# Operating Instructions for RH BluePeg
# Moisture Testing in Concrete with in-situ Probes


**ASTM NEWS:**
**02.15.18**
**Duration of test has been reduced from 72 hrs to 24 hrs.**

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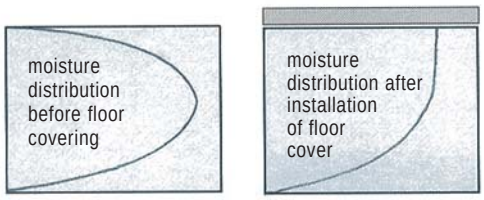
Lignomat USA Ltd
**14345 NE Morris Ct. Portland OR 97230 USA**
**800-227-2105 .. 503-257-8957**

# Using the RH BluePeg System to avoid Floor Covering Failure

The RH BluePeg is a relative humidity and temperature probe, designed to be placed inside a hole liner (sleeve), which has been inserted into a predrilled hole in the concrete test area. The cap is used to seal the sleeve to allow acclimation to the moisture released by the concrete inside the hole. To conform to ASTM F2170-18 standard, the sleeve should be in the concrete and sealed from the outside atmosphere for **24 hrs** before taking readings. Design of Lignomat's RH BluePeg Probes and sleeves comply with the ASTM standard 2170-18.




So far the Calcium Chloride test has been commonly used to determine concrete moisture. Over the years the experts have found that the in-situ probe test is more reliable. One reason is that the Calcium Chloride test is mostly a surface test and not a core test, and in some cases moisture will remain undetected in the core. Another reason is the dependability on ambient conditions. A floor will evaporate more moisture on a dry day than on a humid day.

It has been a common practice to use pin or pinless meters to measure the moisture in concrete slabs. The NWFA recommends pin or pinless meters only as qualitative testing tools and not as meters to determine whether or not a floor covering should be installed. Epoxy, adhesive and floor covering manufacturers usually recommend a test method. Check the manual and follow the installation guide lines to fulfill the warranty requirements.

# Preparations

### Test Site Conditions before Test starts

To obtain relevant test results the concrete slab should be at service temperature and the occupied air space above the slab should be at service temperature and at service relative humidity for at least 48 hrs before drilling the holes.

### Number of Tests per Locations

Recommended are 3 tests for the first 1000 $ft^2$ (100$m^2$) and at least one additional test for each additional 1000 $ft^2$ (100$m^2$). Choose test areas where high moisture levels are suspected. The non-invasive scanning meters Ligno-DuoTec BW or the Ligno-VersaTec can be useful to detect high and low moisture areas.

### Measuring Depth

The standard sleeve from Lignomat is designed for 4-5” thick slabs drying from the top only. Measuring depth does not need to exceed 40% of the slab thickness. For 4-5”thick slabs drying from both sides, the required measuring depth does not need to exceed 20% of the slab thickness. The standard sleeve can be shortened accordingly and an extension piece for the top of the sleeve is available from Lignomat. For a required measuring depth of more than 2” we provide longer sleeves. Contact Customer Service at 1-800-227-2105, if you have any questions.

### Preparing Test Hole, Placing Sleeve and Cap.

Once the location has been determined, drill one hole for the first sleeve with a carbide drill bit 5/8” (16mm) in diameter using a rotary hammer drill (observe all safety precautions as outlined by the manufacturer). To accommodate the sleeve, the hole should be 1 15/16” (50mm) deep. Take extra care in drilling straight down. Clean the area around the hole with a vacuum cleaner and vacuum the dust out of the hole. Next, use a brush to remove loose particles in the hole and vacuum the hole clean. Repeat brushing and cleaning two more times. Next, set the sleeve. To protect the outer ring of the sleeve, put the cap on before inserting the sleeve. You can use a hammer or mallet to tap the sleeve into the hole. You can also place a small piece of wood on top of the sleeve and push the wood down with your hand, hard and fast. Make sure the outer ring of the sleeve is flush with the floor. After all steps are finished, drill the next hole for the next sleeve.

## Measurements

The RH in-situ probe test for measuring moisture in concrete is regulated by the ASTM F2170-18 standard guidelines. Following the ASTM F2170-18 guidelines, the sleeves have to be placed in the concrete for 24 hrs and the RH probes have to be acclimated before test results are valid and can be documented. If waiting times are cut short, the resulting measurements could be too high or too low.

### Test Procedure

ASTM F2170-18 requires the sleeves to be set in the concrete slab and capped off for 24 hrs before recording any readings. If the RH probes are inserted after 24 hours, they still need acclimation time to show true readings. If the acclimation time is cut short, readings could be too low. In your report note: times when the sleeves are placed, when the RH probes are inserted and when the readings are taken. If not enough RH probes are on hand, the RH probes can be leap-frogged and used to measure the next set of holes, an advantage of removable probes. Leap frogged RH probes acclimate faster to the true readings.

