

## Owner's Manual PX-20 & PX-30



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# 1. Introduction

Thank you for purchasing the new PX-20 or PX-30, the latest in Delmhorst's legacy "P-series" pin-type (conductance) moisture meters from the new Navigator™ family of moisture meters. Delmhorst P-meters are known worldwide for their unmatched reliability and ease of use.

The PX meters are ideal tools for the paper industry. These exciting new meters offer the latest in features and functionality. They are packaged in a robust and ergonomically designed ABS case (patent pending) to provide a premium, tactile feel, and intuitive user interface with dashboard-like display.

Together with the new Delmhorst **EDGE™** app (PX-30), users can customize meter settings and share MC data or graphs from any jobsite quickly and accurately.

The PX meters carry a two-year limited warranty. [REGISTER YOUR METER](#) by using the QR code on the back of the meter to receive an additional three month's warranty.

We recommend that you read the following pages in detail to take full advantage of all the PX-20 and PX-30 meters have to offer.

Should you need assistance at any time, please contact us via email at [info@delmhorst.com](mailto:info@delmhorst.com) or by calling 877-DELMHORST (335-6467).

## 2. Safety



**Sharp Measurement Pins:** The measurement pins are very sharp as they are intended to penetrate through hard materials. Ensure that the pin cap is always covering the pins when not in use to avoid unintentional injury to the user or others.



**Meter Calibration:** Meters are factory-calibrated prior to shipment. Calibration should be checked before performing a job (using the internal Cal Check feature or external MCS calibration standard) to ensure the meter is working correctly and electrically accurate.



**Proper Use:** When used properly, the PX meters can help users make informed decisions on the moisture levels of hygroscopic materials. A moisture meter is a secondary method of determining moisture content, and users should be aware of other potential influences on the accuracy of conductance meter readings.

## 3. Meter Features



Figure 1: Meter components

1. **Display** - Easy to read, backlit LCD display.
2. **Read Button** - When in live reading mode, press this button to hold a reading. When in any other mode, press this button to enter live reading mode.
3. **Navigation Buttons** - Use the up/down/left/right buttons to navigate through the meter's display. Use the center button to confirm a selection.
4. **Easy Grip Handle** - The handle is contoured to provide a comfortable grip for right or left-handed users. This shape also allows for increased leverage when

pushing the meter into hard materials. The battery door is located on the rear of the handle.

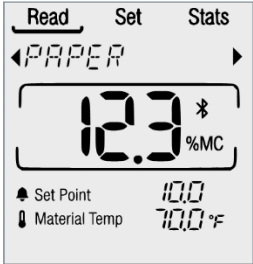
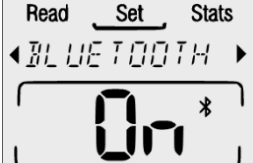
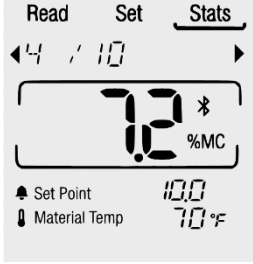

5. **LEDs** - (PX-30) The GREEN light indicates a sufficiently dry moisture level, the YELLOW light indicates a borderline condition, and the RED light indicates material that is wet. Please see the [LEDs section](#) in the Appendix for further details. The LED values can be adjusted for specific materials through the *Edge*<sup>™</sup> app.
6. **Ambient Light Sensor** - When the backlight is set to Auto, the ambient light sensor will trigger the backlight to turn on or off (to the brightness level set by the user) according to ambient lighting conditions.
7. **Contact Pins and Pin Cap** - Integral contact pins provide penetration up to 5/16 in and are easily removable and replaceable. Be sure to leave the pin cap on the meter when the pins are not in use. Replacement pins are part no 2498/A-100 and should be used to accommodate the proper fit of the pin cover. The 2497/A-100 pins (used on older P-series) may also be used, but the pin cover will not fit.
8. **Electrode Connector** - Connect any external special application Delmhorst electrode. Be sure to leave the electrode cap on when the electrode connector is not in use to keep the connector clean.

# 4. Menu Features

The Delmhorst PX meters have three operating modes: **Read**, **Set**, and **Stats**. The currently selected menu is marked with an underline. To change the menu, press the up button until the menu underline is blinking. Then use the left and right buttons to switch between menus. Use the down or center button to enter the menu.

