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## **Assuring the measurement precision of testing devices for the control of plant protection devices in different states of Germany**

### **Summary**

In Germany, as well as in other countries, the variation of different sprayer types is really high. There are field sprayers, orchard sprayers and numerous special sprayer devices for crops like asparagus, christmas trees, cherry standard trees and under-leaf and band sprayer devices for corn and sugar beets as well. In Bavaria for example, 5000 air-assisted sprayers are working in different ambient cultures (hop-growing, viticulture and fruit growing).

### **1. Introduction**

In Germany nearly all sprayer types have to be examined by “officially authorized inspection workshops” in a two-years rotation. Plenty of inspection devices are at different controlling-sites throughout country. The control comprises the test of pressure gauges, pump performance and flow-meters as well as the measurement of the cross distribution (CV) for field sprayers and for measurement of single nozzle output for atomizers and special sprayer devices.

### **2. Different organisation in the states of Germany**

The operators of the mentioned measuring equipments are obliged by federal state ordinance to have the measuring precision being tested by an expert before the first use (for new acquisitions) or after repairs and every second year as well. The way of testing the equipment is different in every single state. For instance in Bavaria the personnel of DEULA test engineering carries exclusively out the inspection of test units. DEULA is also capable of carrying-out re-adjustments of the test units on-site in the controlling enterprises.



Fig 1: Testing of BayWa test units by DEULA on site

In North-Rhine Westphalia (NRW) and Lower Saxony the chamber of agriculture is the control authority which is responsible for the perfect function of the test equipment. In NRW the control workshops has to bring their test facilities to a central place, the head office of the chamber of agriculture, for inspection and quality control. In the Lower Saxony a test team is carrying out the testing on-site in the controlling workshops.

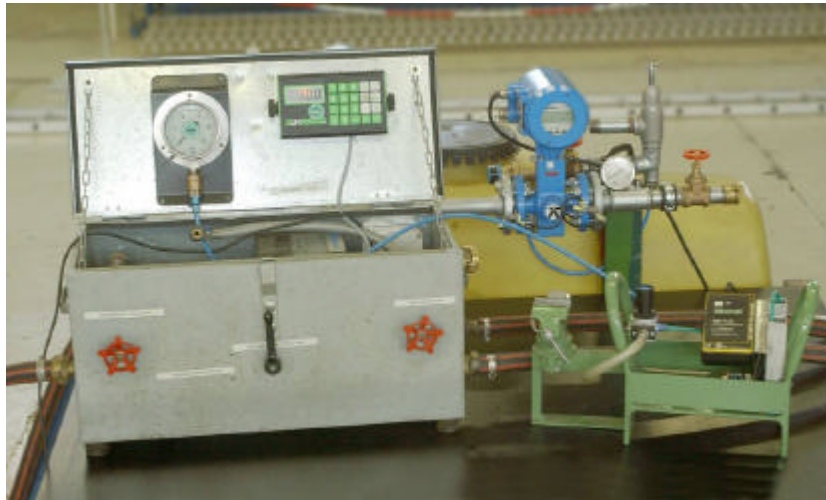


Fig 2: Stationary testing of workshop equipment at the head quarter of the chamber of agriculture in North Rhine Westphalia

If the measurement precision is suitable, the inspection technique receives a badge with the duration of inspection validity.



Fig 3: badge "Kalibriert" that shows the duration of inspection validity. In this case next inspection in April 2006

The inspection of the testing units comprises in detail the following parts:

- ? the pressure gauge with a hydraulic/electric testing-unit
- ? the flow-meter by means of a vane wheel impeller
- ? the cross distribution test stands for the strict keeping to the driving-distance covered
- ? the measured water quantity

- ? the single nozzle measuring devices for measurement precision of a water quantity exactly allocated with a laboratory measuring cylinder
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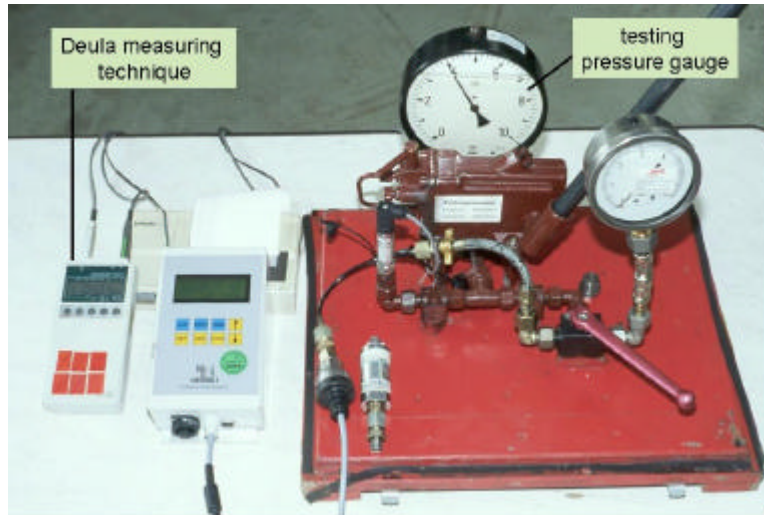


Fig 4: testing the pressure gauge with electronic device

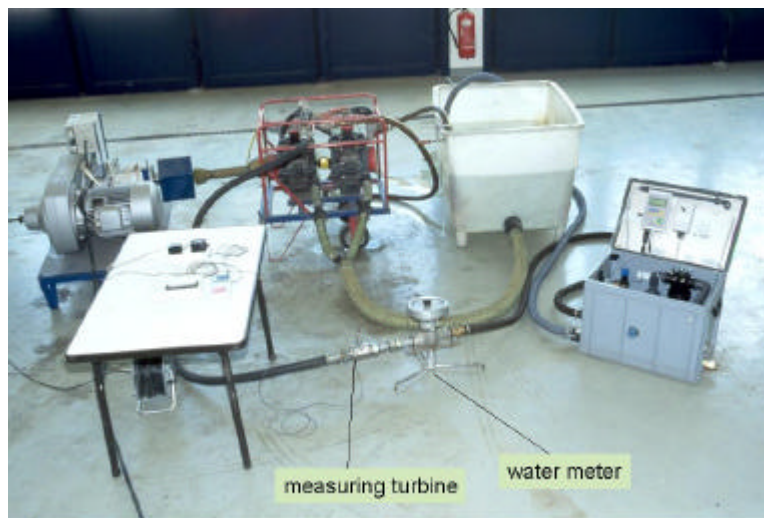


Fig 5: inspection unit to measure the pump performance and flow meter (on site testing in Bavaria)

The all out testing of the equipment of the testing companies is necessary, so that it is assured that plant protection devices are examined with exactly measuring devices. The testing personal of the testing companies as well is trained by the responsible agricultural department. So that the owners of sprayers can assume, that costs of repair at their sprayer do not arise by false measurement results. This creates a relationship of confidence between testing enterprise and implement owner.

# Assuring the measurement precision of testing facilities for the inspection of plant protection equipment in different states of Germany (as Bavaria, Lower Saxony and North Rhine Westphalia)

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- in Bavaria a company (DEULA) carries out the inspection on site
  - in Lower Saxony the chamber of agriculture carries out the inspection on site
  - in North Rhine Westphalia the workshops has to bring their test facilities to the headquarter of the chamber of agriculture for inspection
- ⇒ In all three cases the precision of the test facilities is shown by a badge and a equipment pass



# examples of testing facilities



**testing of pump performance, pressure gauges and flow meters  
in all cases of testing plant protection equipment**



# sprayer types- field sprayer





# fixed patternator – cross distribution



# mobile patternator – cross distribution



# sprayer types- orchard sprayer



# sprayer types- vineyard sprayer



# sprayer types- hop sprayer

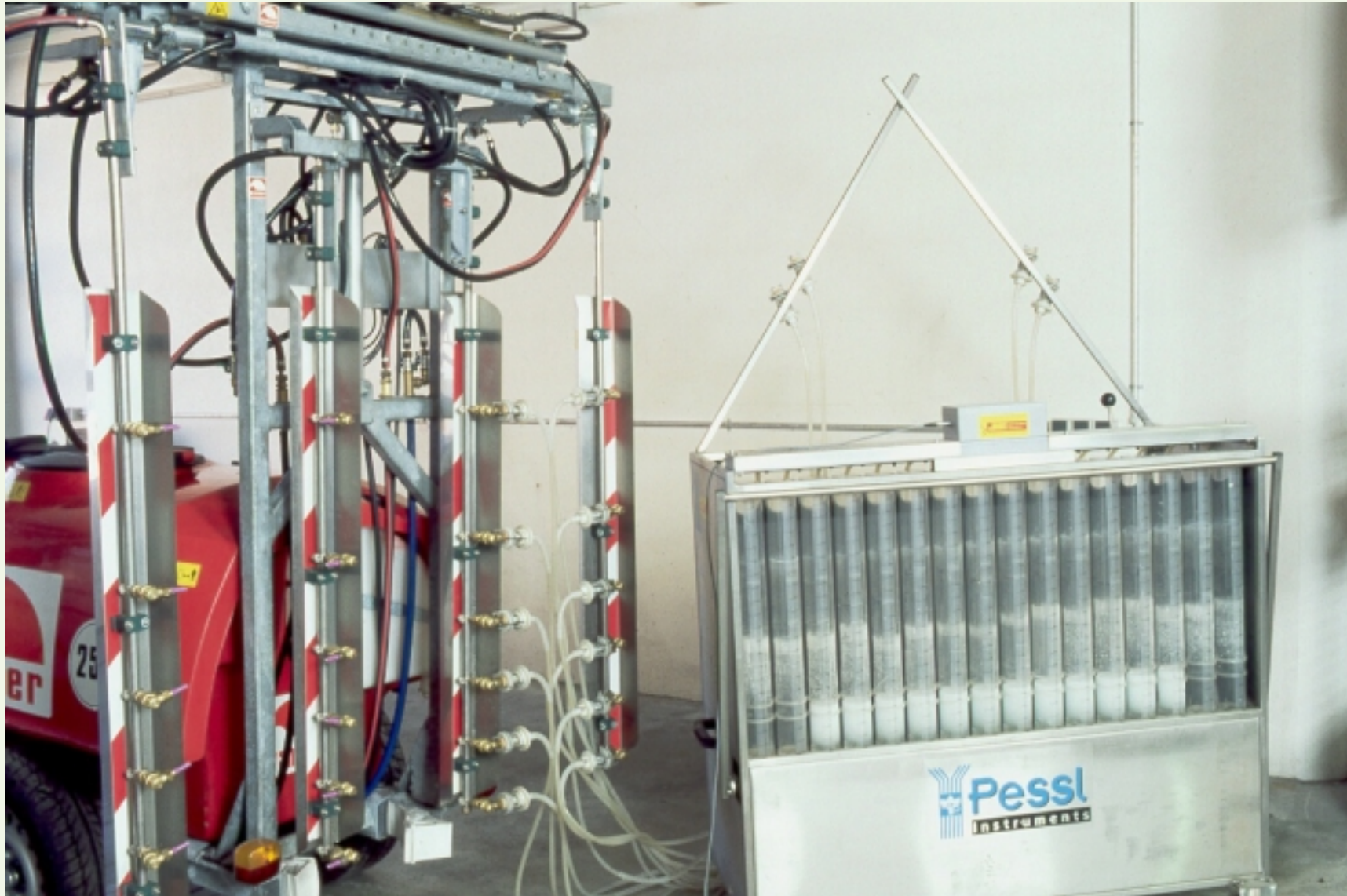


# sprayer types- asparagus sprayer





# single nozzle test stand (commercial)





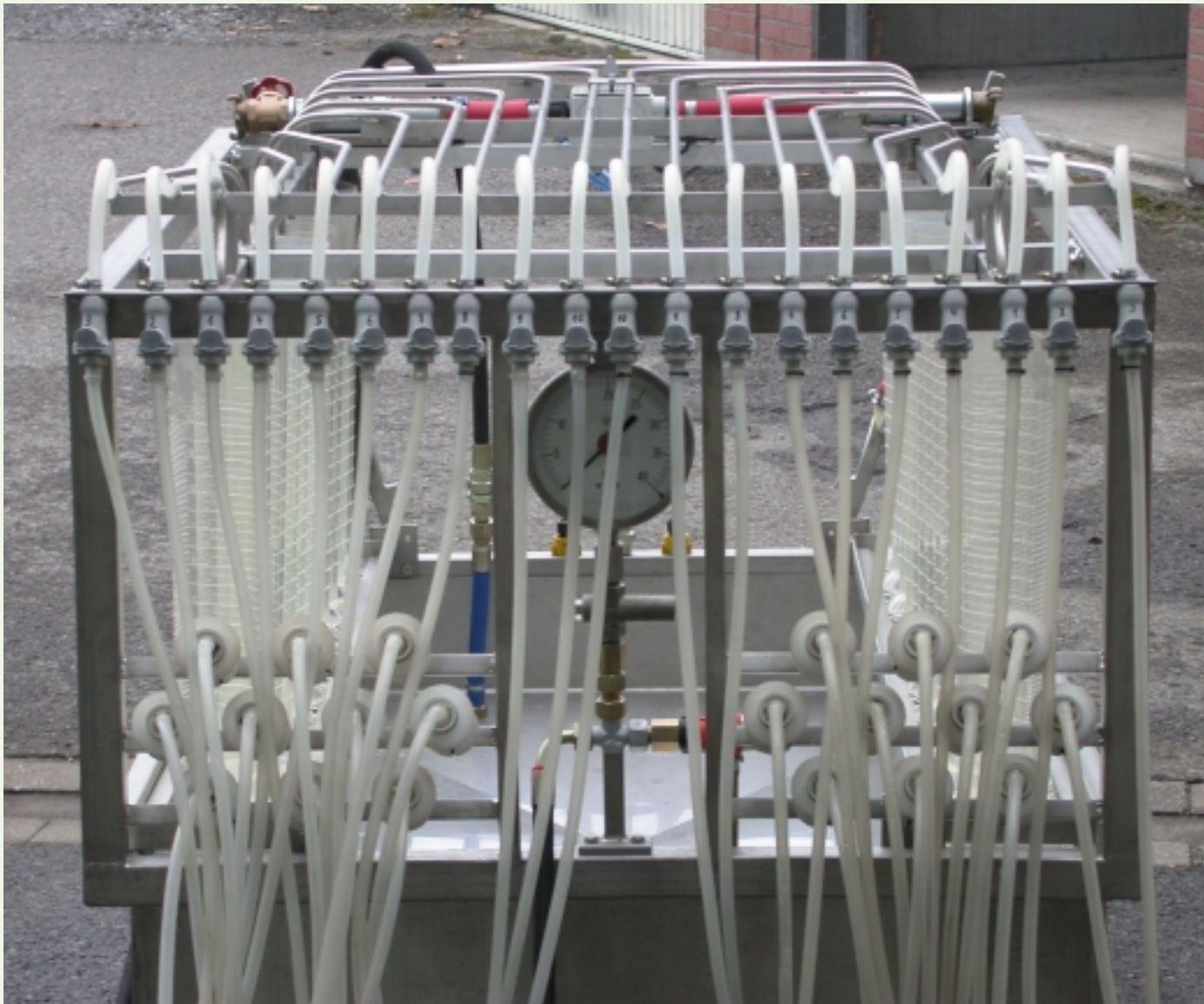
# single nozzle test stand (commercial)



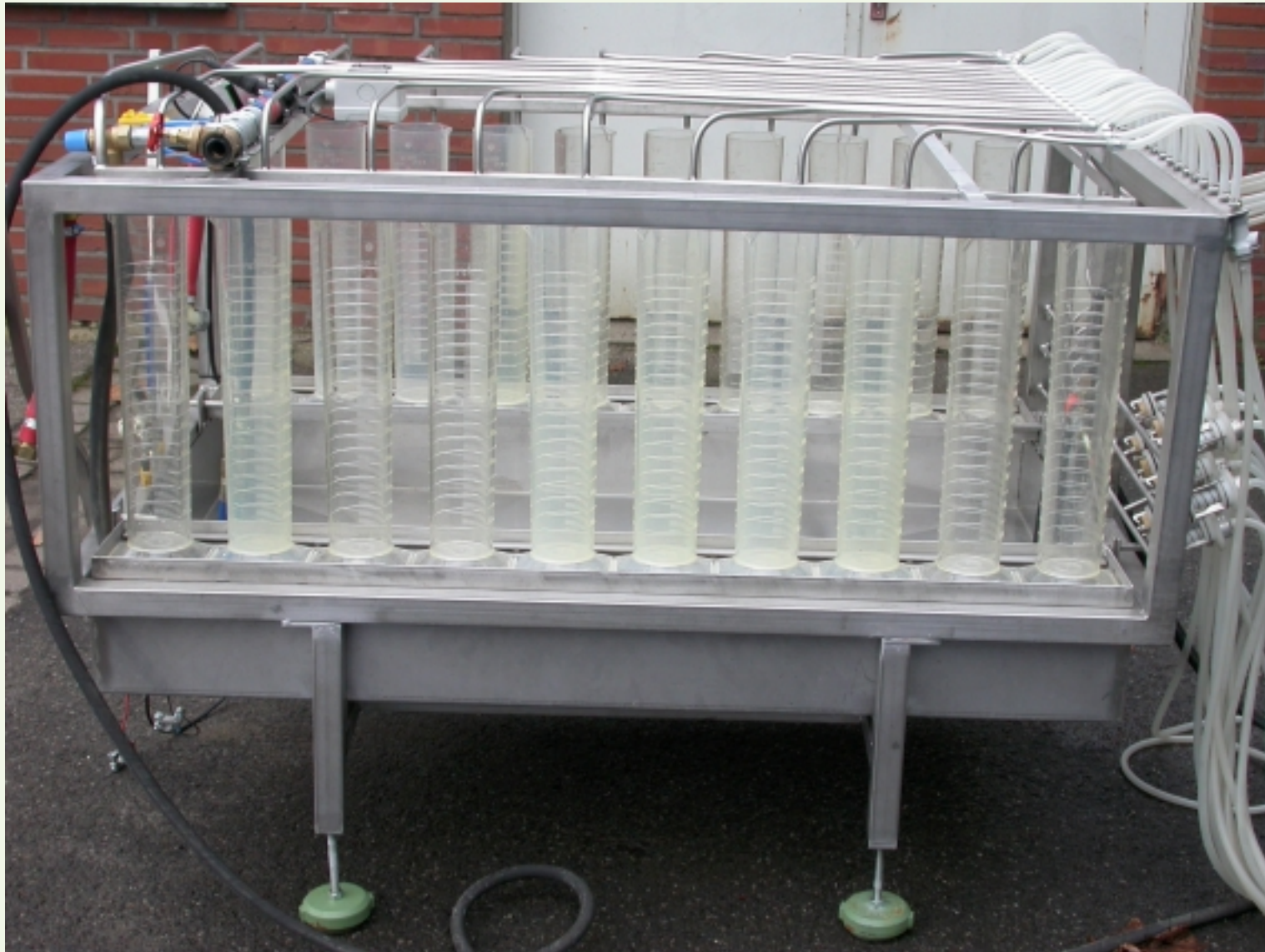
# single nozzle test stand (commercial)



