# Annual Report

# Aircraft Deicing

# Winter Season 2022/2023 at Munich Airport

## Contents



01.06.2023

## 1. Capacities

For deicing only EFM employees have been deployed.
22 deicing vehicles were available.

## 2. Deicing operations

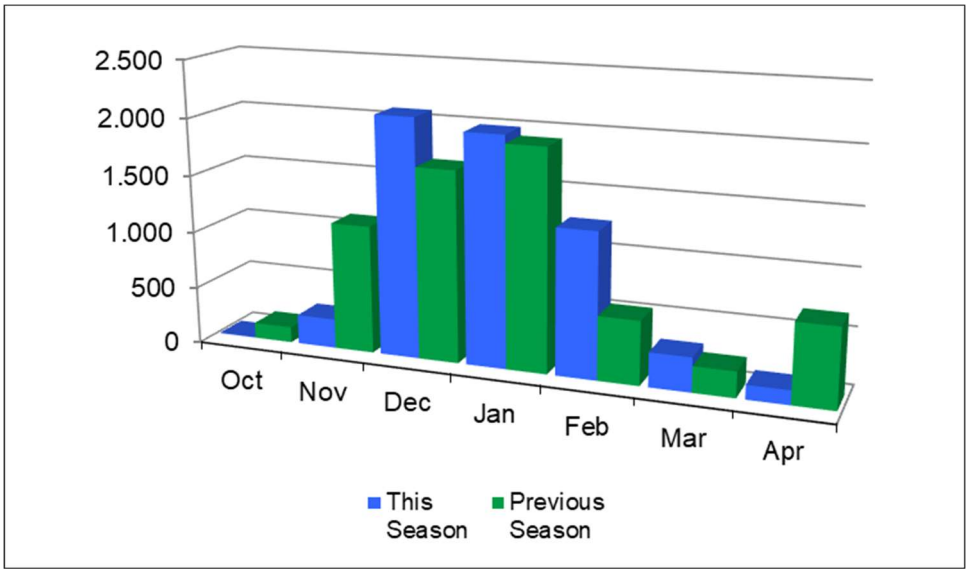
During the winter season 2022-2023 (October through April) EFM de-iced a total of 6,048 aircraft. (plan: 6,274 / previous year: 6,336). EFM's de-icing teams were in action on 147 out of 212 days of the entire winter season. The busiest day was 16th of December 2022 with 276 deicings.

Due to precipitation, anti-icing with ADF Type IV (>10,000 liters) had to be performed on 17 days (previous year: 16). 31 % of all de-icing treatments (previous year: 28 %) were performed as two-step procedure.

**Table 1: Deicing per month**

| Month | This Season | Previous Season |
|---|---|---|
| Oct | 5 | 137 |
| Nov | 258 | 1.123 |
| Dec | 2.092 | 1.673 |
| Jan | 1.999 | 1.926 |
| Feb | 1.269 | 558 |
| Mar | 300 | 227 |
| Apr | 125 | 692 |
| **Total** | **6.048** | **6.336** |

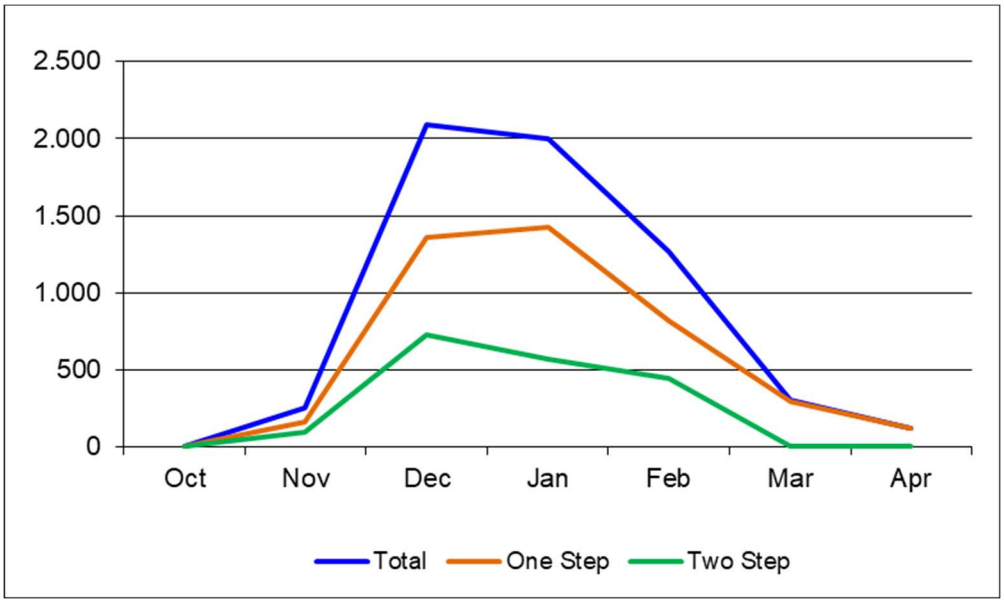
**Diagram 1: De-icing treatments per month**



5,997 out of the 6,048 total deicing treatments (including repeated deicing operations) were performed on the remote-areas close to the runway heads (99.2 %) compared to 51 on the apron (0.8 %).

