) the specimen surface with the soft flexible brush while rinsing to remove loose corrosion products. Immerse samples into acetone for 10 seconds while agitating specimen. Allow samples to dry for 10 minutes in a desiccator. Weigh and record the specimen weights. Do not accelerate drying of samples with oven drying.

**Note:** If multiple solutions are being tested, use different brushes for each solution to avoid cross contamination.

Immediately after weighing the specimens, return them to their test solution container to soak for  $90 \pm 5$  minutes in the humidity chamber. Specimens shall be oriented such that they not resting flush against the bottom or side of the container. After 90 minutes, remove the specimens but do not rinse them. Place them in the humidity chamber by hanging for  $22.5 \pm 0.5$  hours, maintaining the specimen in the initial orientation throughout the cycle.

- h. Day 6 /Day 11 /Day 13 - Return the specimen to the test solution container to soak for  $90 \pm 5$  minutes in the humidity chamber. Specimens shall be oriented such that it is not resting flush against the bottom or side of the container. After 90 minutes, remove the specimen but do not rinse it. Replace it in the humidity chamber by hanging for  $22.5 \pm 0.5$  hours, maintaining the specimen in the initial orientation throughout the cycle.
- i. Day 7 – Remove specimens from the humidity chamber. Rinse the specimens with deionized water. Lightly brush (12 strokes per side) the specimens surface with a soft flexible brush while rinsing to remove loose corrosion products. Immerse samples into acetone for 10 seconds while agitating specimen. Allow samples to dry for 10 minutes in a desiccator. Weigh and record the specimen weights. Do not accelerate drying of samples with oven drying.

**Note:** If multiple solutions are being tested, use different brushes for each solution to avoid cross contamination.

Immediately after weighing the specimens, return them to their test solution container in the humidity chamber. Specimens shall be oriented such that they are not resting flush against the bottom or side of the container. Specimens shall be left in the test solution container in the humidity chamber from DAY 7 to DAY 10.

Client: Esspo, Ltd  
 Product: **NORDWAY NF (2022121601SV)**  
 Dilution: 15% w/w

Date: 12-Apr-2023  
 SMI/REF: 2301-953

- j. **Day 14** – Remove specimens from the humidity chamber. Rinse the specimens with deionized water. Lightly brush (12 strokes per side) the specimen surface with a soft flexible brush while rinsing to remove loose corrosion products. Immerse samples into acetone for 10 seconds while agitating specimen. Allow samples to dry for 10 minutes in a desiccator. Weigh and record the specimen weights. Do not accelerate drying of samples with oven drying.

**Note:** If multiple solutions are being tested, use different brushes for each solution to avoid cross contamination.

- k. Measure and record final pH of solution (record to one decimal place).
- l. Report the initial weight of the specimen, the weight after each periodic weighing, and the final weight. Calculate and report the value of the cumulative weight lost from each specimen after each periodic weighing procedure.

Test Data:

pH at start of test: 11.8  
 pH at end of test: 11.0

INITIAL PANEL WEIGHTS	REPLICATE #	Weight (g)
	1	16.1339
	2	16.9592
	3	16.0444

WEEK #1 PANEL WEIGHTS	REPLICATE #	Weight (g)		
		Monday	Wednesday	Friday
	1	----	16.1340	16.1333
	2	----	16.9589	16.9584
	3	----	16.0441	16.0435

WEEK #2 PANEL WEIGHTS	REPLICATE #	Weight (g)		
		Monday	Wednesday	Friday
	1	16.1338	16.1339	16.1341
	2	16.9582	16.9592	16.9594
	3	16.0433	16.0442	16.0445

Client: Esspo, Ltd  
 Product: **NORDWAY NF (2022121601SV)**  
 Dilution: 15% w/w

Date: 12-Apr-2023  
 SMI/REF: 2301-953

SAE AIR6130A, Cadmium Plate Cyclic Corrosion Test Page 5 of 5

TEST DATA (continued)

REPLICATE #1	INITIAL WEIGHT (grams)	WEEK 1 WED (grams)	WEEK 1 FRI (grams)	WEEK 2 MON (grams)	WEEK 2 WED (grams)	WEEK 2 FRI (grams)
	16.1339	16.1340	16.1333	16.1338	16.1339	16.1341
CUMULATIVE WEIGHT CHANGE ("+" indicates weight gain)	--	+ 0.0001	0.0006	0.0001	0	<b>+ 0.0002 (FINAL)</b>

REPLICATE #2	INITIAL WEIGHT	WEEK 1 WED	WEEK 1 FRI	WEEK 2 MON	WEEK 2 WED	WEEK 2 FRI (FINAL WEIGHT)
	16.9592	16.9589	16.9584	16.9582	16.9592	16.9594
CUMULATIVE WEIGHT CHANGE ("+" indicates weight gain)	--	0.0003	0.0008	0.0010	0	<b>+ 0.0002 (FINAL)</b>