# single nozzle test stand ("self made")



# single nozzle test stand ("self made")



- to assure the measurement precision, the inspection workshops have to present their testing facilities every second year for inspection to an authorized organization/expert
- the precision of measurements of the inspection equipment is higher than the workshop equipment
- the result of the testing is documented in a equipment pass and by a badge

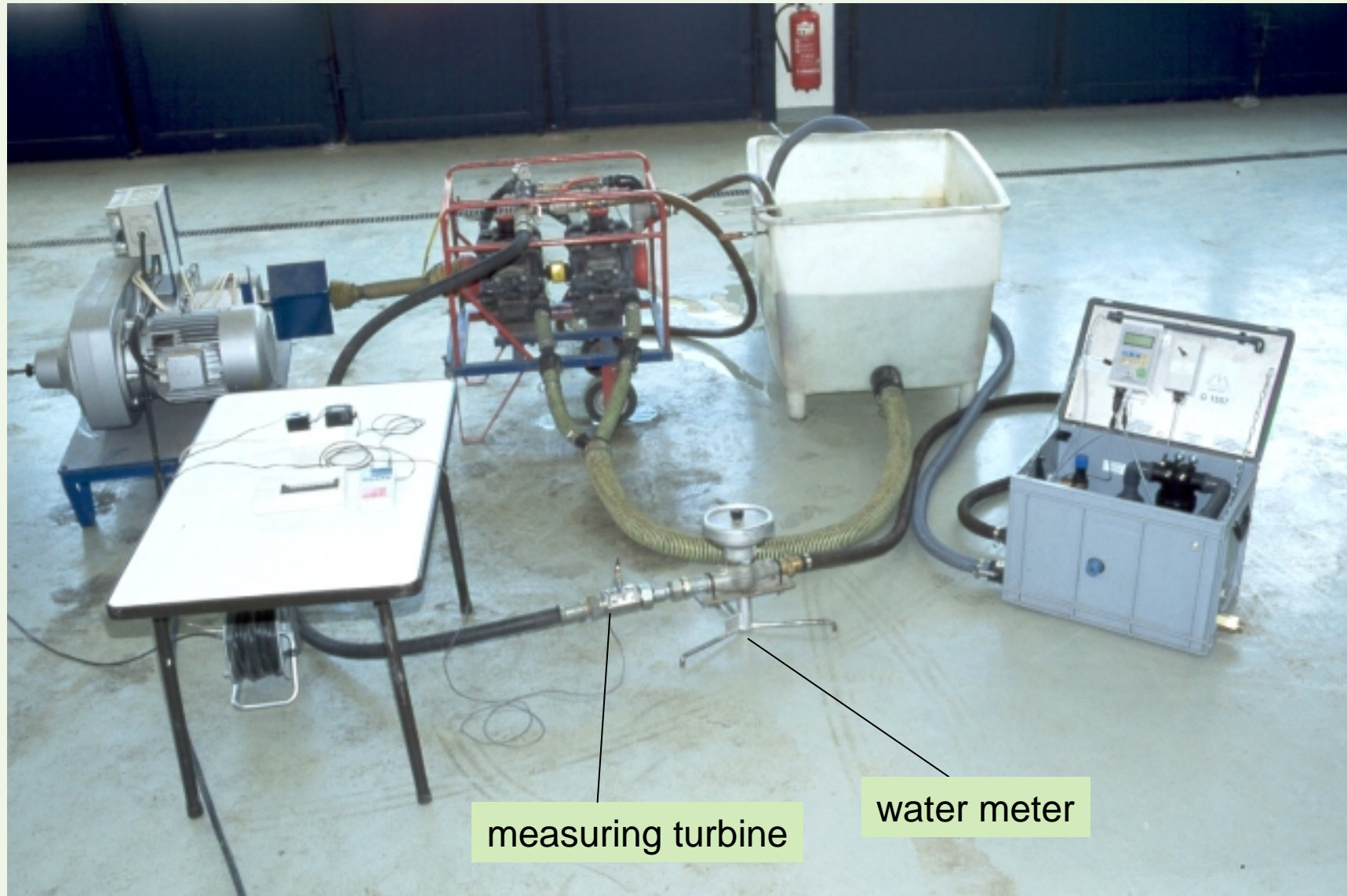


- the corresponding agricultural department is responsible for the inspection workshops
- only agricultural machinery workshops can make an application to become an inspection workshop
- only especially trained staff (trained from the agricultural department) can carry out sprayer inspection
- the testing facilities has to be accepted by the BBA and has to be tested every second year (badge)
- for measuring the cross distribution there is a need of a adequate hall or roofed place with protection against wind





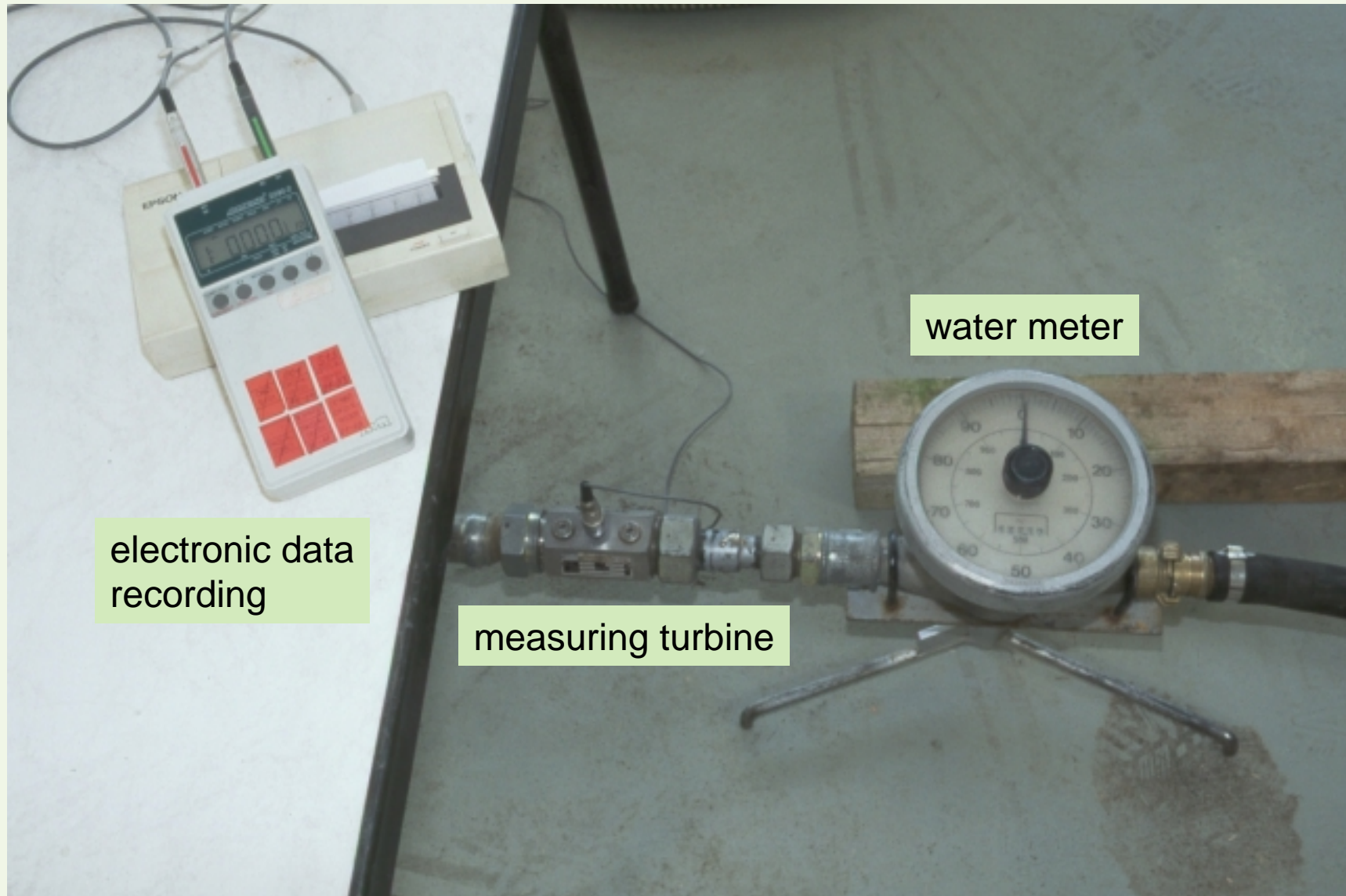
# pump performance (flow rate & flow meter)