To avoid extended waiting periods beyond the 24 hrs required by ASTM F2170-18, ** you can insert the RH probes at the time the sleeves are placed. Wait at least one hour for the drilling heat to dissipate before inserting the RH probes. Then, wait until 24 hrs passed to obtain and document final readings.

Measurements taken after 1 hour are a good indication of the moisture conditions. If the measurements after 1 hour are already above the acceptable RH range, the slab has failed.

Drill all holes at the same time. Once the measurements for all RH probes after 24 hours have been taken, the RH probes can be leap-frogged. These “acclimated” leap frogged RH probes show true readings within 1 hour. In any case, the sleeves have to sit for at least 24 hrs and readings have to be stable.

The same RH Probe in the same sleeve can be read multiple times. However, the RH Probe should not ever be removed from the sleeve during the same test. Between readings, cover the sleeve with the red cap.

We recommend using a different RH Probe to measure ambient air temperature and relative humidity in the room/building.

** The manufacturer of the RH sensing element inside the RH probe recommends not to expose the sensing element over an extended period of time to high relative humdity (over 95%). Please check if those high humidity conditions exist inside the sleeves and make sure the RH probes are not left for hours in these conditions.

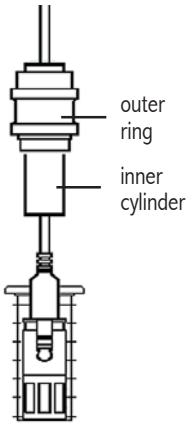
**Obtaining Measurements**


- Connect RH BluePeg Probe to meter via RH cable or RH Adaptor. (RH meters: Ligno-Tec RH, Ligno-DuoTec BW or Ligno-VersaTec)
- Press the READ button. RH, T, DP, GPP and the probe number appear on the left side of the display. The corresponding measured values appear to the right.
- Press HOLD, then ▲ or ▼ keys to toggle between RH, T, GPP, DP.

**Set Probe:** Remove blue cap and drop RH BluePeg into sleeve. Use red cap to mark sleeve with RH probe inside. For acclimation see page 3 “Measurements” and latest ASTM standard.

**Taking Readings in Concrete:** Remove red cap, connect 3.5 mm Plug (P). The plug fits into the top of the RH probe easily. Do not remove probe from sleeve to connect the cable, this disturbs the acclimation of the probe and the climate in the hole.

**Connect Cable to RH Probe for Measurements**




- Remove red cap. Push cable-end-cover back and plug 3.5mm connector into probe. Do not remove the probe from the sleeve.
- Push outer ring into the lip of the sleeve and push inner cylinder down towards the probe. If the inner cylinder already touches the top of the probe, the cylinder will not move down any further. Connect cable to meter and take a reading. After RH value appears, press HOLD and toggle to Temp.

**Remove Cable:** Hold the inner cylinder and outer ring (C) in place with one hand and pull the end of the cable above the inner cylinder about 3/4” towards you . This disconnects the cable from the probe. Now you can remove the cable with the cable-end-cover and the probe will stay in the sleeve.


**Remove Probe:** After removing the cable as described above, simply connect the cable again and pull the probe out of the sleeve.

After a test series is finished, all probes should be removed. The sleeves are unusable after the test, since the fins which seal the air are rubbed off. Remove the lip of the sleeve and close the hole with a cementitious patching compound to produce a smooth surface.

Once a test series is finished, the same holes should not be used for another test series at a later time.

**Maintenance**

After testing is finished the RH BluePeg probes should be stored in the original packaging and kept in a dry location. We recommend 20 to 60% relative humidity and 50$^0$F to 120$^0$F (10$^0$C to 50$^0$C). Visible dust should be removed.

**Calibration:** Follow ASTM F2170 standard. The RH Blue Peg sensing element is a single microchip calibrated to NIST standards. The microchip manufacturer assures long term calibration stability. According to ASTM F2170-18 probes should be checked within 30 days before use. During the one year warranty period, Lignomat offers to check the calibration free of charge three times.

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**Accessories**

A -Cap to cover sleeve

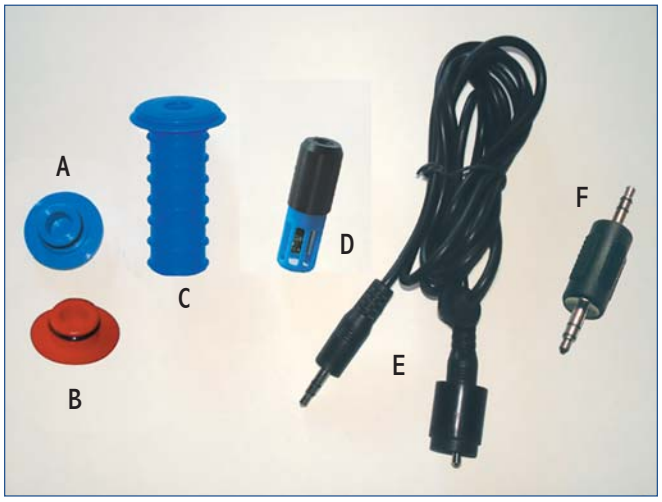
B -Red Cap to mark sleeve with RH probe inside.