Table 1: Menu Features

\*PX-30 Only

Read	Set	Stats
		
<ul style="list-style-type: none"> <li>• Change material type <span style="float: right;">2 →</span></li> <li>• Take readings <span style="float: right;">3 →</span></li> <li>• Change set point <span style="float: right;">4 →</span></li> <li>• Change material temperature</li> </ul>	 <ul style="list-style-type: none"> <li>• Off Timer</li> <li>• Backlight ON/OFF/AUTO</li> <li>• Backlight brightness</li> <li>• Screen contrast</li> </ul>	<ul style="list-style-type: none"> <li>• Total Readings</li> <li>• Average value</li> <li>• Highest value</li> <li>• Lowest value</li> <li>• Standard deviation</li> <li>• View readings</li> <li>• Erase all reading data</li> </ul>

components

# 5. Read Menu

Figure 2: Read screen

## 1. Material Selection and Correction

**Info:** The PX-30 comes with 3 material calibrations: Paper, Reference -Paper, and Baled Scrap, and through the EDGE™ app, users can remove any unwanted species. The PX-20 includes Paper only.

**Use:** Select the Read menu. While the underline flashes, press the down button to enter the species/material selection field. Press the left or right buttons to scroll through available species/materials. Any changes to the material selection field will NOT be saved until the center button is pressed to confirm. **When the material is changed, the user will be asked if they want to erase the data in the meter. Selecting NO will return the user to the original material and keep all readings. Selecting YES will delete all saved readings within the meter and change the material.** If connected to the EDGE™ app, users will be prompted to export readings before they are deleted from the app. Please see Delmhorst EDGE™ App User Guide for further instructions regarding exporting readings and changing the available species/material corrections in the PX-30.

## 2. Live Reading Area

**Info:** The live reading area displays the corrected moisture value of the material. The reading is corrected using the Material Type (1), and Material Temperature (4) (see [Figure 2](#) above).

Indicated readings with a less than (<) or greater than (>) sign are considered out of range. Out of range readings can be saved to memory and exported but will not be used in stats calculations.

The meter tends to read the highest moisture content that is in contact with both pins. If thick samples are not well equalized, it may be necessary to make tests at different depths to determine the degree of uniformity of moisture distribution in the sample.



If the meter is used on stock so thin that the full length of the pins are not entirely embedded in the thickness of the sample, the readings tend to indicate a lower than actual MC. This can be overcome by testing more than one sample in stacks.

**Use:** Use the navigation buttons to move to the live reading area (entry will be confirmed when a live reading appears on screen). **Tip: If a live reading is not currently being displayed, pressing the Read button will navigate to the live reading area.**

**Take a Reading:** Insert the pins into the desired material to their full penetration (if possible). The moisture content of the material will appear in the live reading area.

**Hold a Reading:** Press the Read button to hold the reading on screen. HOLD will appear in the material selection line and the meter will beep. A held reading can be saved, if desired (see below). Saving a reading or pressing the Read button a second time will return the meter to live reading mode.

**Save a Reading:** Press the Center button to save a live or held reading. This will store the reading, material temperature, and pin correction type to meter memory. A 'Saved' message will appear followed by the memory slot which the reading occupies (ex. Paper 2/100). This message can be bypassed by pressing the Read button.

**Memory:** There are 100 memory slots available in the meter. As readings are saved, the memory slots will fill in order from lowest (1) to highest (100). After 100 readings are stored, newly saved readings will replace the oldest stored readings. Unlimited number of readings may be saved when connected to the app.

### **3. Set Point**

**Info:** The Set Point is the user-selectable moisture level at which the alarm will sound. This feature allows users to take readings without having to review each one individually, helping to quickly identify high moisture areas.

**Use:** When active, press the left and right buttons to adjust the Set Point down or up. Holding the left or right buttons will cause the Set Point to change more rapidly.

The Set Point alarm can be turned off by adjusting the set point value to zero (--.).

When changing the active material of the meter, the Set Point will reset to the default values for the new material, with one exception. If the Set Point has been turned off (--.), it will remain off for the new material/species.