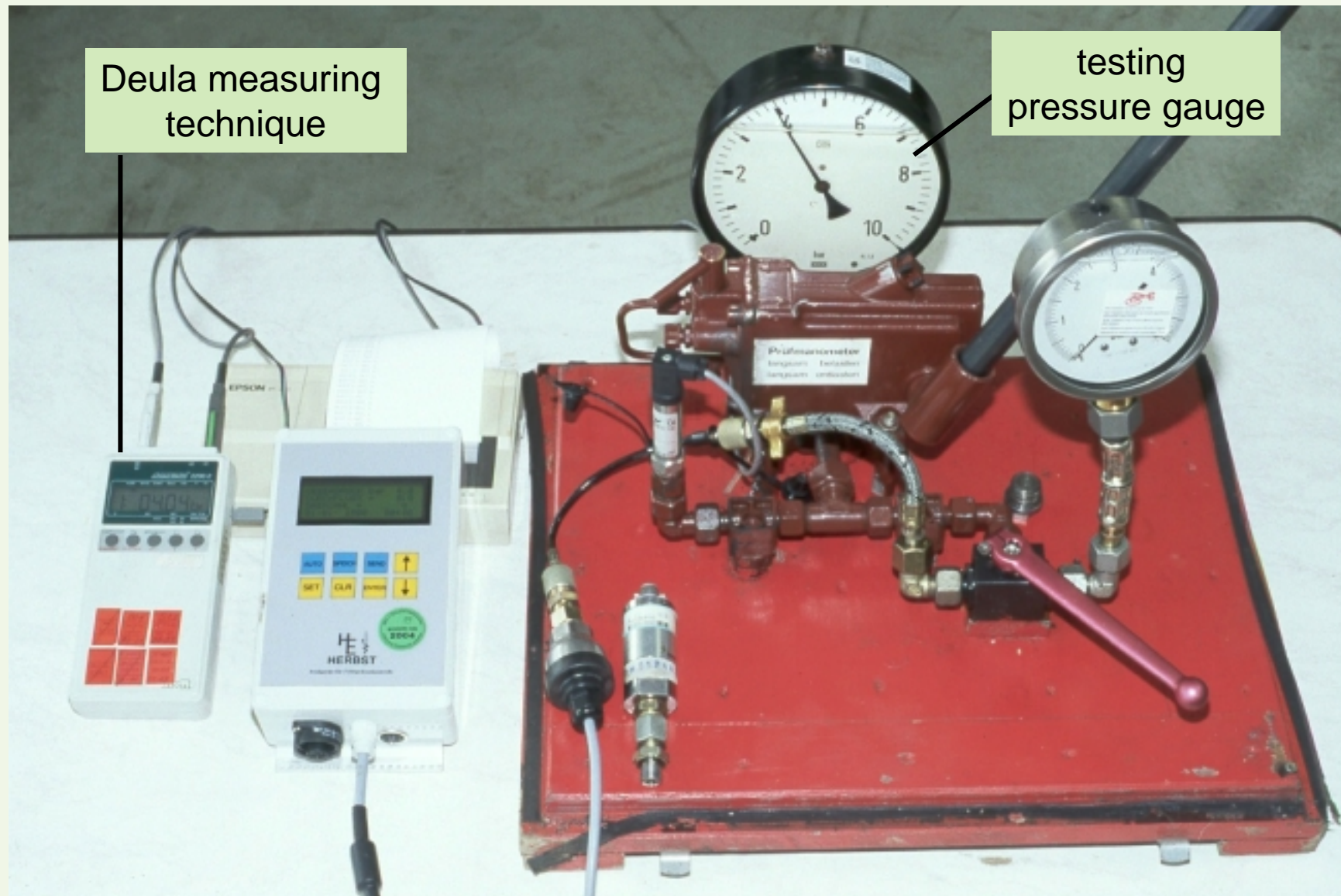




# pump performance (flow rate)



# Digital pressure gauge

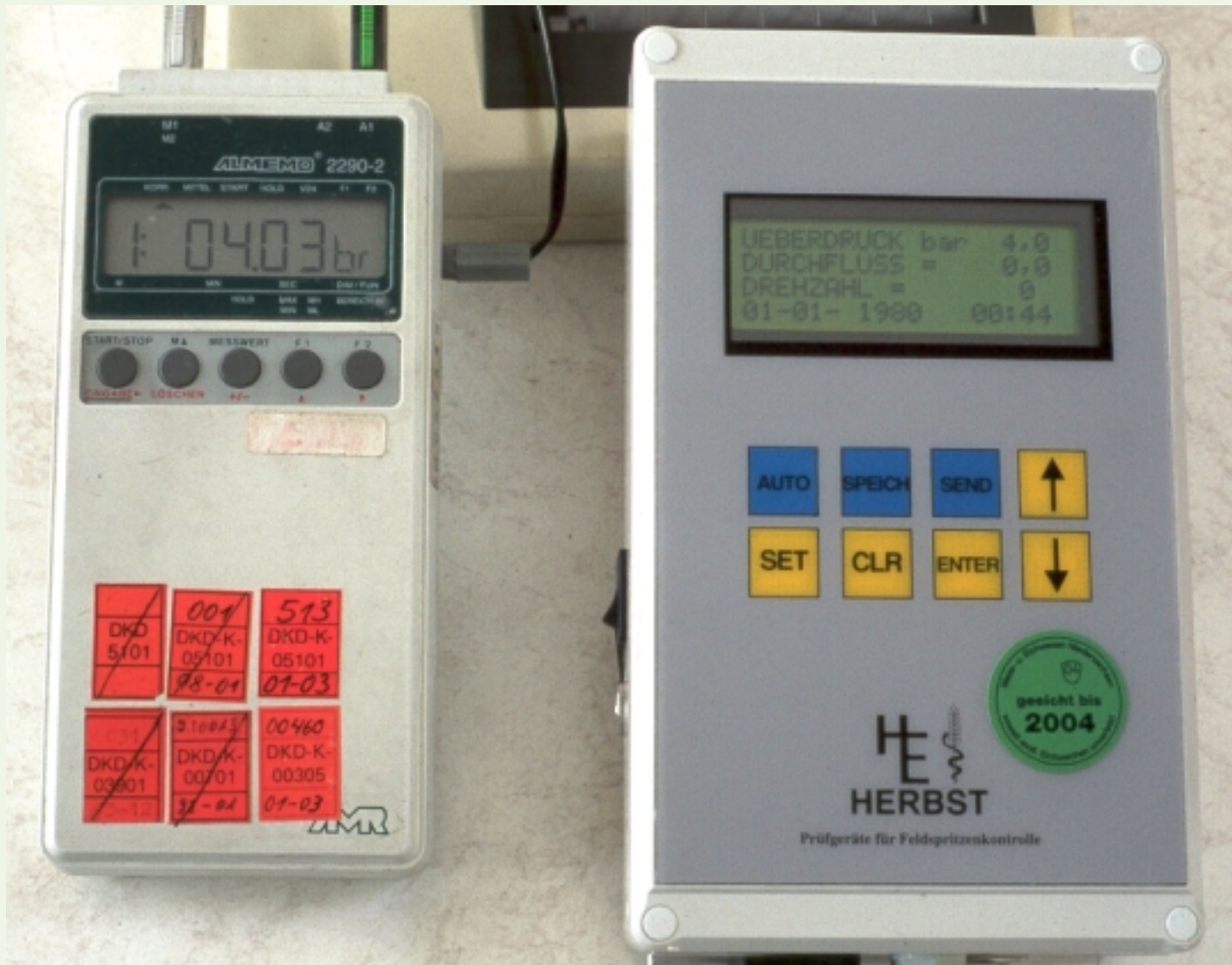


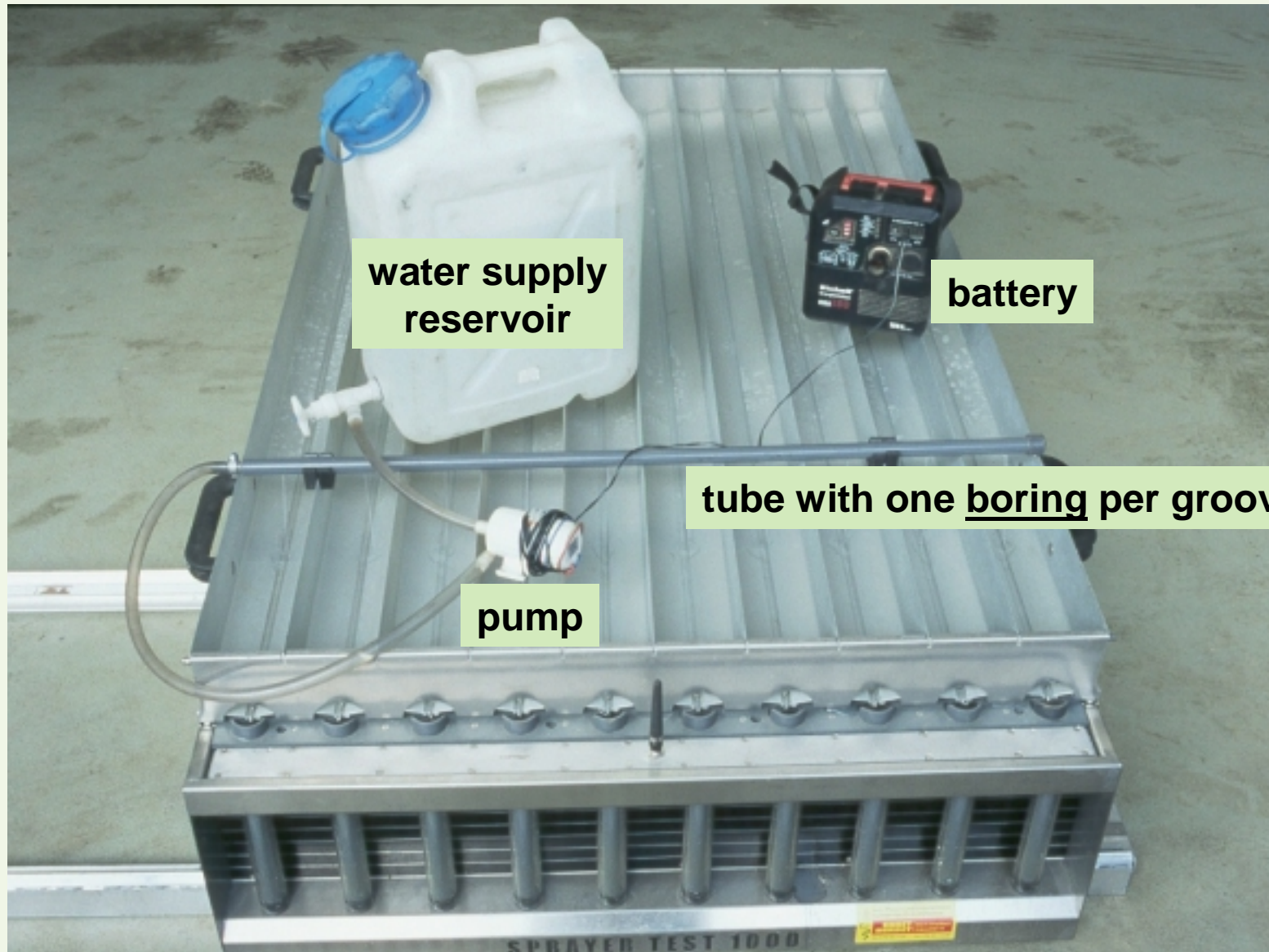
Deula measuring  
technique

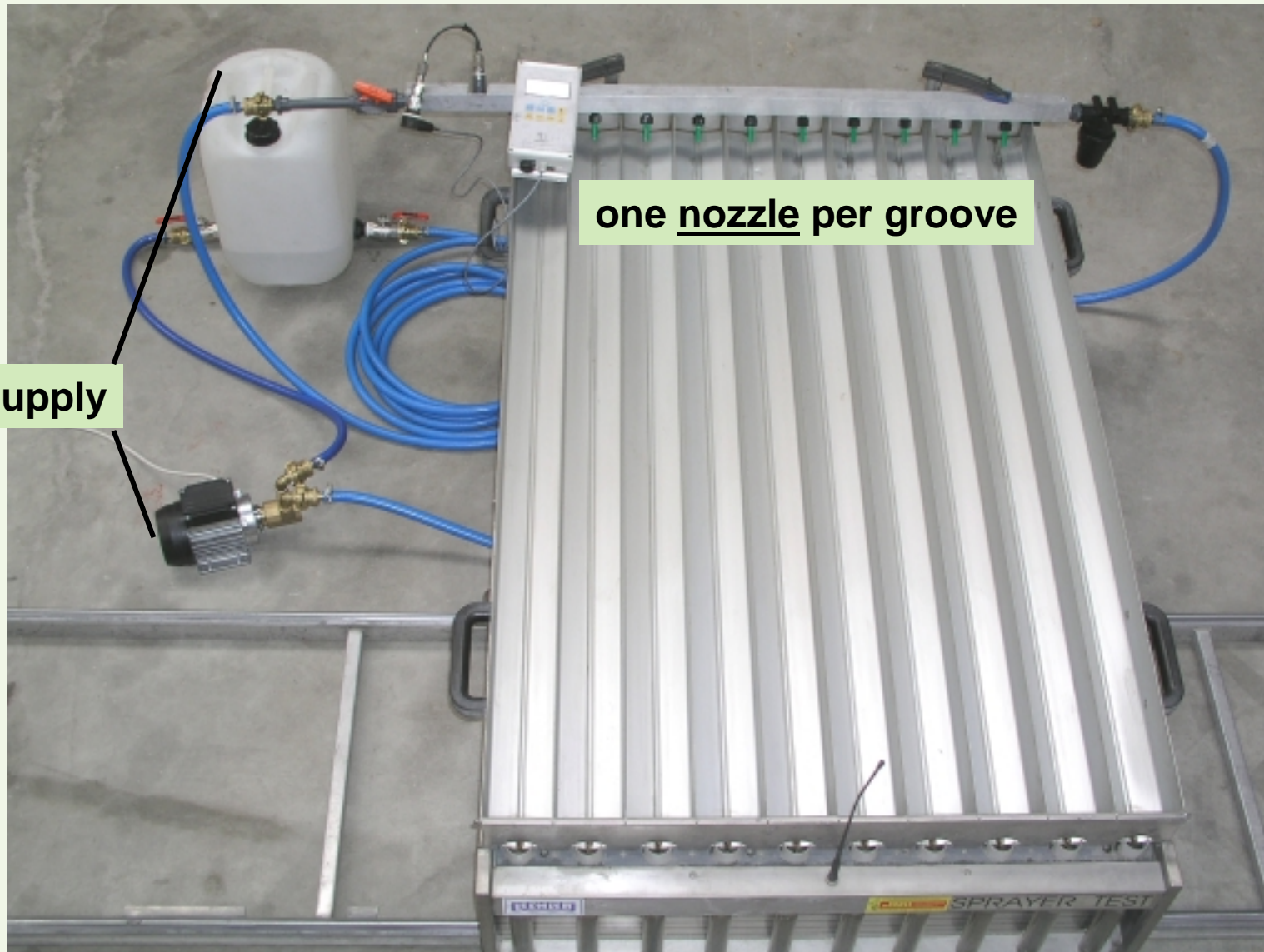
