



# The Austrian armed forces invests in state-of-the-art laboratory equipment

**Mobile measuring equipment from GRABNER Instruments is used for the rapid and reliable examination of fuels. These are then delivered for use once a high level of quality has been determined.**

Lead by Lieutenant colonel SPIELBÜCHLER, the fuel department of the Austrian Federal Office for Military Equipment (Amt für Wehrtechnik) has become an extremely modern and flexible part of the Austrian armed forces, which is also increasingly well regarded internationally. The introduction of modern analytical equipment, especially mobile instruments such as those from GRABNER INSTRUMENTS, now enables the Austrian army to determine important parameters rapidly on-site. Decisions are then taken on the basis of these results. Equipment from GRABNER INSTRUMENTS will also form a large part of the fuel laboratory which is being set up for international operation.

Around 400 people at the Federal Office for Military Equipment are responsible for technical matters concerning all types of instrument, weapon, ammunition and fuel for aircraft, boats and land vehicles. Man and measuring instrument are stretched to the limit here! Not only is the quality of fuel permanently monitored, substitute products are also tested and inspection specifications established for new products.

Whereas results from the mobile laboratories are generally used for the rapid quality control of fuels and are therefore directly responsible for the smooth running of machines, at the Federal Office for Military Equipment's chemical laboratory, one of the on-going projects is the optimisation of service intervals. This aims at considerably reducing costs and environmental pollution.

There are very few measuring instruments which can be used both on-site and in the laboratory. Firstly, the technical demands placed on an instrument in the field are different to those in the lab and secondly, mobile use requires an especially robust design.



GRABNER INSTRUMENTS GmbH is one of the few manufacturers which produce instruments which are suitable for both on-site and laboratory operation. The Austrian armed forces uses Grabner instruments to determine the flash point [i], flow properties of lubrication grease [ii] according to KESTERNICH and measure the vapour pressure [iii].

### Product identification using flash point measurement

The quality assurance routine includes a systematic acceptance inspection for all fuel deliveries. The criteria for aircraft fuel are especially strict. A sample is taken from each tank load and the flash point, density, viscosity and numerous other parameters are determined. The tanker is only sealed and given official permission to deliver to the air base if the measuring results confirm that the contents are flawless. As lieutenant colonel Spielbüchler explained, the Austrian army is justly proud „that no aircraft has ever been lost due to defective fuel“. Often samples are measured which have very high or very low flash points because the law requires flash point determination for the transport and storage of hazardous freight. For the optimal fulfilment of these demands, GRABNER INSTRUMENTS offers a range of models from the MINIFLASH series.

The instruments are equipped with powerful Peltier thermostats and cover a sufficient temperature range of -25° - +400°C.

### „Safety first“

Although the flash point of a substance is a very typical product characteristic, its determination has not always been popular. This was because conventional methods used **an open flame as part of the test**.

The MINIFLASH from Grabner Instruments was the first instrument to make flash point determination safe. Grabner Instruments was the first company to use the principle of the continuously closed cup in a commercial product. This means that there is no open flame at any time during the test. With the MINIFLASH, the fuel vapours are **ignited** in a closed sample cup.

The MINIFLASH also requires very little sample which is a decisive advantage. One millilitre is enough! Lieutenant colonel Spielbüchler explains that this means that unpleasant odours in the laboratory are kept to a minimum and very little waste is produced. This small amount of sample is also sufficient for the reconstruction of damage claims and for mixtures (diesel and petrol). Consistent use of these types of flash point instruments has led to a considerable reduction in personnel costs.

All these advantages have also convinced the US navy, for example, to equip the majority of its fleet with several hundred MINIFLASH flash point instruments.

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### Estimating drying times and explosion behaviour using vapour pressure

Whether for rust remover, special cleaner or fuel, the vapour pressure is, like the flash point, an important quality parameter for fuels which are dangerously explosive or for fuels with noxious vapours. In practice, the vapour pressure reveals when special cleaner has dried on brake shoes or clutch parts allowing them to be fitted, for example, or whether the fuel mix used for aircraft motors will still ignite at very high altitudes or very low temperatures.

The Austrian armed forces has been using Grabner vapour pressure measuring instruments for years. „We use models from the MINIVAP series“,

confirms lieutenant colonel Spielbüchler, „They are easy to operate and very robust, providing accurate and reliable vapour pressure values within just 5 minutes. The instruments are used for mobile routine measurements for quality control and also for special tasks in the laboratory“.

#### Flash point:

This is the lowest temperature at which the vapours of flammable liquids will ignite, adjusted to an atmospheric pressure of 101.3 kPa (760 mm Hg). Ignition is triggered by applying a flame. The flash point is a measurement of the flammability of a substance.

Short flash point table:

Kerosene	Diesel	Petrol	Motor Oil	Motor oil containing 5% diesel
40 - 60 °C	55 - 70 °C	-25 °C	~ 200 °C	~ 140 °C

#### Vapour pressure:

The vapour pressure is a physical variable which describes how quickly a liquid becomes a gas under certain temperature and air pressure conditions. The vapour pressure is the pressure acting on the walls of a vessel containing a vapour with its liquid component in equilibrium. The vapour pressure is dependent on temperature and increases as the temperature increases.

Liquids with a low boiling point and small heat of evaporation and which vaporise easily (e.g. ether) have a high vapour pressure. Liquids with a high boiling point which do not vaporise easily (e.g. oils) have a low vapour pressure.

Short vapour pressure table, specifications at 20 °C:

Ethyl ether	Ace-tone	Ben-zole	Etha-nol	Water	Dimethyl-formamide	Diglycol	Mercury
58.5 kPa	23.3 kPa	10 kPa	5.9 kPa	2.3 kPa	0.05 kPa	0.0013 kPa	0.0002 kPa