#### **4. Material Temperature**

**Info:** The material (paper) temperature will typically be equivalent to the ambient temperature of the environment. As the temperature increases, the indicated moisture content will increase above the actual moisture content. Lower material temperatures result in a lower indicated moisture content.

For best accuracy, it is important to use the temperature correction in the meter, especially when working in extreme environments (outside 50-90°F or 10-32°C) and environments subject to temperature variation.

**Use:** When active, press the left and right buttons to adjust the Material Temperature down or up. Holding the left or right buttons will cause the temperature to change more rapidly.

## 6. Set Menu

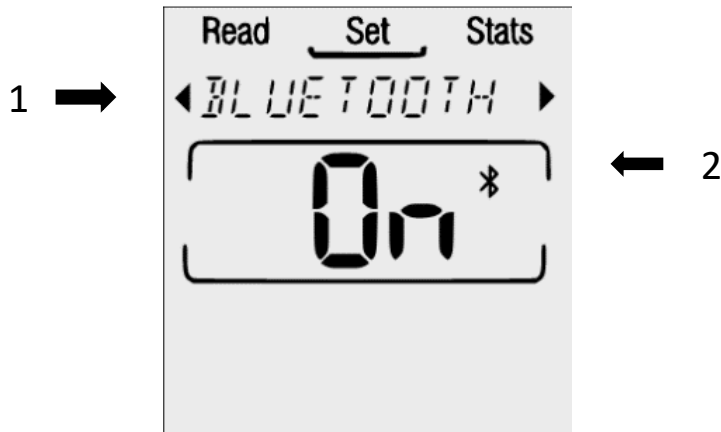


Figure 3: Set screen components

### 1. Setting Selection

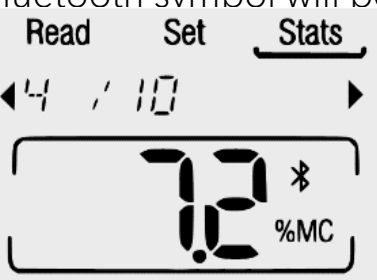
The setting selection area will display all settings in a scrollable list. Each setting is listed and explained in Table 2 below. Press the left and right buttons to view settings. After locating the desired setting, press the down or center button to enter the setting state. Then press the Read button to enter the live reading screen.

### 2. Bluetooth® Indicator

The PX-30 is equipped with Bluetooth® technology, allowing users to connect their meter(s) to a mobile device (smartphone or tablet). The Bluetooth® icon is visible on all meter screens when turned on. Please refer to the Delmhorst EDGE™ App User Guide for more information.

Table 2: Settings options

Setting	Description
Cal Check	<ul style="list-style-type: none"> <li>Allows users to check the electrical calibration of the meter</li> <li>A value between 11.8 and 12.2 means the meter is in calibration</li> </ul>

	<ul style="list-style-type: none"> <li>• A value of &lt;11.8 or &gt;12.2 means the meter is out of calibration - change the batteries (2 x AA)</li> </ul>
<p>Bluetooth® (P-X30 only)</p> <p>1 →</p> <p>2 →</p>	<ul style="list-style-type: none"> <li>• When Bluetooth is on but not connected, the Bluetooth symbol will be on screen and flashing</li> <li>• When Bluetooth is on and connected, the Bluetooth symbol will be on screen and solid</li> <li>• When Bluetooth is off, the Bluetooth symbol will be visible on screen and solid</li> </ul> 
Temperature Unit	<ul style="list-style-type: none"> <li>• Choose Fahrenheit or Celsius as the unit between Fahrenheit and Celsius</li> <li>• Factory default is Fahrenheit</li> </ul>
Off Timer	<ul style="list-style-type: none"> <li>• Choose 1, 4, or 10-minute screen off timer</li> <li>• <i>Factory default is 1 minute</i></li> <li>• Manually turn the meter off by depressing the center button until screen goes blank - approx. 3s</li> </ul>
Backlight	<ul style="list-style-type: none"> <li>• Turn backlight ON enable, and OFF to disable</li> <li>• Turn the backlight ON when in low ambient light, and OFF when in bright ambient light</li> <li>• When set to AUTO, meter will automatically enable and disable backlight according to ambient light</li> <li>• <i>Factory default is off</i></li> </ul>
Brightness	<ul style="list-style-type: none"> <li>• Adjust backlight brightness from 1 (low) to 10 (high)</li> <li>• The selected brightness level will be used whenever backlight is enabled (ON or AUTO)</li> <li>• <i>Factory default is brightness level 2</i></li> </ul>
Contrast	<ul style="list-style-type: none"> <li>• Adjust the contrast level of the screen from 1 (low) to 10 (high)</li> <li>• <i>Factory default is contrast level 5</i></li> </ul>