testing  
pressure gauge



# pressure gauge





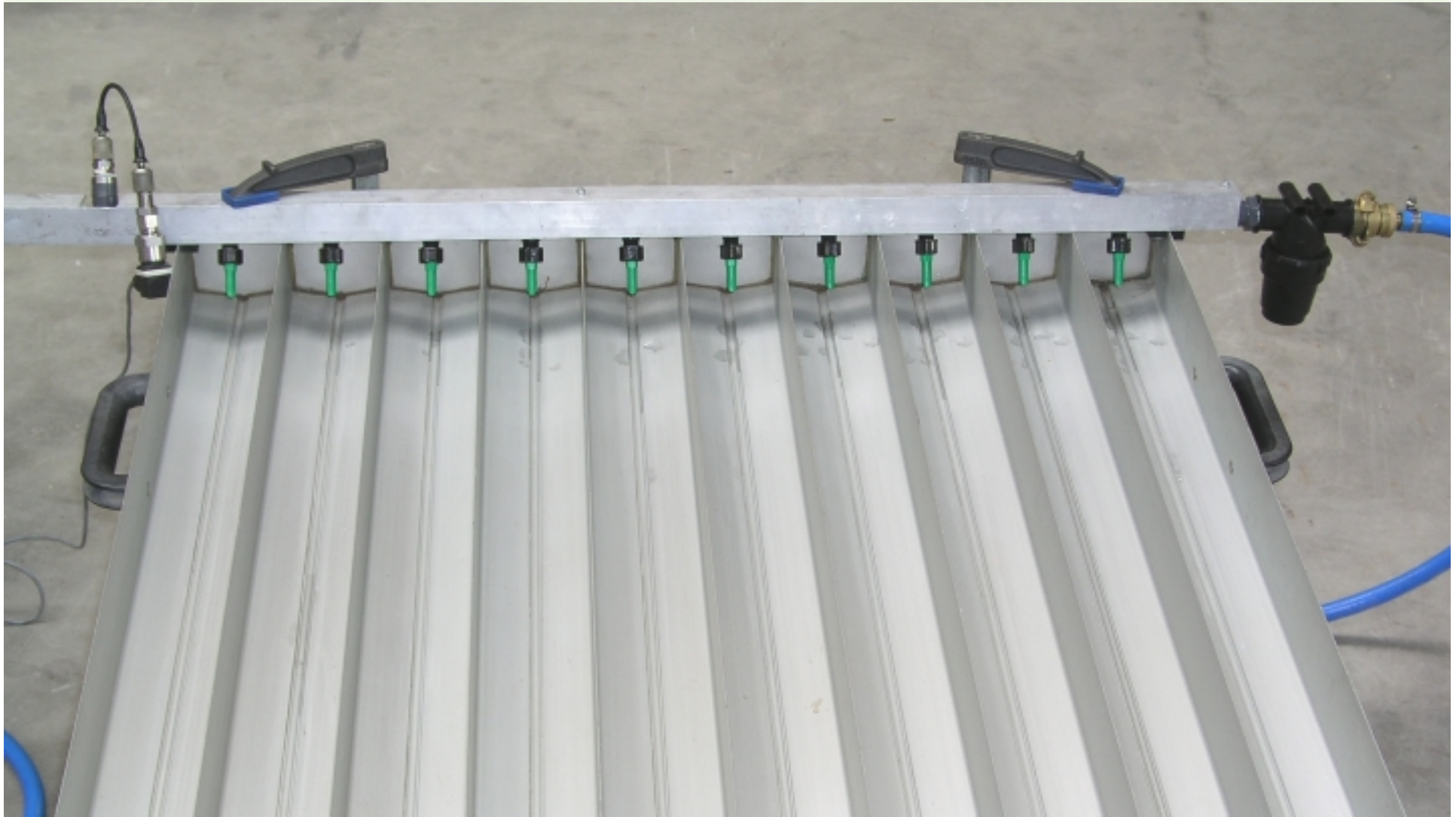


water supply

one nozzle per groove



# mobile patternator





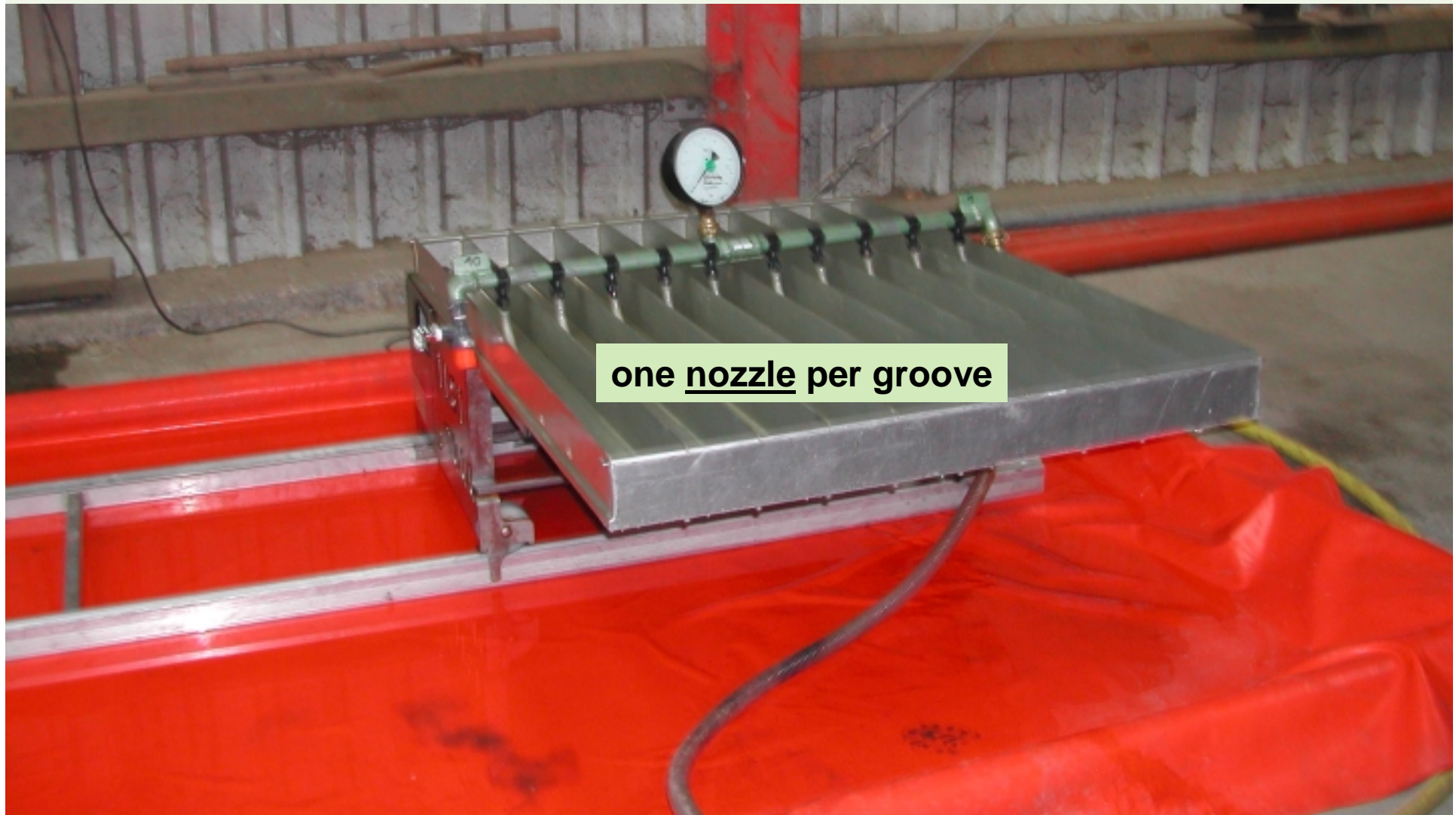






water supply





one nozzle per groove

