



QUALITY MANAGEMENT MANUAL





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1. CONTACT

Management

Tel. + 49 89 975-98600

Fax + 49 89 975-98690

EFM Operation Center (EOC) Dispatching Aircraft Towing

Tel. + 49 89 975-98677

Fax + 49 89 975-98693

Customer Services

Tel. + 49 89 975-98602

Fax + 49 89 975-98690

EFM Operation Center (EOC) Dispatching Aircraft Deicing

Tel. + 49 89 975-98666

Fax + 49 89 975-98693

Operations Duty Managers

Tel. + 49 89 975-98652 / 98653

Fax + 49 89 975-98690

Supervisors

Tel. + 49 89 975-98667

Fax + 49 89 975-98690

Management Counsel Quality, Environment and Safety

Tel. + 49 89 975-98603

Fax + 49 89 975-98690

Head of Operations

Tel. + 49 89 975-98650 / 98651

Fax + 49 89 975-98690

Technical Management

Tel. + 49 89 975-98630 / 98631

Fax + 49 89 975-98690

2. ABOUT US

EFM – Gesellschaft für Enteisen und Flugzeugschleppen am Flughafen München mbH (Aircraft Deicing and Towing Services Munich Airport) was formed in November 1992 as a joint subsidiary of Deutsche Lufthansa AG and Flughafen München GmbH (FMG). Our services include moving aircraft (pushback and towing), deicing and air conditioning of aircraft. In addition we act as consultants for other companies, provide training and offer technical support.

Our state-of-the-art fleet consists of 29 towing tractors in various sizes and 26 deicing vehicles for one man operation. More than 150 employees work around the clock 365 days a year to ensure a trouble-free service. We carry out up to 250,000 towing operations and up to 15,000 deicing operations each year (as of 2019). EFM represents a bundling of the shareholders' specific know-how. For both economic and operational reasons it made sense to combine towing and deicing of aircraft within a single company and to develop a concept to cover all aspects of towing and deicing. Through our focus on these areas, we are in a position to guarantee reliable, high quality operations at all times.

In 1996 we made a decision to launch a quality management system (QM system) covering EFM's complete range of services. In July 1997 this system was certified under the ISO 9001 standard. Right from the outset our company placed a strong emphasis on environmental protection. Consequently we have always selected solutions that meet the highest ecological standards. Our environmental management is an integral part of our quality management and was certified under the ISO 14001 standard in July 2003.

In 2017 we also introduced a safety management system (SMS) in accordance with ICAO Annex 19. EFM's high safety and quality standards are one of the foundations for the company's development into the leading aircraft towing and deicing service provider. We have earned ourselves a very good reputation in the industry and are always asked for advice by airports and even airlines on various projects.

EFM's present high level of safety is the result of the consistent application of the highest international safety standards and recommendations. We are aware that further successful development and securing of the market position can only be achieved by maintaining or increasing today's level of safety. The goal is the zero-error tolerance.

We not only invest in employee training, but also in the further development of vehicle technology. The constant exchange with process partners gives us the opportunity to quickly implement and improve changes.

We regard the SMS with all its components as a prerequisite for maintaining and further improving the company's high operational safety standard. Our SMS is the instrument with which we ensure the principles of our safety policy.

3. AIRCRAFT TOWING

We have pooled the many years of experience of our staff in the towing of aircraft in the form of a Towing Operations Manual as well as procedures and operating instructions, checklists, etc. Our compliance with this QM documentation, developed through our own efforts, ensures that our work consistently meets the highest quality standards. This documentation also includes the results of the risk analysis process carried out for every new vehicle type before initial operation. Our well trained staff undergoes regular quality management checks to ensure that we can offer our customers a high standard of service in the long term.



With our conventional and towbarless tractors we are able to move all aircraft currently approved for flight operations. By firmly clamping the front landing gear, the towbarless tractors can execute towing operations considerably faster than conventional towing tractors. In addition, towbarless tractors offer greater safety as the possibility of a broken towbar can be ruled out.

Towbarless tractors also increase flexibility as there is no need for a variety of different towbars – most of which do only fit one aircraft type. It is not necessary to swap the towbars located at different collection points after each operation. This significantly reduces the vehicle operating times, the lead times for an order and fuel consumption.

