Annual Report

Aircraft Deicing

Winter Season 2023/2024 at Munich Airport

Contents

05.06.2024

1. Capacities

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

2. Deicing operations

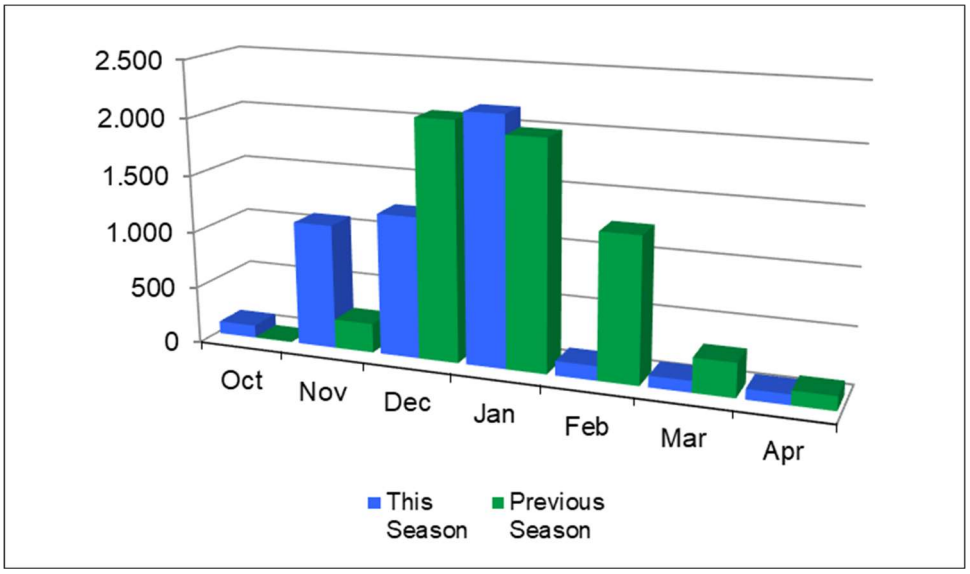
During the winter season 2023-2024 (October through April) EFM de-iced a total of 4,942 aircraft. (plan: 6,589 / previous year: 6,084). EFM's de-icing teams were in action on 131 out of 213 days of the entire winter season. The busiest day was 7th of January 2024 with 321 deicings.

Due to precipitation, anti-icing with ADF Type IV (>10,000 liters) had to be performed on 14 days (previous year: 17). 31 % of all de-icing treatments (previous year: 31 %) were performed as two-step procedure.

Table 1: Deicing per month

Month	This Season	Previous Season
Oct	111	5
Nov	1.099	258
Dec	1.245	2.092
Jan	2.168	1.999
Feb	127	1.269
Mar	101	300
Apr	91	125
Total	**4.942**	**6.048**

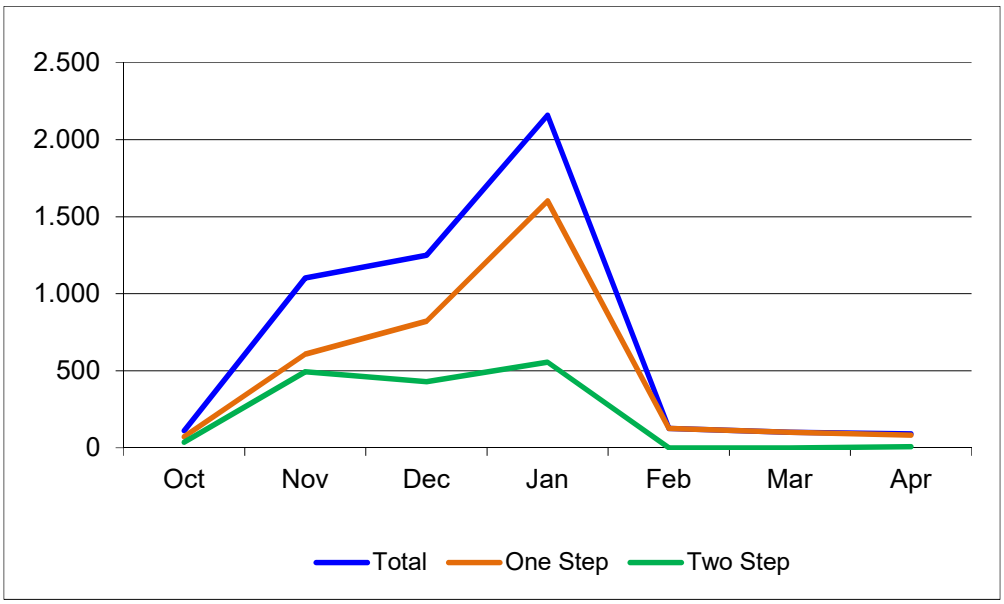
Diagram 1: De-icing treatments per month