## Stats Menu

Figure 4: Stats screen components

### 1. Stats Selection

The stats selection area will display all statistics in a scrollable list (see Table 3 below). Press the left and right buttons to view statistics.

## 2. Stats Details

Statistics are calculated from the list of saved readings in meter memory, and only readings taken within the valid measurement range of the selected material are used for the calculations. Out of range (OOR) readings will not be included in statistical calculations for average and standard deviation.

The meter provides statistics (average, high, low, standard deviation) for the readings that are currently stored in the meter. Note: The statistics in the meter are calculated without any out of range readings.

The stats details section can only be selected for the 'Last 10' and 'Erase Data' options. For these two cases, press the down or center buttons to enter stats details box from stats selection. Use the left and right buttons to scroll the list of latest readings or select the desired option for clearing readings. For all other statistics, stats details will simply reflect the details of the above statistic and cannot be selected.

Table 3: Available Stats

Statistic	Description
Readings	<ul style="list-style-type: none"> <li>• Displays the total number of readings stored in the meter</li> </ul>
Average	<ul style="list-style-type: none"> <li>• Displays the average value of the saved readings.</li> </ul>
High	<ul style="list-style-type: none"> <li>• Displays the highest value of the saved readings.</li> </ul>
Low	<ul style="list-style-type: none"> <li>• Displays the lowest value of the saved readings.</li> </ul>
Standard Deviation	<ul style="list-style-type: none"> <li>• Displays the standard deviation of the saved readings.</li> </ul>
View Data	<ul style="list-style-type: none"> <li>• Displays a list of all saved readings. The %MC, and temperature of each reading are displayed.</li> </ul>
Erase Data	<ul style="list-style-type: none"> <li>• Clears all saved readings and statistics from the meter.</li> </ul>

## 8. Applications

### Testing Paper, Paper Cores and Corrugated Products

Set the material to PAPER. Select the Set Point and set the Material Temperature, if desired. Check that the contact pins are firmly hand tightened. Push the contact pins into the material to their full penetration, if possible. The meter will display the %MC.

The readings are the result of an “average” calibration, if a high degree of accuracy is required, the meter should be checked on the specific material and corrections determined by the user.

The meter tends to read the highest moisture content that is in contact with both pins. If thick samples are not well equalized, it may be necessary to make tests at different depths to determine the degree of uniformity of moisture distribution in the sample. If the meter is used on stock so thin that the full length of the pins is not entirely embedded in the thickness of the sample, the readings tend to indicate a lower than actual MC. This can be overcome by testing more than one sample in stacks.

Special application external electrodes for very hard materials, books and stacks, and material on a moving web are available. [www.delmhorst.com](http://www.delmhorst.com)

### Using the 0-100 Scale

The REF-PAPER scale is used to test the moisture content of hygroscopic materials for which calibration is not available. Depending on the material, a special application external electrode, instead of the integral contact pins may be required. Increasing readings on the 0-100 reference scale indicate higher levels of moisture content. These readings can be translated into percent moisture content once a calibration has been developed.

Set the meter to REF-PAPER. Select the Set Point and set the Material Temperature, if desired. Push the contact pins (or other external electrode) into the material. The meter displays a relative value. This number is not a quantitative %MC.

The readings may be used for comparative tests, after meter readings have been related to given conditions for the materials involved. When the meter is used for

comparative tests, readings should be taken on samples considered to be at “safe” levels or in satisfactory condition. These readings are then used as the “standard” against which subsequent readings on the same material are evaluated. The “standard” for any given material is related to safe storability or any other property which is important for further production processing.

## Testing Baled Scrap Paper

Set the meter to BALED SCRAP PAPER. Select the Set Point and set the Material Temperature, if desired. Connect the H-4 handle with a #830-series prod (10” or 18”) to the meter. Insert the electrode into the material. The meter will display the %MC.