C -Sleeves 1.8" or 3"

D -RH BluePeg probe

E -RH-C Cable with cable-end-cover to plug into sleeve.

F- RH Adaptor for direct connection of probe to meter.




Accuracy of Humidity Readings: +/-1.8% for 10% to 90%, up to +/-3% below 10% and above 90%.
Accuracy of Temperature Readings: +/-0.5$^0$F for 32$^0$F to120$^0$F, up to +/-1$^0$F for 5$^0$F to 32$^0$F and 120$^0$F to160$^0$F.

### RH BluePeg 5, 10, 25 Pack:

Convenient, time-saving, reusable. Since multiple test locations are necessary to obtain representative moisture data for a test site, using several RH BluePeg probes per test site cuts down on waiting time for the sensors to be acclimated.

### RH Adaptor:

Ideal for measuring ambient conditions of relative humidity and temperature. 3.5 mm male plugs on both ends to connect meter to RH BluePeg Probe.

### Sleeves with Caps 20 Pack:

The sleeve is a liner for the test hole, drilled with a 5/8" concrete drill bit. A cap with seal ring covers the opening. RH-S20 pack containes 20 sleeves and caps . For deeper holes 3" sleeves are available.

### RH Cable with Cable-End-Cover:

Easy-to-use 3.5 mm plug conncets and disconnects the cable from the RH-BluePeg probe. Cable-end-cover secures cable in place while taking readings and is used to disconnect the cable from the RH BluePeg probe, while the probe stays in the sleeve.

**Lignomat RH Meters - with Connector built-in for Lignomat RH BluePeg Probes**

**Ligno-Tec RH: A, B**

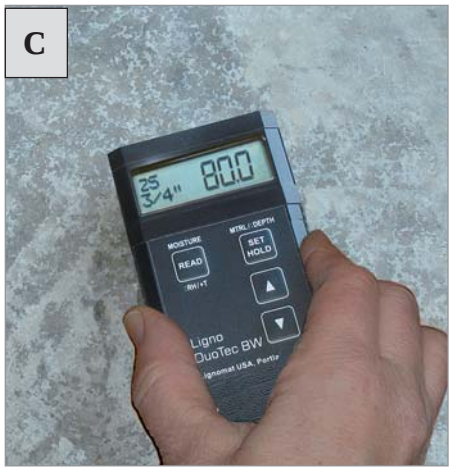
**Ligno-DuoTec BW: A, B, C, D**

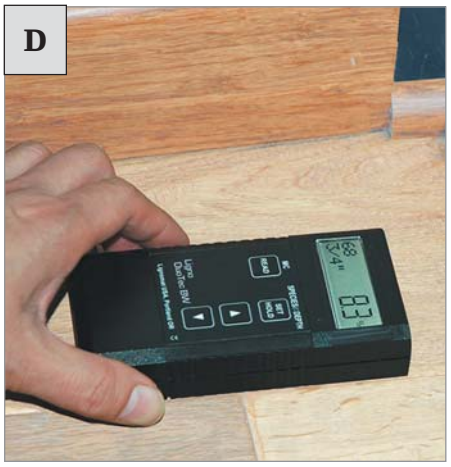
**Ligno-VersaTec: A, B, C, D plus Pin Mode**



**A** Measurement of relative humidity, temperature, DT,GPP.

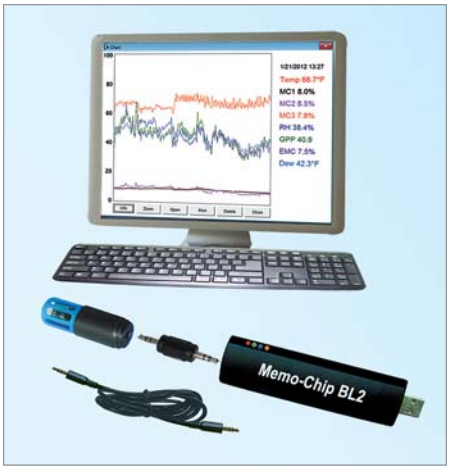
**B** In-situ RH test, measurement of RH and T in concrete.




**C** Non-invasive concrete measurement. Qualitative values of high and low moisture levels.

**D** Non-invasive wood and bamboo measurements. Meter gives percentages of moisture content for wood and bamboo.




BL2 is a data logger for Lignomats RH Probe. The data logger can be used to keep track of ambient conditions in the test location.
Or,
can be connected to the RH probe in the sleeve, to make sure the probe is acclimated.