

**Annual Report**  
**Aircraft De-Icing**  
**Winter Season 2021/2022 at Munich Airport**



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### 1. Capacities

For de-icing only EFM employees have been deployed.  
22 de-icing vehicles were available.

### 2. De-icing operations

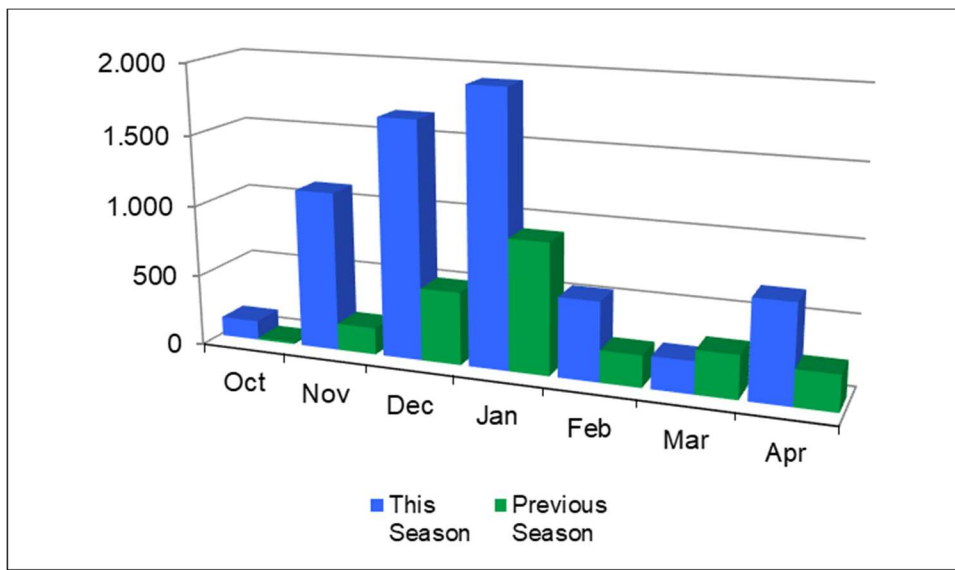
During the winter season 2021/2022 (October through April) EFM de-iced a total of 6,336 aircraft. (plan: 4,697 / previous year: 2,425). EFM's de-icing teams were in action on 166 out of 212 days of the entire winter season. The busiest day was 02. April 2022 with 303 de-icings.

Due to precipitation, anti-icing with ADF Type IV (>10,000 liters) had to be performed on 16 days (previous year: 4). 28 % of all de-icing treatments (previous year: 13 %) were performed as two-step procedures.

**Table 1: De-icing per month**

Month	This Season	Previous Season
Oct	137	14
Nov	1.123	191
Dec	1.673	513
Jan	1.926	923
Feb	558	225
Mar	227	305
Apr	692	254
<b>Total</b>	<b>6.336</b>	<b>2.425</b>

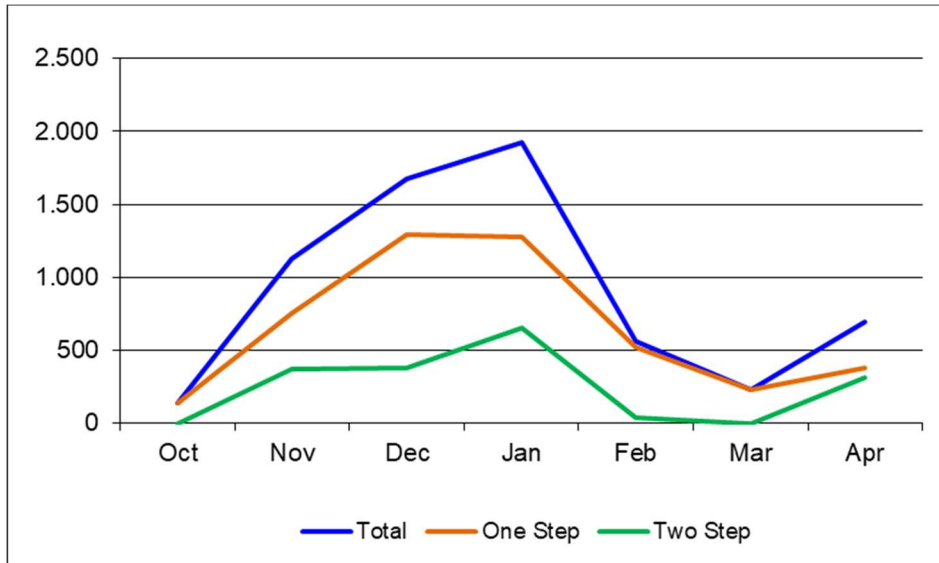
**Diagram 1: De-icing treatments per month**



6,288 out of the 6,336 total de-icing treatments (including repeated de-icing operations) were performed on the remote-areas close to the runway heads (99.2 %) compared to 48 on the apron (0.8 %).