The level of accuracy of meter readings depends on a number of factors: similarity between the material tested and samples on which the calibration was made; moisture distribution; and chemical application or processing which may affect the electrical properties of the paper product. A sharp, steel rod to open the hole for the prod may be helpful if the bale is very dense. A few meter readings in a limited number of specific areas of a large mass cannot be projected to indicate an average moisture content of an entire bale.

The readings can be very helpful in providing an indication of the overall moisture condition inside the bale and to detect areas of excessive moisture. Meter readings may be used as an arbitrary guideline in determining whether or not to accept or reject the material. When checking the moisture condition of bales is performed when buying and selling, the specific value of the meter readings is a point to be agreed upon between buyer and seller. Such an agreement should consider not only a specific “range” of readings, but the number and location of where they are taken.

The following ranges can be used as a guideline and may help to interpret the readings:

- Readings of 5%–10%, with EMC to 60% RH are usually considered “dry”.
- Readings from 11%–20% with EMC to 95% are usually considered “acceptable” but should be taken with some reservation.
- Readings of 20%–40% are considered “wet” and unacceptable.

## 9. Delmhorst *EDGE*™ App Features

The Delmhorst *EDGE*™ app expands upon many features found within the PX-30. These features include:

1. Export full data sets or selected readings from meter to app to be viewed on a single page and further analyzed.
2. Exclude extraneous readings from Statistics calculations.
3. View a customizable plot of all readings.
4. Export readings from app to spreadsheet for long term storage and analysis.
5. Change the materials available in the PX-30 meter.
6. Adjust the moisture values at which the LEDs change colors.
7. Upgrade meter firmware.

Please refer to the Delmhorst *EDGE*™ App User Guide for more details on how to connect the meter to the app and a detailed explanation of the features mentioned above.

## 10 . Specifications and Operating Conditions

### **Temperature Compensation Range (not operating)**

0-255 °F / -18-124 °C

### **Reading Range**

Paper: 4.3 - 20% MC

Ref - Paper: 5 - 100 REFERENCE SCALE

Baled Scrap: 7 - 40% MC

### **Power**



## 2x AA Alkaline Batteries

Battery life while using the meter in reading mode and active LED's is estimated at 125-150 hours. A combination of alarm, backlight and Bluetooth will reduce expected life to a minimum of 35 hours. A "LOW BATT" warning will appear on screen when the meter is woken up if battery voltage is below 1.75V. At this level the meter has 1-2 hours of life depending on the functions being used. The same alert is sounded and displayed every 5 minutes. Continued use with a low battery may cause your meter to go out of calibration. **TIP:** Extend battery life by turning Bluetooth® off in the meter when not in use, setting the backlight brightness low, and using shorter timeout settings.

## Size

8.6 in x 2.9 in x 1.6 in (22 cm x 7.4 cm x 4.1 cm)

## Weight

6.9 oz (0.20 kg) without batteries

8.6 oz (0.24 kg) with batteries

## Regulations/Compliance

WEE, RoHS, CE

## Dispose of your Meter



Figure 5: WEEE symbol - crossed out wheeled bin

## **For private households: Information on Disposal for Users of WEEE**

This symbol (figure 5) on the product(s) and / or accompanying documents means that used electrical and electronic equipment (WEEE) should not be mixed with general household waste. For proper treatment, recovery, and recycling, please take this product(s) to designated collection points where it will be accepted free of charge. Alternatively, in some countries, you may be able to return your products to your local retailer upon purchase of an equivalent new product.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

Please contact your local authority for further details of your nearest designated collection point.

Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

## **For professional users in the European Union**

If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.

## **For disposal in countries outside of the European Union**

This symbol is only valid in the European Union (EU). If you wish to discard this product, please contact your local authorities or dealer, and ask for the correct method of disposal.