For the conventional towing tractors EFM has a wide range of its own towbars in addition to the towbars provided by our customers. Our own towbars are subject to regular inspection and maintenance as is all of the equipment used by EFM. Most of this inspection and maintenance work is carried out by authorized specialist workshops. The correct storage and handling of the towbars – as well as all other equipment and operational aids – is regulated by procedures and work instructions and is subject to constant monitoring. Procedures are in place to ensure that defective equipment and operational aids as well as defective products and services are not used in the work process. Moreover, as a result of an internal bonus system



we have put in place, the engines of our vehicles now do only run when absolutely necessary and are shut off during lengthy waiting periods between pushback or towing operations. In addition to the obvious environmental benefits this also improves our operational efficiency.

3.1. EFM Operation Center (EOC) – Aircraft Towing

In the EOC, trained dispatchers ensure that the right towing equipment with a suitably qualified driver is always in the right place at the right time. The dispatcher also pays attention to the most efficient and therefore economical use of the vehicles. If, contrary to expectations, there are deviations in quality in daily operation, the dispatcher is the first point of contact for our customers. He will take immediate action so that the agreed service can still be provided to the full satisfaction of the customer. All partial steps are documented in the dispatching department: from receipt of the order to the message that the order has been completed and the vehicle is available for the next order. To accomplish this task and to archive the numerous data, special IT systems are in place. EFM records the quality-relevant characteristics of the service provided and makes them retraceable. Thus an analysis of the service is possible at any time.

3.2. Pushback

Under contract with the customer, we pushback aircraft from their parking positions as a team with a walkout assistant of a ground handling service (Pushback). The requirements for consistently high quality are specified in our operating manual and are adjusted as necessary.

3.3. Single Man Pushback (SMPB)

The single man pushback operation (SMPB) was developed in collaboration with Deutsche Lufthansa AG and FMG to meet the requirements of the airlines for low-cost flight preparation with high standards of work safety. There is no need for an additional walkout assistant with the SMPB process. The tractor driver takes on the walkout assistant's responsibilities and therefore he is in charge of the "final walkaround" as well as the communication with both the cockpit and the ramp controller. This ensures a quick and economical pushback of the aircraft.

3.4. Repositioning Towing

Under contract with FMG we tow aircraft from one position on the apron to another as necessary.

3.5. Maintenance Towing

Under contract with the airlines or their maintenance departments we tow aircraft between handling aprons and hanger areas.



4. AIRCRAFT DEICING

Aircraft deicing – a task involving a high degree of responsibility and importance for aircraft safety – is carried out at Munich Airport exclusively by EFM. Compliance with the relevant regulations combined with the appropriate, recurrent training as well as careful operations ensure the safe and reliable execution of our task.

Our well-trained and conscientious employees have one of the world's most modern aircraft deicing fleets. It consists of 26 deicing vehicles which are designed for one-man operations. As with our towing tractors, authorized specialist workshops that have a certified QM system or are periodically audited by us perform most of the maintenance and repair work on our vehicles.

The Deicing Operations Manual (BHB) provides a process-driven description of the procedural steps. Where appropriate the BHB is supplemented by procedural instructions, information materials and other documents.

The BHB and the procedures described in it are based on the requirements of SAE Aerospace Standards (AS) of ICAO, IATA and SAE relevant for aircraft deicing, as well as the regulations of the aircraft manufacturers. Any requirements of individual airlines above and beyond these regulations can also be fulfilled on request.

Our deicing staff inspects the aircraft for ice, snow or frost contamination and, where permitted, meets customer requirements. The contaminated aircraft parts are then deiced as efficiently as possible. However, compliance with the above-mentioned regulations and the most exacting flight safety standards will always be the top priority and will never be compromised in the interest of environmental protection.



4.1. EFM Operation Center (EOC) – Aircraft Deicing

The deicing coordinator is responsible for the coordination of the deicing and the monitoring of ongoing operations. He is responsible for ensuring that sufficient vehicles and personnel for aircraft deicing are available at all times on the deicing areas and decides on which deicing fluid is to be used. In addition, the deicing coordinator receives the deicing orders, enters the data into an IT system developed by EFM, and is available to our customers, in particular the pilots, for further inquiries. In the event of irregularities, he intervenes in a proactive manner.



4.2. Remote- De-/Anti-Icing

So-called remote deicing is carried out directly before take-off with the engines running on specific areas at the runway heads (remote areas). The ATC ground controllers direct the aircraft to one of the deicing areas. The coordination of the deicing operation on the area will then be handled by the EFM team chief as the head of the respective deicing crew, trained according to aerospace standards.