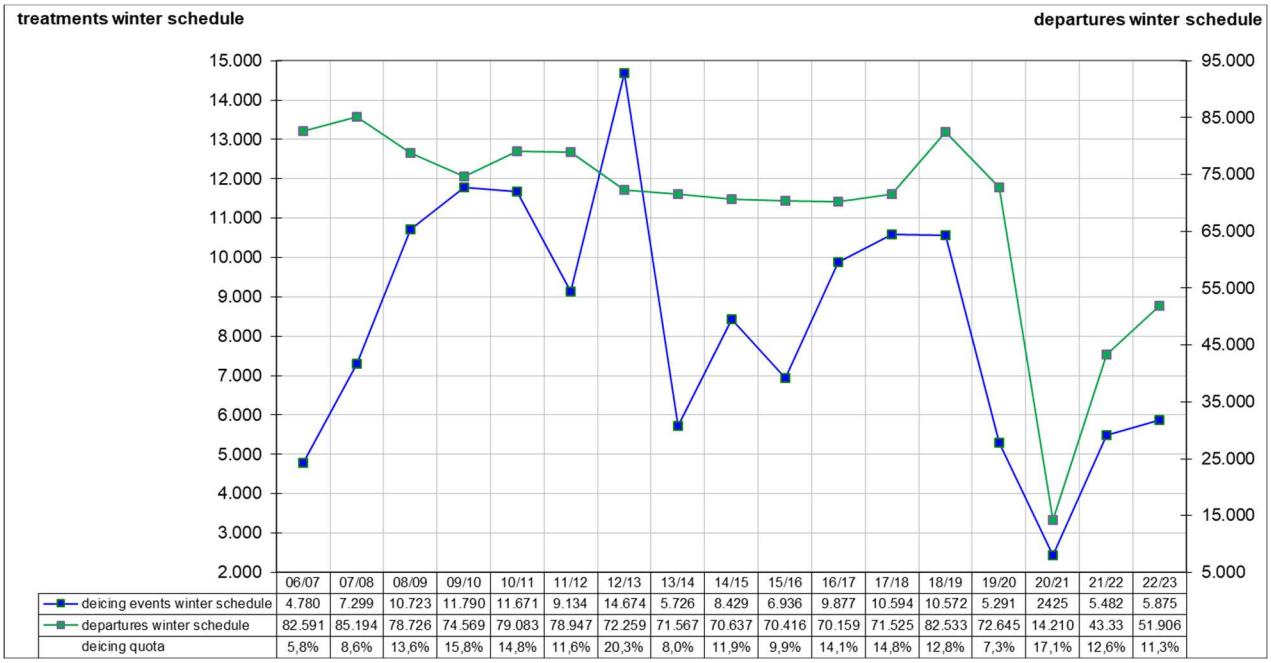
Based on the statistics from previous seasons, a deicing rate of 12 % of all departures of our COLD partners during the winter schedule was expected. Concerning the customers without a COLD contract a probability of 7 % was predicted. The actual figures are 11.9 % for COLD partners and 7.6 % for Non-COLD customers. During the full deicing season, a deicing rate of 11.3 % of all commercial flights could be recorded (previous season: 12.6 %).

**Diagram 2: Development of deicing treatments**




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

**Diagram 3: Number of departures and deicing treatments**




| | 06/07 | 07/08 | 08/09 | 09/10 | 10/11 | 11/12 | 12/13 | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| deicing events winter schedule | 4.780 | 7.299 | 10.723 | 11.790 | 11.671 | 9.134 | 14.674 | 5.726 | 8.429 | 6.936 | 9.877 | 10.594 | 10.572 | 5.291 | 2425 | 5.482 | 5.875 |
| departures winter schedule | 82.591 | 85.194 | 78.726 | 74.569 | 79.083 | 78.947 | 72.259 | 71.567 | 70.637 | 70.416 | 70.159 | 71.525 | 82.533 | 72.645 | 14.210 | 43.33 | 51.906 |
| deicing quota | 5,8% | 8,6% | 13,6% | 15,8% | 14,8% | 11,6% | 20,3% | 8,0% | 11,9% | 9,9% | 14,1% | 14,8% | 12,8% | 7,3% | 17,1% | 12,6% | 11,3% |