4,853 out of the 4,942 total deicing treatments (including repeated deicing operations) were performed on the remote-areas close to the runway heads (98.2 %) compared to 89 on the apron (1.8 %).

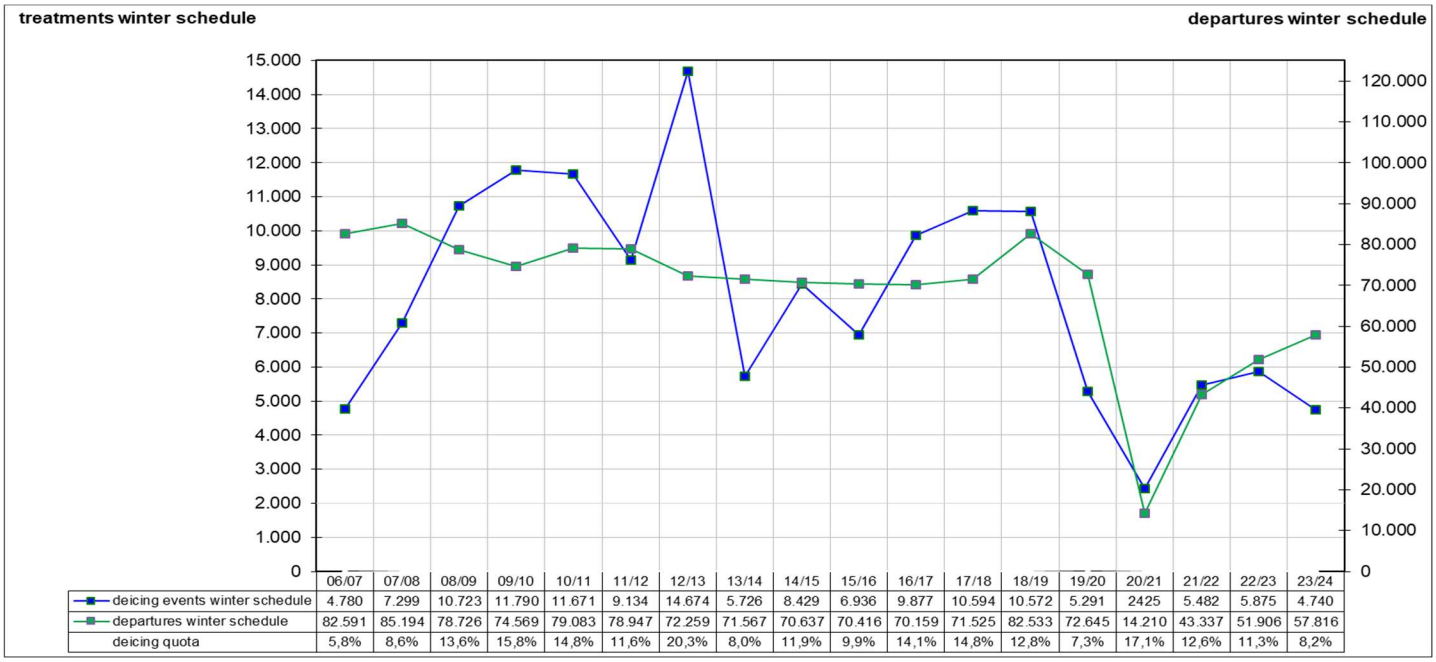
Based on the statistics from previous seasons, a deicing rate of 12 % of all departures of our COLD partners during the winter schedule was expected. Concerning the customers without a COLD contract a probability of 7 % was predicted. The actual figures are 8.9 % for COLD partners and 4.8 % for Non-COLD customers. During the full deicing season, a deicing rate of 8.2 % of all commercial flights could be recorded (previous season: 11.3 %).

