

## MPD Moisture Readings

The following discusses the role the initial and final moisture readings play in calculating Ksat:

Taking these moisture readings is required by ASTM D8152. This requirement dates back to Philip and Dunne in the 1980s before computers were prevalent and math was done by hand.

The Ksat calculation is iterative. After the calculation is done the first time, the result is plugged into the equation and recalculated. Over and over, each round is converging on the solution. Eventually, it converges on the correct Ksat value. It may take 30 or more iterations to converge on the solution, and manually doing it could take several hours. The moisture values simply give the user a closer starting point to the solution, requiring less math work.

The Automated MPD uses a modern server to converge on the solution in about one second. This renders the initial and final moisture values less critical than they once were. However, the calculation still needs initial and final moisture values to start the equation.

### Example of Moisture Value Significance

A customer contacted us because they typed in the wrong initial moisture values and wondered if we could edit them. As a legal policy, we cannot change tests. But what we could do for them was calculate Ksat using their test data and the correct initial moisture values and create the following table:

Test Name	Original (incorrect) Initial Moisture	Original Ksat	Corrected Initial Moisture	New Ksat	Percent Change in Ksat
Test 1	5%	705 mm/hr	37%	741 mm/hr	4.8%
Test 2	5%	1091 mm/hr	37%	1129 mm/hr	3.3%
Test 3	5%	1025 mm/hr	47%	1067 mm/hr	3.9%
Test 4	5%	1006 mm/hr	47%	1081 mm/hr	6.9%
Test 5	0%	1423 mm/hr	28%	1468 mm/hr	3.0%
Test 6	5%	1414 mm/hr	28%	1463 mm/hr	3.3%

The most Ksat changed was 7%. And the initial moisture change went from 5% to 47%. That's a significant change in moisture with an insignificant change in Ksat.

The delta between the initial and final moisture is what matters, not the actual values.

We have conducted over one hundred tests using actual MPD data to determine the effect of changing the moisture values to their extremes.

We set the initial moisture to 0 and the final moisture to 100 and then calculated Ksat. Then, using the same data set, we set initial to 99 and the final to 100 and calculated Ksat.

The worst percent change in Ksat we saw, was a 15% change. Most of the results showed a change of under 10% in Ksat.