

Equilibrium Moisture Content for Grains

Implications for drying:

- Grain will eventually reach the moisture levels shown in the tables when exposed to the corresponding temperature and humidity levels for long periods of time. This can occur in the field or in the top layers of a low-temperature bin dryer.
- Drying time will depend on the airflow rate through grain, which in turn depends on the depth of grain in a bin. The minimum drying rate for natural air drying is 1 cfm/bu, but this can take up to a month to dry the top layer depending on the grain and air conditions-- during which time spoilage can occur.

Implications for storage:

- The air space between kernels in a bin of corn will have the humidity indicated at the corresponding moisture and temperature. For example, 15% corn at 60 degrees will generate a relative humidity in the air space between kernels of 70%, but when cooled to 45 degrees will have a relative humidity of 65%.
- Mold growth is suppressed during storage when the environment is maintained at a relative humidity level of 65% or lower.

Table 1. Equilibrium moisture content of yellow corn (%wb) at different temperature and relative humidity levels.

| Temp. | Relative Humidity (%) | | | | | | | | | |
|-------|-----------------------------------|-----|------|------|------|------|------|------|------|------|
| | 10 | 20 | 30 | 40 | 50 | 60 | 65 | 70 | 80 | 90 |
| F | Equilibrium moisture content, %wb | | | | | | | | | |
| 35 | 6.5 | 8.6 | 10.3 | 11.8 | 13.3 | 14.8 | 15.7 | 16.6 | 18.7 | 21.7 |
| 40 | 6.2 | 8.3 | 9.9 | 11.5 | 12.9 | 14.5 | 15.3 | 16.2 | 18.3 | 21.3 |
| 50 | 5.7 | 7.8 | 9.4 | 10.9 | 12.3 | 13.8 | 14.7 | 15.5 | 17.6 | 20.5 |
| 60 | 5.3 | 7.3 | 8.9 | 10.3 | 11.8 | 13.3 | 14.1 | 15.0 | 17.0 | 19.9 |
| 70 | 4.9 | 6.9 | 8.4 | 9.9 | 11.3 | 12.8 | 13.6 | 14.4 | 16.4 | 19.4 |
| 80 | 4.6 | 6.5 | 8.0 | 9.4 | 10.8 | 12.3 | 13.1 | 14.0 | 16.0 | 18.8 |
| 90 | 4.2 | 6.1 | 7.7 | 9.1 | 10.5 | 11.9 | 12.7 | 13.5 | 15.5 | 18.4 |

Source: ASAE Data D245.4 / Average of two prediction equations.

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Table 2. Equilibrium moisture content of soybeans (%wb) at different temperature and relative humidity levels.

| Temperature | | Relative Humidity (%) | | | | | | | | | |
|-------------|----|-----------------------------------|-----|-----|-----|-----|------|------|------|------|------|
| | | 10 | 20 | 30 | 40 | 50 | 60 | 65 | 70 | 80 | 90 |
| C | F | Equilibrium moisture content, %wb | | | | | | | | | |
| 1.7 | 35 | 4.2 | 5.3 | 6.5 | 7.8 | 9.4 | 11.5 | 12.8 | 14.4 | 19.1 | 28.9 |
| 4.4 | 40 | 4.1 | 5.3 | 6.4 | 7.7 | 9.3 | 11.3 | 12.6 | 14.2 | 18.9 | 28.7 |
| 10 | 50 | 4.0 | 5.2 | 6.3 | 7.6 | 9.1 | 11.1 | 12.4 | 14.0 | 18.6 | 28.2 |
| 16 | 60 | 4.0 | 5.1 | 6.2 | 7.4 | 8.9 | 10.9 | 12.2 | 13.7 | 18.3 | 27.8 |
| 21 | 70 | 3.9 | 5.0 | 6.1 | 7.3 | 8.8 | 10.7 | 11.9 | 13.5 | 17.9 | 27.3 |
| 25 | 77 | 3.8 | 4.9 | 6.0 | 7.2 | 8.6 | 10.6 | 11.8 | 13.3 | 17.7 | 27.0 |
| 32 | 90 | 3.7 | 4.8 | 5.8 | 7.0 | 8.4 | 10.3 | 11.5 | 13.0 | 17.3 | 26.5 |

Source: ASAE Data D245.5 / modified-Halsey equation.

Table 3. Equilibrium moisture content of soft red winter wheat (%wb) at different temperature and relative humidity levels.

| Temperature | | Relative Humidity (%) | | | | | | | | | |
|-------------|----|-----------------------------------|-----|------|------|------|------|------|------|------|------|
| | | 10 | 20 | 30 | 40 | 50 | 60 | 65 | 70 | 80 | 90 |
| C | F | Equilibrium moisture content, %wb | | | | | | | | | |
| 1.7 | 35 | 7.3 | 8.9 | 10.2 | 11.3 | 12.3 | 13.4 | 14.0 | 14.7 | 16.1 | 18.2 |
| 4.4 | 40 | 7.1 | 8.7 | 10.0 | 11.1 | 12.1 | 13.2 | 13.8 | 14.4 | 15.9 | 18.0 |
| 10 | 50 | 6.8 | 8.4 | 9.6 | 10.7 | 11.8 | 12.9 | 13.4 | 14.1 | 15.5 | 17.6 |
| 16 | 60 | 6.5 | 8.1 | 9.3 | 10.4 | 11.4 | 12.5 | 13.1 | 13.7 | 15.1 | 17.2 |
| 21 | 70 | 6.2 | 7.8 | 9.0 | 10.1 | 11.1 | 12.2 | 12.8 | 13.4 | 14.8 | 16.9 |
| 25 | 77 | 6.0 | 7.5 | 8.7 | 9.8 | 10.9 | 11.9 | 12.5 | 13.1 | 14.5 | 16.6 |
| 32 | 90 | 5.8 | 7.3 | 8.5 | 9.6 | 10.6 | 11.6 | 12.2 | 12.8 | 14.2 | 16.3 |

Source: ASAE Data D245.4 / Average of two prediction equations.

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