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 treatment



	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	23/24
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	4.740
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	43.337	51.906	57.816
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%	8,2%

3. Consumption of deicing fluid

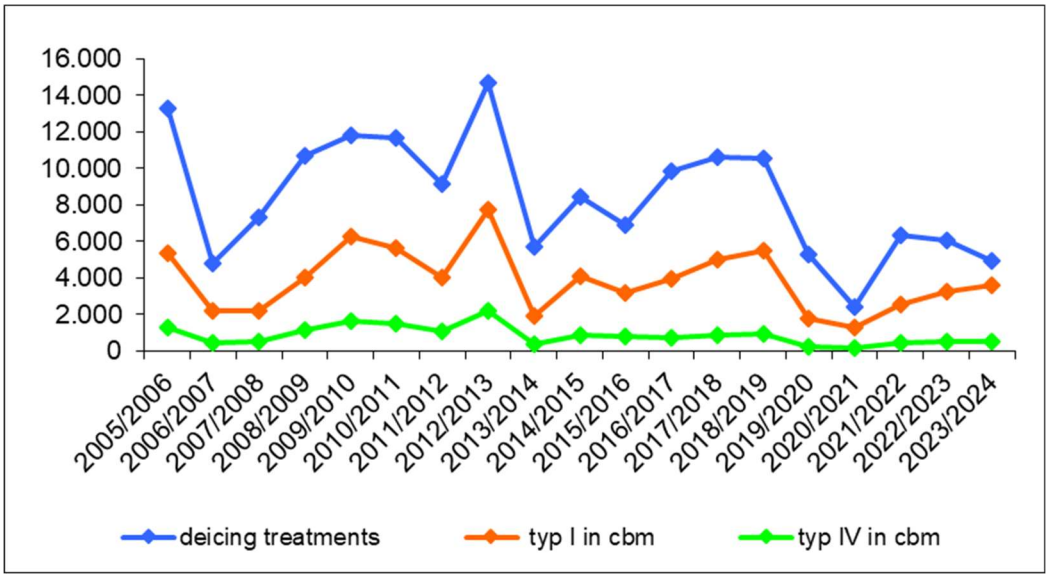
The total consumption of ADF Type I Mix during this season was 3,598 cubic meters (previous season: 3,256 cbm) while 509 cbm ADF Type IV (previous season: 536 cbm) were needed. 2,158 cbm from consumed 3,598 cbm of ADF Type I Mix were made from recycled material. This means that 60 % of the entire Type I consumption could be supplied by recycled fluids.

The average consumption of ADF Type I Mix per deicing treatment was 728 liters (previous season: 538 liters) and of ADF Type IV for two-step procedure was 334 liters (previous season: 289). Relating to the total fluid consumption the portion of ADF Type IV decreased minimally to 12.4 % compare to 14.1 % 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.	2022/2023	2023/2024	2022/2023	2023/2024	2022/2023	2023/2024	2022/2023	2023/2024
0	47	56	19	15	366	391	123	141
1	905	686	286	219	349	404	149	172
2	4.356	3.543	1.308	1.079	449	604	252	279
3	78	73	35	30	961	1.291	453	515
4	662	584	208	182	1.349	1.822	702	837
Total	**6.048**	**4.942**	**1.856**	**1.525**	**538**	**728**	**289**	**334**

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



4. Forecast for next winter season

The EFM does not see any fundamental changes in service provision for the next winter. Despite the strong fluctuations, no impact of climate change on the average deicing rate is yet visible. However, it is becoming apparent that the EFM's operations are more strongly influenced by extreme weather events than by continuous winter weather conditions. In order to remain operationally stable even in extreme weather conditions, the EFM is investing in two additional deicing vehicles, bringing the total number of vehicles available for the 2024/2025 season to 26. 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.