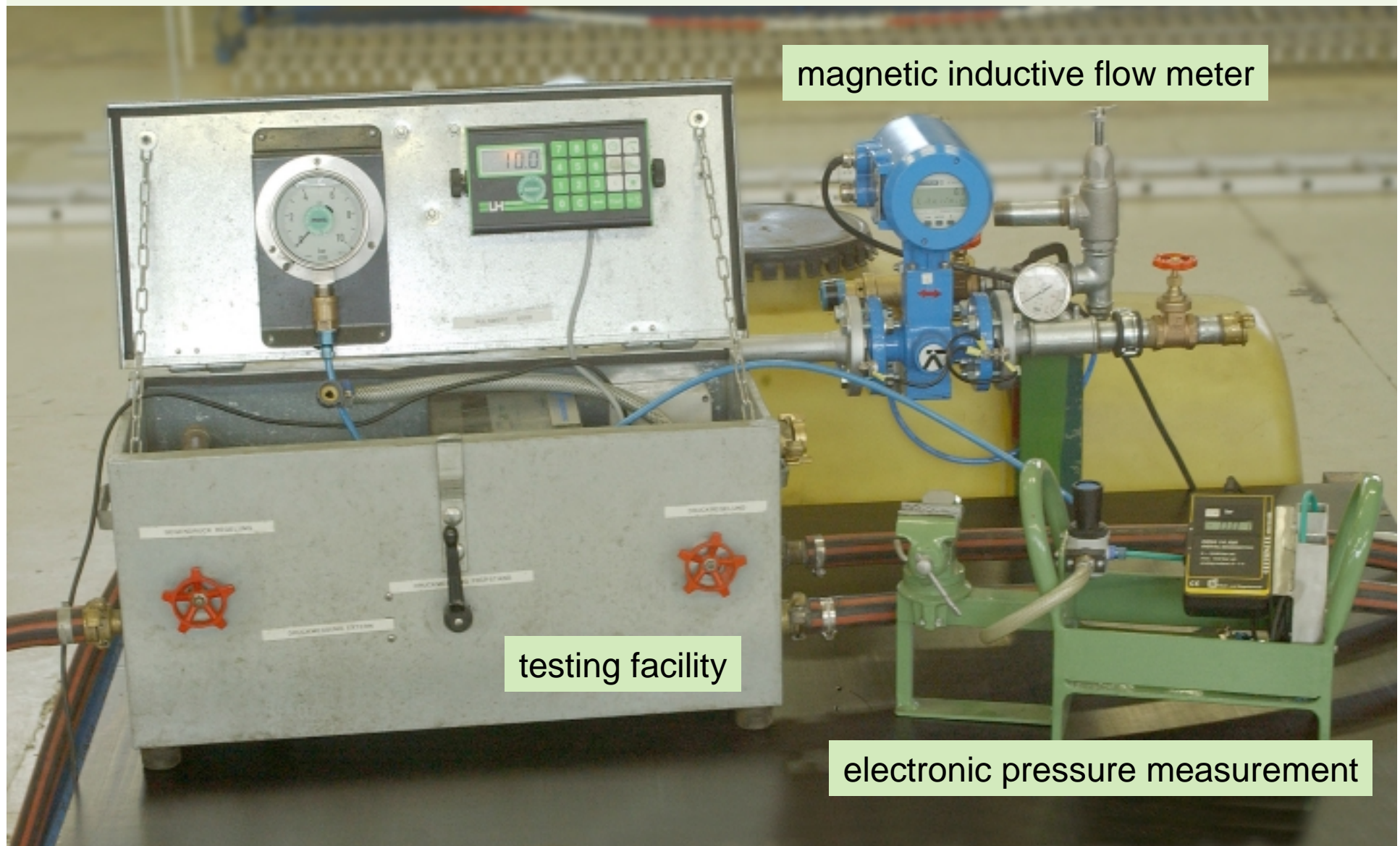


# mobile patternator – covered distance





# Pressure gauge – flow rate &- meter



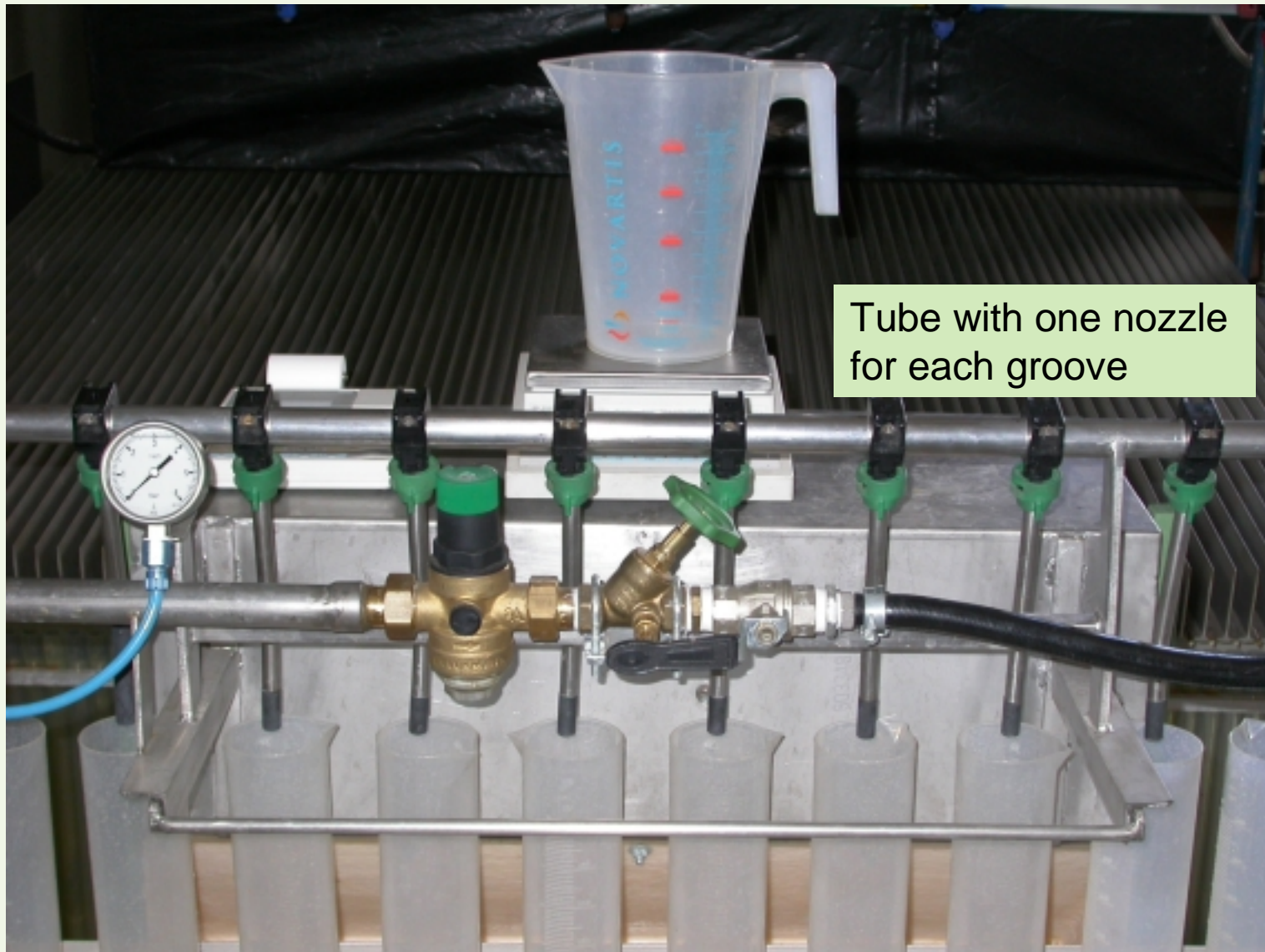
Tube with one nozzle  
for each groove



pressure tank



## define exact flow rate



Tube with one nozzle  
for each groove





# mobile patternator – LH AGRO



# single nozzle test stand





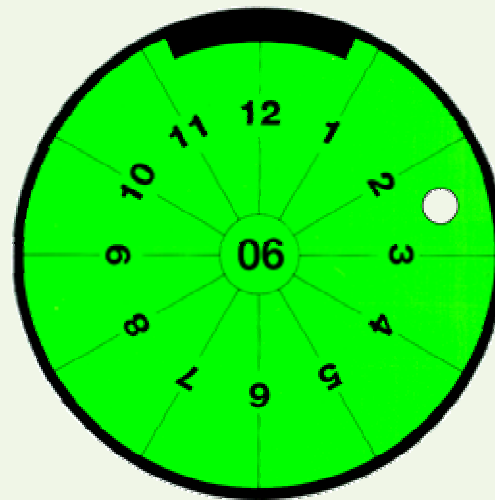
# Prüfungsnachweis der Kontrollstelle



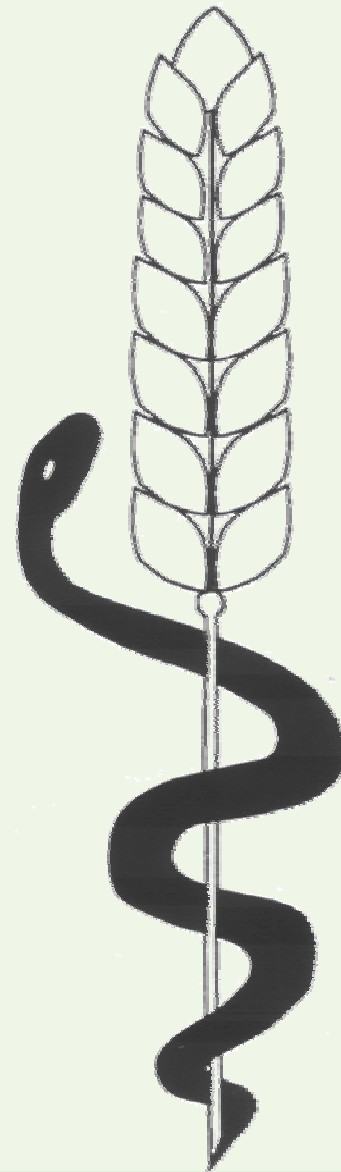
**DEULA – Bayern GmbH**  
**Prüftechnik**



