

## **SOP-BALL-8     Ball Cleaner FTIR % Residue**

**Purpose:** To determine whether or not a ball cleaner leaves residue on the surface of a bowling ball.

**Materials:**

- Spectrum 100 Series Perkin Elmer FT-IR
- Spectrum software and computer to run it
- Coverstock discs: Reactive, Urethane, Polyester
- Kimwipes
- Cleaner for testing
- Isopropyl alcohol (IPA)
- 25X - 400X Photo Capture 8 LED AV Digital Microscope Endoscope Magnifier Loupe Camera
- Designated hardness test ball

**FTIR Procedure:**

1. Ensure sample has been entered in LabLog and given a printed label
  - a. Locate the “LabLog” online
  - b. Select “Log Entry”
  - c. Make sure to fill in all the fields possible using the cleaner and application:
    - Sample Number – 7 digit number, the first two numbers will be the last 2 digits of the current year followed by a hyphen and a 5 digit number representing the nth product received in the current year.
2. Power on the Instrument
  - a. Power on FT-IR and wait for display on PE Spectrometer
  - b. Power up computer and log in as Administrator (no password)
  - c. Select the Spectrum icon on the Desktop.
  - d. At Perkin Elmer Log-in click OK
3. Run a System Suitability Check
  - a. Perform the system suitability check at the beginning of each workday the instrument will be used.
  - b. Using a Kimwipe, swab crystal (located on the top-plate) with IPA, or other acceptable solvent, and allow the top-plate to dry.
  - c. From the menu toolbar, at the top of the page, select: Measurement > Instrument Checks > Ready Checks > Run Selected
  - d. Select OK to run system suitability check. Once instrument has been validated, save the report in the appropriate folder.
4. Take a Background Scan
  - a. On the sample (upper) toolbar, located at the top of the screen, type “background” in the Sample ID cell and “background” in the Description cell.
  - b. Make sure that the “Accumulations” cell to the left designates 16 scans. (This is the default.)



- c. Select the Background icon from the upper toolbar. The scan will automatically begin and the report will print once the background is complete.
5. Select the most recently dated or highest numbered coverstock discs from each of the three chemistries (plastic, urethane, reactive) from the drawer below the FTIR.
6. Clean the plastic disc thoroughly by applying IPA and rubbing a Kimwipe in circular motions.
7. Set data collection location.
  - a. Select “Instrument” from the **Setup** bar located on the vertically on the right side of the screen.
  - b. In the bottom window of the screen, select the “Setup Instrument Data Collection” tab.
  - c. Under “Auto-Save Options” make sure that the “Save after each measurement” box is checked.
  - d. In the box below, click the “...” button to choose your Save Location.
  - e. You should select the folder with the current year’s ball cleaners.
  - f. Create a new folder that should be named with the LabLog number of the cleaner you are testing.
  - g. Make sure this new folder is highlighted and select “Okay”.
7. Scan the disk.
  - h. In the “Sample ID” cell on the sample toolbar, enter in the LabLog number of the cleaner being tested, which coverstock disk and number is being used as well as “Blank” or “Sample”
    - Examples: “17-00100 P# Blank” (plastic), “U# 17-00100 Sample” (urethane)
  - i. Enter all other known information in the Description cell.
  - j. Make sure that the Accumulations cell designates 16 scans.
  - k. Ensure that the disc is completely dry before gently placing it label-side-up (smooth side down) over the crystal.
  - l. Move arm over the sample and apply light pressure by rotating knob clockwise.
  - m. Select “Scan” from the toolbar. (This takes you to a preview screen.)
  - n. Monitor the force gauge and do not exceed 150.
    - You want your vertical axis numbers to begin as low as possible. Aim for 40-50.
  - o. Select scan.
  - p. When complete, sample spectrum will appear on monitor.
  - q. Select the Results tab just above the graph to check scan quality. If green, proceed to the next step. If orange or red, repeat from 4a.
    - If this becomes a reoccurring issue, you may need to sand the discs surface smoother or acquire new disks.
  - r. If the Results Table shows your data as Not Saved, save the collected scan.
  - s. Turn the knob on the FTIR counter clockwise to release the sample and return arm to its original position.
  - t. Remove the sample gently.
8. Clean the plastic disc thoroughly by applying the testing cleaner and rubbing a Kimwipe in circular motions and repeat Step 7.

9. Clean both the top-plate of the FTIR and the sample disk with IPA and a Kimwipe to eliminate cross-contamination before analyzing another sample.
10. Repeat Steps 6-9 on the urethane and reactive sample disks.
11. Compare Spectra
  - a. In the Data Explorer window to the left of the screen, right-click the “Samples View 1”, and select “Open spectrum...”.
  - b. Select the 3 blanks for the different coverstocks under the current sample’s folder.
  - c. Delete all remaining spectra in this window under Samples View 1. This will not permanently delete the files.
  - d. From the **Setup** menu on the right select “Compare”
  - e. Under the “Setup Compare References” set the path for your current cleaner’s folder.
    - Make sure that the “Correlation” column reads “0.95”
  - f. Select your 3 coverstock blanks (either all together or separately)
  - g. From the menu select: Process > Compare OR select the Compare icon located above your graph on the toolbar.
  - h. The top-right window under the Compare tab will list the sample correlations within your folder.
  - i. Make sure to match your sample blank to the correct coverstock sample for comparisons.
12. Input data into summary spreadsheet.
  - a. Locate and open the Excel file “Cleaner and Polish Products Data”
  - b. Record the % similarity for each coverstock on the “Results” sheet, on the right side of the table, in the correct row for the cleaner’s LabLog number. This should have been set up when you input the hardness data.
13. Any cleaner producing less than 95.0% (<0.950) similarity to the blank puck is not to be approved or used on bowling balls.

### **Visual Residue Procedure:**

1. Plug the LED Digital Microscope Camera into the USB port on your laptop and load the Windows Camera application. This should bring up the image from the microscope camera instead of the webcam.
2. Place the hardness test ball in the ball cup beneath the microscope camera with the test circle facing upwards towards the lens.
3. Take a picture of the 1 in. circular area to be tested in the hardness SOP. Save this photo in the cleaner’s folder.
4. Repeat steps 2-3 after fully completing the hardness procedures for that cleaner.
5. Inspect the ball surface for any visual residue. Cleaner fails the residue test if a visual residue is present.