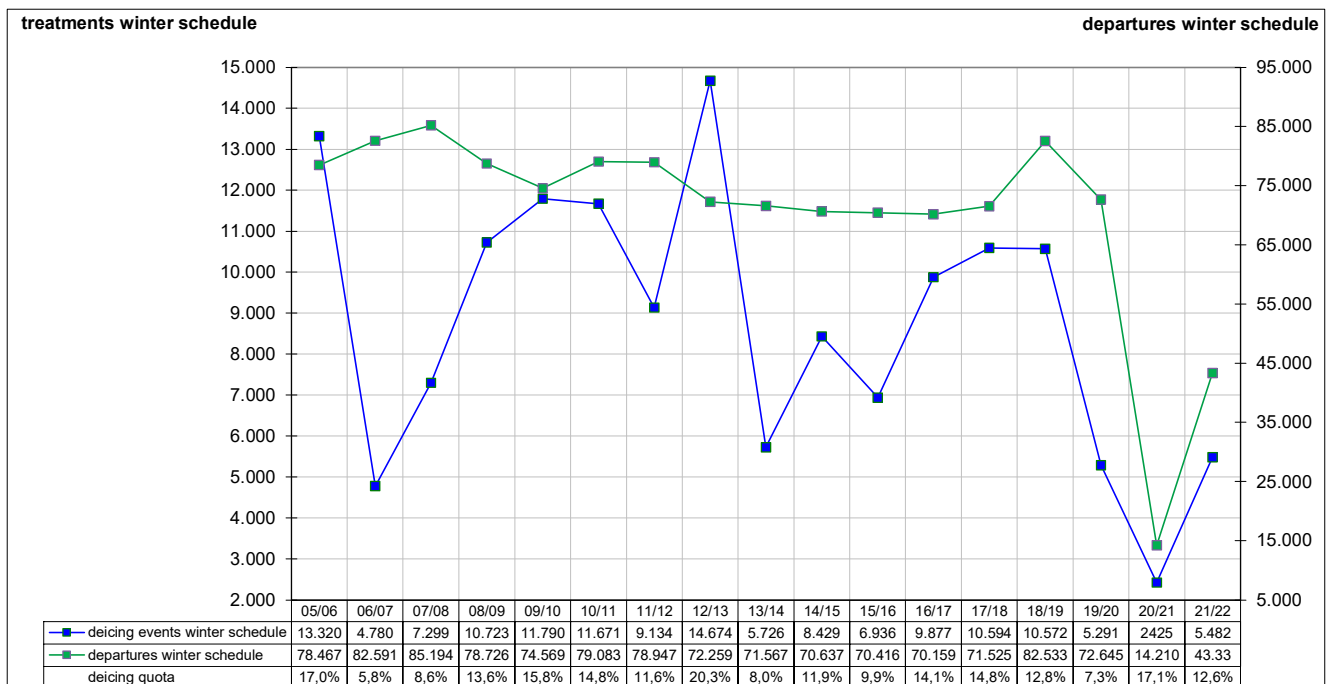
Based on the statistics from previous seasons, a de-icing rate of 12 % of all departures of our COLD partners during the winter schedule was expected. Concerning the customers without a COLD contract a probability of 7 % was predicted. The actual figures are 14 % for COLD partners and 5.5 % for Non-COLD customers. During the full de-icing season, a de-icing rate of 12.6 % of all commercial flights could be recorded (previous season: 17.1 %).

**Diagram 2: Development of de-icing treatments**



The diagram below shows de-icing numbers as of the last years during the winter schedule.