After completion of deicing, a final check with documentation and the all-clear to the flight crew, the aircraft can take off within a very short time thanks to the proximity to the runway. This minimizes the possibility that the hold-over time for the deicing fluid will be exceeded necessitating a repeat deicing treatment. Remote deicing ensures safety, saves time, reduces costs, limits the quantity of deicing fluid used and protects the environment.

Since the remote areas are used only for deicing purposes, and thus have specially designed features, much more used deicing fluid can be collected there than in deicing operations on the apron. The fluid collected on the remote areas is generally clean enough to make recycling a profitable proposition (more: see recycling). The remote areas are open only during the deicing season (from October to April). In cooperation with FMG, we at EFM continually work to optimize those areas and the entire deicing infrastructure, taking into account both operational and environmental considerations.

4.3. Apron Deicing

Apron deicing is only carried out when deicing with running engines on the remote areas is not possible, for special deicing procedures (e.g. under-wing deicing) or outside the deicing season. In such cases the aircraft is de-iced at its parking position. EFM has optimized the methods and procedures of apron deicing and has documented it in the operating manual.

4.4. Fan-blade Deicing

Ice or snow build-up on fan-blades or propellers may cause engine vibrations which can damage the engines. We de-ice the particularly sensitive aircraft parts using hot air blowers on request.

5. AIR CONDITIONING

We can heat or cool the cabin of an aircraft while it is on the ground if necessary with our mobile air conditioners. For technical reasons and because of their greater energy efficiency, external air conditioning units are often preferable to using the on-board systems. In such cases, we can support the airline with one of our two air conditioning units or three heating units. Needless to say, when providing air conditioning we observe all instructions from the equipment manufacturers and our customers.

6. RECYCLING

In the late 1980s, environmental awareness and responsible stewardship of the environment and natural resources were embraced as an integral part of entrepreneurial thinking. Because this shift in consciousness coincided with the development of the new Munich Airport, it was possible to take these priorities into account in the planning and construction phase. In this context it was important to find an environmentally friendly solution for managing glycol-based fluids – still an essential aid in ensuring flight safety. As a result, Munich Airport was equipped with a sophisticated infrastructure for handling these fluids.

It includes a recycling plant used exclusively by EFM in which the used deicing fluid collected on the deicing pads is recycled as premixed deicing fluid (Type 1 Premix) and stored. As 100% of the used deicing fluids cannot be collected, fresh product is added to the process when needed. For this reason the plant is also used for storage and mixing of neat (undiluted) fluid with water. Both the recycled and the neat fluid are subject to constant quality control carried out in the recycling plant and by the deicing fluid manufacturer.

The recycling plant is operated for EFM by Clariant Deutschland GmbH. Clariant is a manufacturer of aircraft deicing fluids and also responsible for quality assurance. Clariant has a QM system in accordance with the ISO 9001 standard and is inspected at regular intervals by our own auditors. The recycling plant makes it possible to produce up to 70 percent of Type 1 deicing fluid needed at Munich Airport from the collected fluid.

7. TRAINING

Most of the service processes are subject to variable factors and require employees to make situation-based decisions which cannot be covered by procedural guidelines or operating instructions. The specialized skills of our employees guarantee that these decisions are made properly. They receive this qualification through appropriate regular theoretical and practical training.

Training includes initial training and additional on-the-job training as well as refresher courses in all relevant activities and other necessary and useful additional skills (English, PC skills, coaching for management personnel, principles of quality management etc.). As far as possible the training is carried out by our own employees with experience in the respective areas or with special skills. In all other cases we use external trainers. Here we work closely with FMG Airport Academy.

We evaluate the effectiveness of the training through continual monitoring of the quality of our services.

8. CONSULTING

EFM operates a close-loop system for the deicing of aircraft, extending from supplying deicing fluids to operating deicing facilities and equipment to the regeneration of used deicing fluid to produce ready-to-use recyclate. This system is unparalleled anywhere in the world. In implementing it, we take environmental concerns into account to the highest possible degree. Also highlighting the importance of these issues for EFM is our unconventional practice of not deicing aircraft on the apron, but rather with engines running on special pads immediately adjacent to the head of the runway. The deicing operations are part of a comprehensive system that encompasses air traffic control, airlines, airport, snow removal services and EFM.