REPLICATE #3	INITIAL WEIGHT	WEEK 1 WED	WEEK 1 FRI	WEEK 2 MON	WEEK 2 WED	WEEK 2 FRI (FINAL WEIGHT)
	16.0444	16.0441	16.0435	16.0433	16.0442	16.0445
CUMULATIVE WEIGHT CHANGE ("+" indicates weight gain)	--	0.0003	0.0009	0.0010	0.0002	<b>+ 0.0001 (FINAL)</b>

SUMMARY:

WEIGHT CHANGE	REPLICATE #	Weight Change (g)	Average Weight Change	Informational
	1	<b>+ 0.0002</b>	<b>+ 0.01 mg/cm<sup>2</sup> (+ 0.0002 g)</b>	
	2	<b>+ 0.0002</b>		
	3	<b>+ 0.0001</b>		

*AIR6130A: A runway deicing fluid or solid compound tested in accordance with this document that exhibits a weight loss of more than 0.3 mg/cm<sup>2</sup> may cause undesirable corrosion effects to airplane equipment and/or airport equipment.*

Respectfully submitted,

  
 Jeff Nottebaum, SMI Inc.  
 Director

  
 Rae-anne Nottebaum, SMI Inc.  
 Chemist



# TEST REPORT

**VTI No.: 23-003B**

Client

ESSPO  
Kipras Pakeltis  
Troškūnų str. 1, Anykščiai  
LT-29100, Lithuania

Commission  
Test material  
Date of sample arrival  
Test period  
Marking of sample

Laboratory analysis  
De-icing agent  
2023-01-13  
2023-01-24 – 2023-04-06  
Nordway-NF  
Batch number: 2022121601 ŠV.

## Test material

*The test material consists of Nordway-NF solid runway de-icing agent.*

## Analysis

Asphalt Concrete Degradation Resistance has been tested according to LFV Method 2-98 as specified in Appendix A (and in EN 12697-41:2023) and § 3.2.8.2 of the SAE Aerospace Material Specification AMS1431E, revised 10/2018.

## Result

The reduction in adhesion value was 43% \* for asphalt concrete specimens stored in the concentrated (regular highest concentration) solution of the solid de-icing agent Nordway-NF compared to the dry reference specimens. Detailed information on the test results is given in Appendix 1 of this report.

The pH value of the concentrated solution was 11 # and the density at 20 °C was 1,320 g/cm<sup>3</sup>.

\*The adhesion value for specimens stored in the concentrated solution shall not be reduced by more than 50% compared to the dry reference specimens to meet the requirement of the specification AMS1431E.

#The reported pH value is for indicative purposes only, and its measurement uncertainty is undetermined.

Test report issued by

2023-04-06

X

Jiqinq Zhu  
Senior Researcher  
Signerat av: Jiqinq Zhu

Reviewed by

2023-04-06

X

Björn Kalman  
Research Director  
Signerat av: Björn Kalman

*"The results relate only to the tested items. This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. Uncertainty of measurements are calculated according to EA-4/16 and stated with the coverage factor k=2.*





# TEST REPORT

**VTI No.: 23-003B**

## Appendix 1

*Effect on asphalt concrete of the runway de-icing agent according to AMS1431E, Appendix A (LFV Method 2-98) for the solid de-icing product.*

The test has been performed on dense asphalt concrete (ABT16) with a 16 mm maximum size of the aggregate. The aggregate, a granite, came from the Skärlunda quarry, located outside Norrköping, Sweden. The asphalt concrete was made with paving grade bitumen 160/220 manufactured of crude oil from Venezuela. Binder content was 5,7 % by mass. The air voids content was 7%±1% by volume. The samples were stored in the concentrated (regular highest concentration) solution of the solid de-icing agent for 70 days at 40 °C and the tensile tests were performed at 23 °C.

### Runway de-icing product Nordway-NF

The unit for the surface tensile strength is MPa in the tables below.

Surface tensile strength, dry samples		Type of failure (adhesion between the epoxy resin and the asphalt concrete in %)		Mean value and standard deviation of surface tensile strengths (dry samples)	Density, dry samples. (g/cm <sup>3</sup> )		Mean value of density, dry samples (g/cm <sup>3</sup> )	Mean value of air voids, dry samples (%)
1,038	1,087	100	100		1,06 ± 0,22	2,246		
1,096	1,021	100	100	2,251		2,249		

Surface tensile strength, wet samples		Type of failure (adhesion between the epoxy resin and the asphalt concrete in %)		Mean value and standard deviation of surface tensile strengths (wet samples)	Density, wet samples. (g/cm <sup>3</sup> )		Mean value of density, wet samples (g/cm <sup>3</sup> )	Mean value of air voids, wet samples (%)
0,516	0,626	100	100		0,60 ± 0,22	2,249		
0,587	0,669	100	100	2,249		2,250		

The expanded uncertainty is the product of the reproducibility standard deviation  $\sigma_R$ , and the coverage factor  $k = 2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The reproducibility standard deviation determined in interlaboratory comparisons and are indirectly specified in the method  $2 \sigma_R = R / 2^{0,5}$ .

The reduction in surface tensile strength of the wet samples compared to the dry samples is: **43%.**

*"The results relate only to the tested items. This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. Uncertainty of measurements are calculated according to EA-4/16 and stated with the coverage factor  $k=2$ .*