**Diagram 3: Number of departures and de-icing treatments**



### 3. Consumption of de-icing fluid

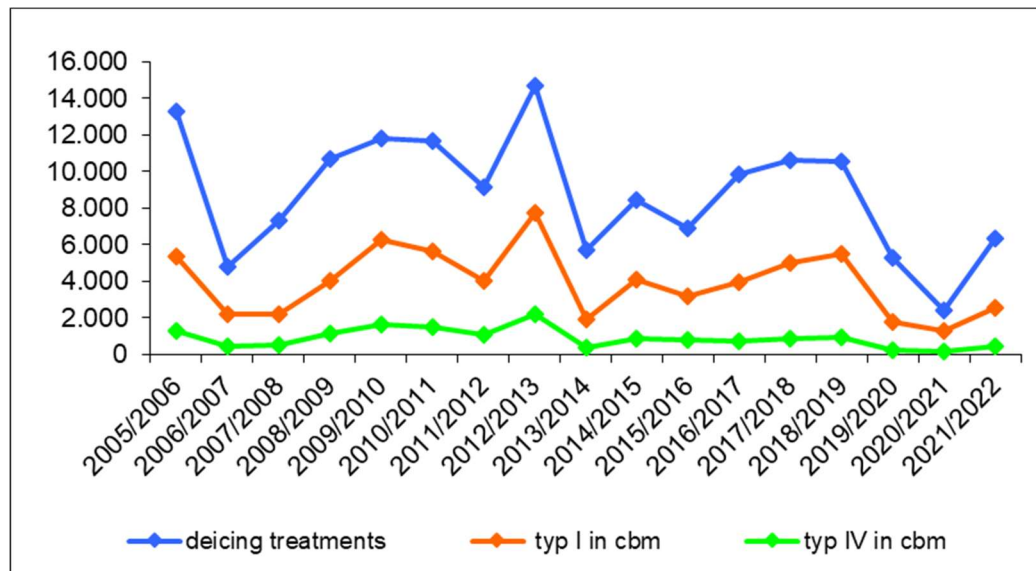
The total consumption of ADF Type I Mix during this season was 2,559 cubic meters (previous season: 1,281 cbm) while 455 cbm ADF Type IV (previous season: 187 cbm) were needed. 1,743 cbm from consumed 2,559 cbm of ADF Type I Mix were made from recycled material. This means that 68 % of the entire Type I consumption could be supplied by recycled fluids.

The average consumption of ADF Type I Mix per de-icing treatment was 404 liters (previous season: 528 liters) and of ADF Type IV for two-step procedure was 260 liters (previous season: 238). Relating to the total fluid consumption the portion of ADF Type IV increased minimally to 15.1 % compare to 12.7 % in the previous season.

**Table 1: De-icing treatments und average consumption per aircraft category**

Aircraft cat.	Treatments total		Treatments 2-Step		ADF Typ I (liters/treatments total)		ADF Typ IV (liters/2-step treatments)	
	2020/2021	2021/2022	2020/2021	2021/2022	2020/2021	2021/2022	2020/2021	2021/2022
0	51	43	22	7	331	252	137	119
1	844	1.118	270	341	345	266	142	155
2	1.297	4.629	398	1.250	489	373	232	242
3	68	126	31	43	1.225	748	402	447
4	165	420	63	111	1.548	1.021	648	718
<b>Total</b>	<b>2.425</b>	<b>6.336</b>	<b>784</b>	<b>1.752</b>	<b>528</b>	<b>404</b>	<b>238</b>	<b>260</b>

**Diagram 4: deicing events and fluid consumption of the last years**



#### 4. Forecast for next winter season

After several very difficult month of pandemic, the global aviation business looks in to the future with cautious optimism. The Numbers are still far apart from the level prior to pandemic, but the trend is positive. Should the air traffic continuously show a positive development also in winter season 2022/2023, EFM will examine the effects on operations and take appropriate measures to adjust the capacities.

#### 5. Explanations

ADF	Aircraft de-icing fluid
ADF Type I	Aircraft de-icing fluid Clariant Safewing MP I LFD (80 % glycol, 20 % water). EFM uses ADF Type I in a mixture of 55/45 (Type I/water) which means a proportion of 44 % glycol and 56 % water.
ADF Type IV	Aircraft de-icing fluid Clariant Safewing MP IV LAUNCH. EFM uses Type IV only pure and only as anti-icing fluid (to protect the aircraft against new icing).

Aircraft categories

A/C cat.	MTOW (= Max. take-off weight, metric tons)
0	General aviation aircraft
1	< 25
2	25 < 100
3	100 < 200
4	> 200

COLD partner	De-icing of customers who have a COLD contract with EFM. COLD customers pay a flat fee per season for de-icing and a small sum for each de-icing treatment.
Non-COLD customer	De-icing of customers who do not have a COLD contract with EFM. They do not pay a flat fee but higher prices for each de-icing treatment than COLD partners.
Remote areas	Special areas near the ends of the runways which are used only for de-icing and as entries to the runways. ADF, which is used on these areas, can be collected and recycled.
Two-step procedure	Two-step de-icing. The first step (the actual de-icing) removes ice, snow etc. from the aircraft. In the second step (anti-icing), the aircraft is re-sprayed, either with Type I de-icing fluid or with Type IV fluid to protect the relevant surfaces against fresh accumulations.

**Note:** Minor differences in the tables result from rounding differences.