## Nächste Geräteprüfung







**Anerkannte  
Kontrollstelle  
für  
Pflanzen-  
schutzgeräte**



Thank you for your attention



# field sprayer



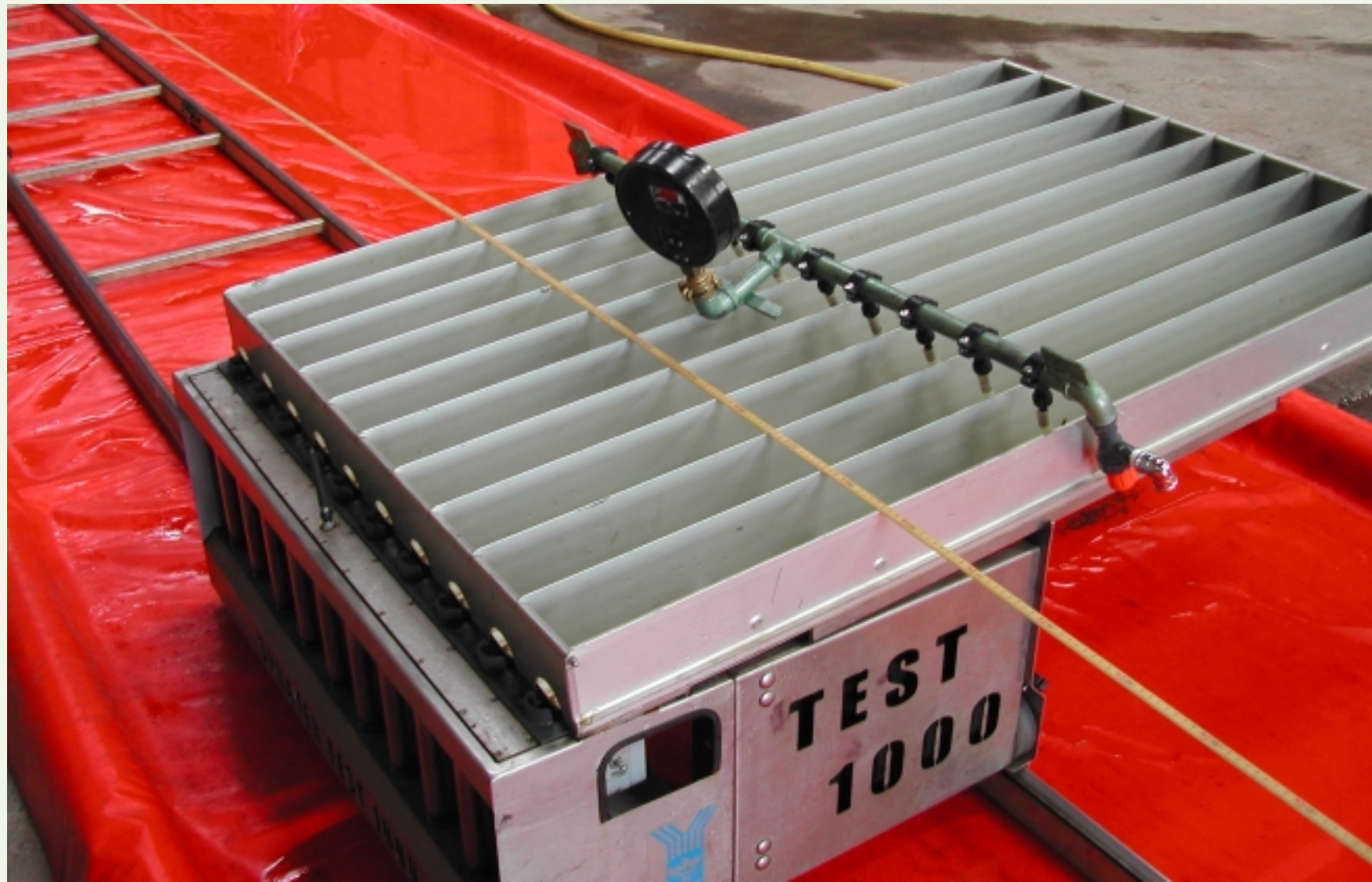


# field sprayer



# field sprayer

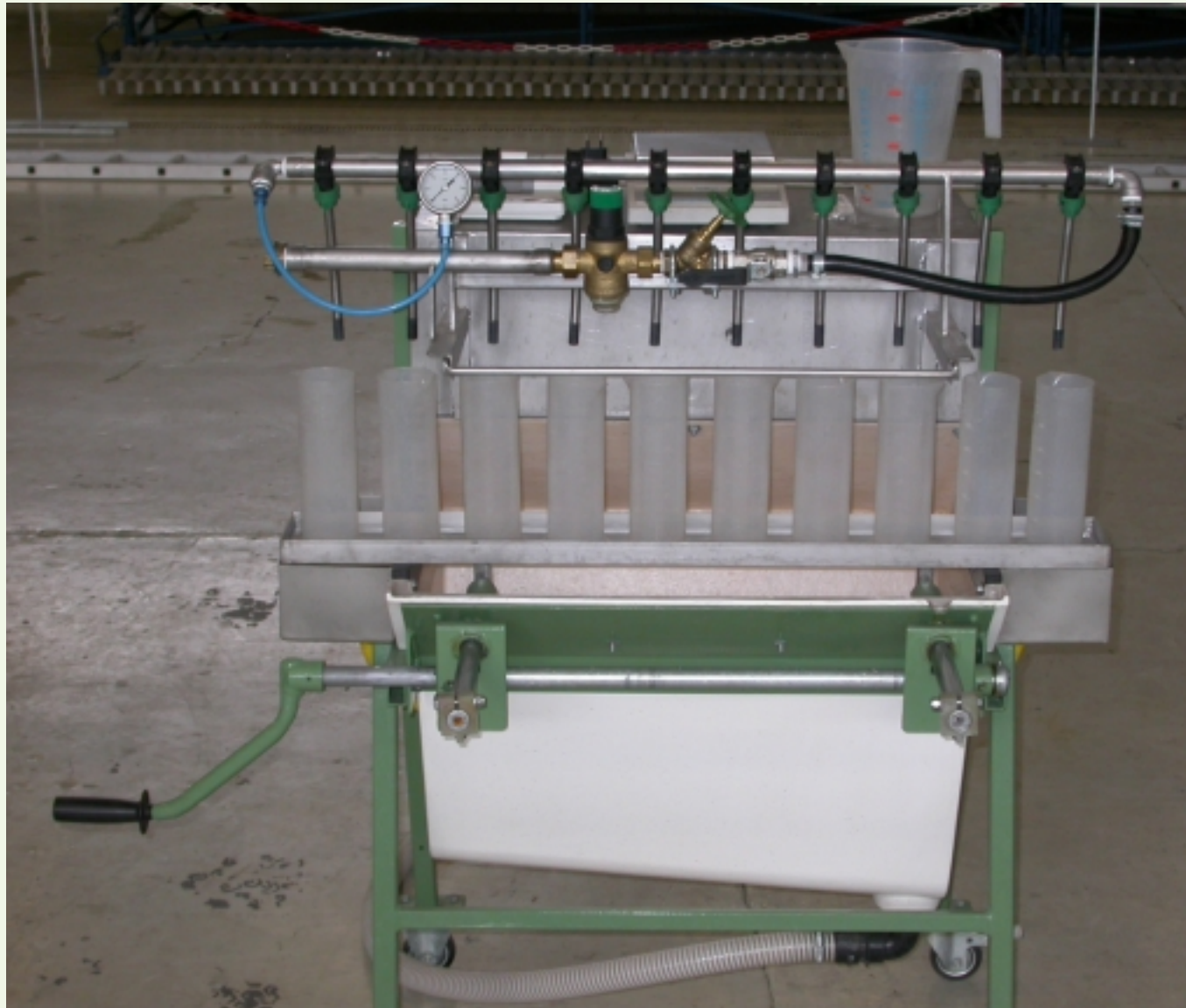




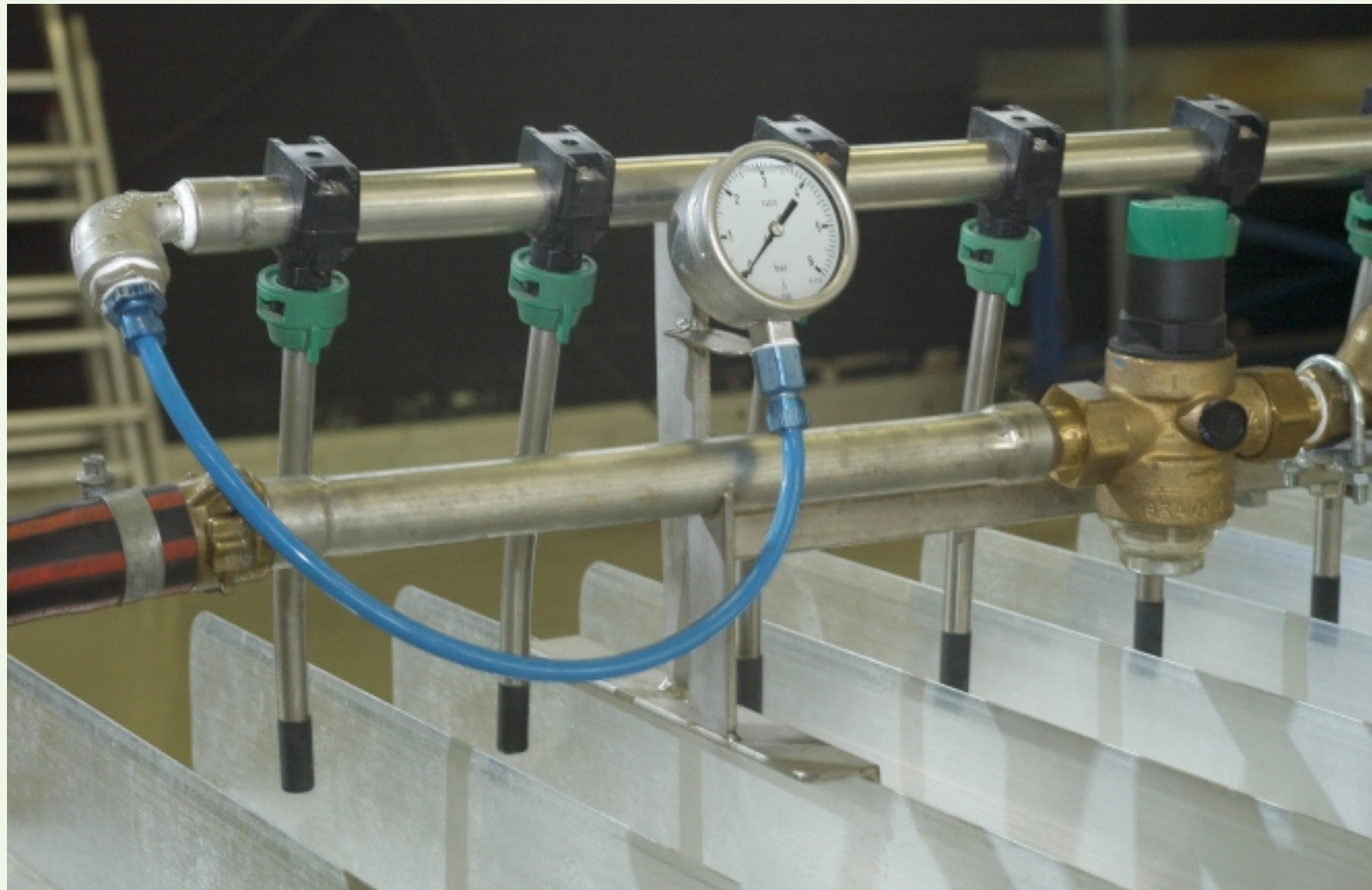
# magnetic inductive flow meter



# field sprayer



# field sprayer



## Gebühren

Anerkennung der Kontrollwerkstätten (Bescheid)  
einschließlich Erstabnahme des Kontrollortes und  
Aushändigung des Anerkennungsbescheides **200 Euro**

Erstellung eines Änderungsbescheides, z.B. Bescheid  
geänderter Kontrollort (LwA vor Ort) **150 Euro**

Erstellung eines Änderungsbescheides, der keine Maßnahmen  
vor Ort erfordert (vom Büro aus) **40 Euro**

Rücknahme eines Bescheides einschl. Anerkennungsschild  
und des Deula-Prüfungsnachweises **50 Euro**

Abnahme der Prüftechnik durch die Deula, alle 2 Jahre  
(erstmalig vor Inbetriebnahme) ca. **500 Euro**

Eintägige Grundschulung ca. **60 Euro**