# **11. Meter Care, Service and Warranty**

## **Care for your Meter**

To keep your meter in good working order:

- Store your meter in a clean, dry place. The protective carrying case provided is an ideal storage place when the meter is not in use.
- Change the AA batteries as needed. Continued use with a low battery may cause the meter to go out of calibration. Remove the batteries if the meter will not be used for one month or longer.
- Change contact pins as needed. Keep pins' retainers hand tightened.
- Clean the meter and contact pins with any biodegradable cleaner. Use the cleaner sparingly and on external parts only. Keep cleaner out of the external connector.
- Ensure the pin cap is always covering the pins when not in use to avoid unintentional injury. Keep the connector cap in place when not using an external electrode to keep the connector clean. Each meter includes two short pieces of nylon cord to tie into tethers for the pins covers, if desired. See instructions under the Manuals and Training section of the website.
  - PX-20 - <https://www.delmhorst.com/moisture-meters/PX-20#manuals>
  - PX-30 - <https://www.delmhorst.com/moisture-meters/PX-30#manuals>

## **Service Your Meter**

If your meter is not working properly, replace the batteries and check the calibration. If this does not resolve the problem, go to [www.delmhorst.com](http://www.delmhorst.com) and follow the instructions under the Support tab. If you require further assistance, please call 877-DELMHORST (335-6467) or 973-334-2557.

## **Limited Warranty**

Delmhorst Instrument Co. 51 Indian Lane East, Towaco, NJ 07082, referred to hereafter as Delmhorst, guarantees its PX series moisture meters against defects in material or

workmanship for two years from date of purchase. Optional electrodes are guaranteed for 90 days. See the owner's manual or Delmhorst website ([www.delmhorst.com](http://www.delmhorst.com)) for warranty period on your specific product. If, within the warranty period of the product, you find any defect in material or workmanship, return the meter to Delmhorst or an authorized reseller, using the return form <https://www.delmhorst.com/returns-service-warranty>. Include proof of purchase. Shipping charges to return the product are customer's responsibility.

This warranty does not cover abuse, misuse, damage during shipment, improper service, unauthorized or unreasonable use of the meter or electrodes. This warranty does not cover normal wear and tear, batteries, or pins. If the meter or electrode have been altered or tampered with, the warranty shall be void. **DELMHORST RESERVES THE RIGHT TO REPAIR OR REPLACE THE PRODUCT AT ITS SOLE DISCRETION.**

Delmhorst shall not be liable for incidental or consequential damages for the breach of any express or implied warranty with respect to this product or its calibration. The meter should stay in calibration indefinitely with proper care and maintenance. Follow the manufacture's guidelines in the owner's manual.

**UNDER NO CIRCUMSTANCES SHALL DELMHORST BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES OF ANY TYPE WHATSOEVER, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS OR DOWNTIME ARISING OUT OF OR RELATED IN ANY RESPECT TO ITS METERS OR ELECTRODES AND NO OTHER WARRANTY, WRITTEN, ORAL OR IMPLIED APPLIES. DELMHORST SHALL IN NO EVENT BE LIABLE FOR ANY BREACH OF WARRANTY OR DEFECT IN THIS PRODUCT THAT EXCEEDS THE AMOUNT OF PURCHASE OF THIS PRODUCT.**

The express warranty set forth above constitutes the entire warranty with respect to Delmhorst meters and electrodes and no other warranty, written, oral, or implied applies. This warranty is personal to the customer purchasing the product either from Delmhorst directly or through an authorized reseller. Purchases through unauthorized resellers, including but not limited to unauthorized e-commerce resellers, are not covered by this warranty, to the extent permitted by law.

This warranty extends to the original owner only and is not transferable.

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# 12. Appendix

## LED Details

The LED's are a visual aid to help quickly determine the moisture level that each reading indicates. Readings that activate the green light indicate a sufficiently dry moisture level, those that activate the yellow light indicate a borderline situation, and those that activate the red light indicate material that is too wet for most applications. **Specific applications require different MC thresholds.** The Delmhorst *EDGE*<sup>™</sup> app enables users to adjust these thresholds accordingly.

The default LED thresholds are as follows:

- Paper
  - Green: 4.3 to 6.9 %MC
  - Yellow: 7 to 9.9 %MC
  - Red:  $\geq 10.0$  %MC
- Reference - Paper
  - Green: 5 to 39 REF
  - Yellow: 40 to 49 REF
  - Red:  $\geq 50$  REF
- Baled Scrap
  - Green: 7 to 15.9 %MC
  - Yellow: 16 to 18.9 %MC
  - Red:  $\geq 19$  %MC