All of the partners coordinate their activities in their everyday work, thus ensuring safe and mostly smooth flight operations even in inclement weather.

Due to its many years of experience with advanced working techniques in a highly efficient deicing operation, EFM is in a position to provide advice and hands-on support to interested parties from all over the world seeking to explore similar approaches. This includes training of employees from other companies. We also offer our training and consulting services in our second core area, aircraft towing.

9. QUALITY AND ENVIRONMENTAL POLICY

We intend to be a reliable and professional partner to our customers in daily operations at the airport and place great emphasis on enduring relationships with our business partners based on openness, trust and fair treatment. Only when our customers put EFM in the category of “best supplier” we do feel that we have fully achieved this aim.

We are particularly concerned with the safe and punctual processing of orders in line with individual customer requirements and careful handling of customer’s property. We guarantee compliance with the relevant customer regulations and quality standards, the applicable legal and other (safety) regulations and consideration of environmental aspects.

In order to meet the growing and changing requirements of our customers well into the future we are concerned to continue developing our services and extend our range of offers. This is why we stay in contact with our customers so that we are aware of their requests and requirements as well as any complaints they might have so that we can react immediately. In this respect our integrated management system is dynamically oriented and is continuously improved with the intensive involvement of our staff.

The careful selection of personnel and their qualification by thorough training is very important to us. We promote their loyalty to EFM and ensure that they remain conscious of the need for a high quality of service as well as a considerate application of the employed resources.

10. ORGANIZATION AND QM SYSTEM

The quality of the equipment and other products we use is crucial to the quality of our services. That is why we place the highest demands on our suppliers and make regular inspections to ensure compliance.

EFM has formulated measurable quality and environmental targets on the basis of these principles. Target values, measurement methods and measurement intervals have been established for every quality target. Our own systems and procedures are used for evaluation purposes. The measures necessary to fulfill customer requirements and achieve our quality targets are established and implemented within the framework of quality planning. Compliance is assessed, deviations are registered and relevant corrective measures are taken immediately. Naturally the responsible treatment of the environment is among our most important quality considerations. Consequently, we have identified the main areas where our activities have an environmental impact and established our own program to minimize these effects as far as possible.

We are convinced that with the principles outlined here we are actually living the slogan: “The highest quality target is customer satisfaction”. Our relationships with our clients and suppliers are governed by agreements or general terms and conditions which may be supplemented by service agreements. Before agreements are signed, EFM assesses them to ensure that they can be performed and provides the necessary financial and technical resources for high-quality service. This includes an appropriate budget for maintaining the quality management system.

The responsible handling of documents and data is essential to the execution of high-quality services. To achieve the highest possible degree of reliability and security, competencies and processes are clearly regulated in procedural guidelines and operating instructions. Data are protected against unauthorized changes by clearly defined access rights. To ensure continual monitoring and improvement of this system, the management has appointed a quality management representative who simultaneously functions as an environmental management representative with the necessary clearances to perform this important task.

The QM representative is actively supported by our QM staff allocated to the various shift groups. Every employee can contact the QM representative or the QM staff at any time with questions or suggestions regarding the management system and any other quality-related topics. Customer satisfaction is a top priority for us. Consequently, every member of staff is willing to listen to our customers’ suggestions, requests or complaints and pass them on to the responsible department: customer services (administrative) or operations management (operational).

All matters brought to our attention by customers are dealt with in these departments which initiate the necessary measures to address the customers' concerns. All these matters along with customer discussions and surveys are assessed in close cooperation with the QM representative to measure and evaluate the level of customer satisfaction.

11. EVALUATION OF THE QM SYSTEM

At least once a year the QM system is reviewed by the management to assess whether the system meets the demands of the established quality and environmental policy, fulfills the quality targets and is in compliance with ISO 9001 and 14001. Included in the performance evaluation are the results of the internal quality audits, the regular reports of the QM representative to the management on efficiency, performance and potential improvements of the system as well as the records of customer contacts. The results of the evaluations are documented in the review.



EFM

**Gesellschaft für Enteisen und Flugzeugschleppen am Flughafen München mbH
Aircraft Deicing and Towing Services Munich Airport**

P.O. Box 23 16 25

85325 Munich Airport · Germany

Tel. +49 (0)89 975-98601

<https://www.efm.aero>