## 3. Consumption of deicing fluid

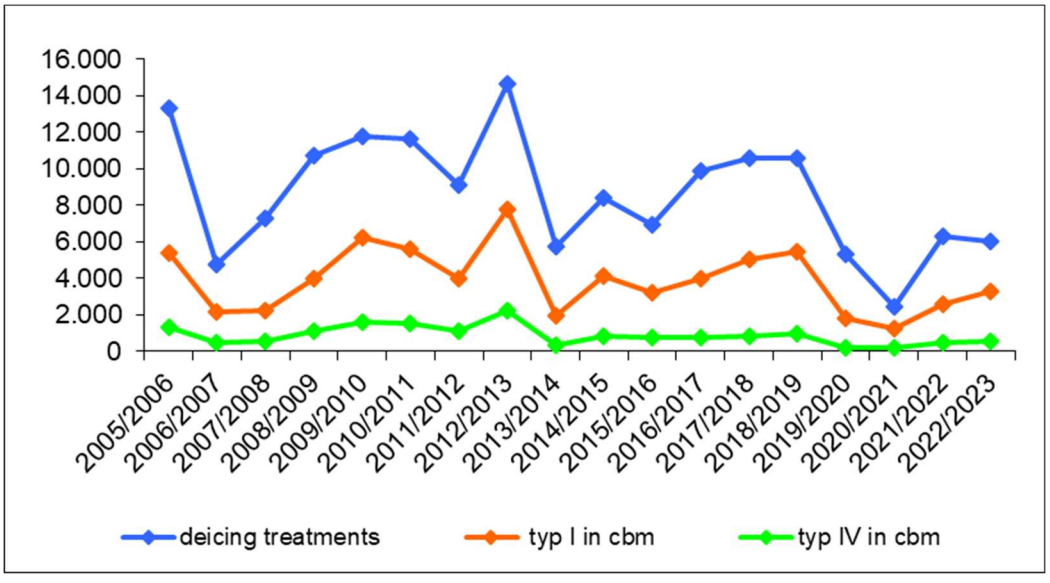
The total consumption of ADF Type I Mix during this season was 3,256 cubic meters (previous season: 2,559 cbm) while 536 cbm ADF Type IV (previous season: 455 cbm) were needed. 2,236 cbm from consumed 3,256 cbm of ADF Type I Mix were made from recycled material. This means that 69 % of the entire Type I consumption could be supplied by recycled fluids.

The average consumption of ADF Type I Mix per deicing treatment was 538 liters (previous season: 404 liters) and of ADF Type IV for two-step procedure was 289 liters (previous season: 260). Relating to the total fluid consumption the portion of ADF Type IV decreased minimally to 14.1 % compare to 15.1 % in the previous season.

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

| | Treatments total | | Treatments 2-Step | | ADF Typ I (liters/treatments total) | | ADF Typ IV (liters/2-step treatments) | |
|---|---|---|---|---|---|---|---|---|
| Aircraft cat. | 2021/2022 | 2022/2023 | 2021/2022 | 2022/2023 | 2021/2022 | 2022/2023 | 2021/2022 | 2022/2023 |
| 0 | 43 | 47 | 7 | 19 | 252 | 366 | 119 | 123 |
| 1 | 1.118 | 905 | 341 | 286 | 266 | 349 | 155 | 149 |
| 2 | 4.629 | 4.356 | 1.250 | 1.308 | 373 | 449 | 242 | 252 |
| 3 | 126 | 78 | 43 | 35 | 748 | 961 | 447 | 453 |
| 4 | 420 | 662 | 111 | 208 | 1.021 | 1.349 | 718 | 702 |
| **Total** | **6.336** | **6.048** | **1.752** | **1.856** | **404** | **538** | **260** | **289** |

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



## 4. Forecast for next winter season

The global aviation industry has emerged from the COVID-19 crisis. Nevertheless, there are still regional differences, so traffic in Germany and specifically in MUC is still below the 2019 values. We do not expect any sudden changes for the next season and therefore we are well positioned in terms of capacity. In order to be able to keep the stability of the deicing operation at a high level, the EFM is therefore investing in two new deicing vehicles next season. In addition, minor adjustments will be made to the infrastructure. Regarding deicing fluid we continue to rely on our supplier Clariant.

## 5. Explanations

| | |
|---|---|
| ADF | Aircraft deicing fluid |
| ADF Type I | Aircraft deicing 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 deicing 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 | Deicing 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 | Deicing 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.