

Final humidity of textile drying - Results of an in-house investigation

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Target

- Find out the final humidity of textiles which are dried in a tumble dryer in German households
- Verify if there are significant differences between the use of humidity and time controlled dryers?
- Calculate what is the difference in energy consumption between these two cases?
- Concentrate on textiles for cupboard-dry operation

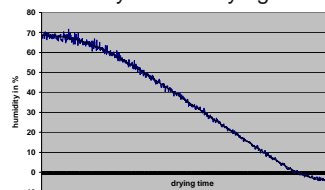
Background

- Definition: Final humidity (acc. to IEC 61121):

$$\mu_f = \frac{W_f - W_0}{W_0}$$

- where
 - W_0 = conditioned mass of the test load (g)
 - W_f = mass of the test load after drying
- 0% final humidity means 'dry cotton' or 'cup-board dry'
- Drying curve: Rather flat around 0 %

Fig.: Final humidity versus drying time



Material and Methods

- Two possibilities to investigate consumer behaviour were used:
 - Assess the **correct feeling** textiles should have at the end of the drying process by touching textiles of defined humidity at -4%, -2%, 0%, +2% and +4%.

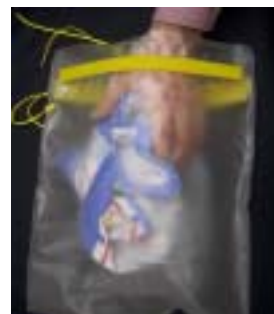
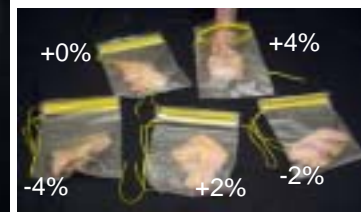


Fig: Feeling of the correct humidity with various prepared samples



- **Measure the final humidity** of test swatches added to the load consumer dry at home

Fig: Measuring the final weight on a balance

- Have 25 consumers for each method and for time controlled and humidity controlled dryers.
- Two kind of textiles were used: dish cloth and hand towel



Results

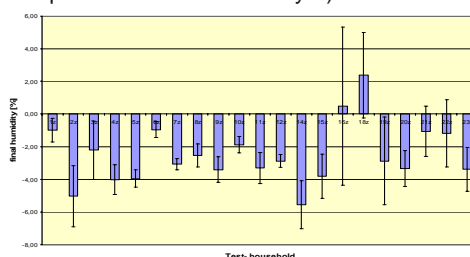
Feeling approach

- The average of the preferred feeling of a cupboard-dry load has a final humidity of:
- | | humidity- | time-controlled |
|---------------|-----------|-----------------|
| ■ Dish cloth: | -2,0 % | -1,5 % |
| ■ Towel: | -1.4 % | -2,2 % |
- This approach showed to be too **insensitive** to differentiate between time and humidity controlled driers, as the classes of humidity chosen are 2% apart.

Measuring approach

- Average final humidity of
 - Humidity controlled dryers: -2.04 %
 - Time controlled dryers: -2.50 %
- Measured and assessed humidity of cupboard-dry correlate very well.
- Most frequently the assessed correct feeling is less dry than the measured humidity.
- Final humidity for 'cup-board-dry' loads seems to be well below 0% when tested with real load under consumer-like conditions (also for humidity controlled dryers)
- Statistics (and difference) are too small to claim a proven difference between time and humidity controlled dryers' energy consumption in real use.
- These results are proven to be valid for Germany. Confirmation in other countries would be desirable.

Fig.: Final humidity as measured in 21 homes (example for time controlled dryer)



This investigation was sponsored by:

