



Standard Operating Procedure: SOP-Ball-17 Oil Absorption

Oil Absorption Procedure for Bowling Ball



EQUIPMENT SPECIFICATIONS

<u>Rev</u>	<u>Date</u>	<u>Staff Member</u>	<u>Purpose</u>
9	6/5/18	Dan Speranza	Add detailed ball sanding procedure for ball surface preparation.
8	4/13/18	Jason Milligan	Add USBC Ball and Syringe Stand to materials and conditions.
7	3/26/18	Dan Speranza	Change test time to between 2 hours and 3 days after sanding.
6	8/24/17	Dan Speranza	(1) Added definition of oil absorption end time. (2) Added sanding within 24 hours of testing (3) changed to fastest color determines oil absorption time
5	5/26/2017	Dan Speranza	Added additional ball test parameters
4	5/18/2017	J. Milligan	Add photos and parts
3	4/4/2017	A. Stanton	Procedure clarification
2	2/20/2017	A. Stanton	New equipment and procedures
1	1/23/2017	T. Frenzel	Minor edits and pictures
Origination date: 1/9/2017		Originator: D Speranza	



Purpose: Measure the time for a drop of oil to soak into a bowling ball shell.

Materials and test conditions:

- Bowling Ball
 - Ball is to be at least 7 days old to ensure fully cured and at ambient temperature
 - Ball surface preparation – Ball surface is to be prepared by sanding a maximum of two balls with a new 500-grit abralon sanding pad using a Surface Factory machine at a sanding time of 3 minutes and 9 seconds. Alternatives to the Surface Factory machine will be developed with each manufacturer in an attempt to use their production equipment. The goal of the sanding procedure is to duplicate a similar surface roughness (Ra) as achieved with the Surface Factory machine. The surface roughness can be adjusted by varying the sanding time for the different equipment until a similar surface roughness is achieved.
 - Wait a minimum of two hours after sanding, but a maximum of three days (72 hours) after sanding, to test for oil absorption.

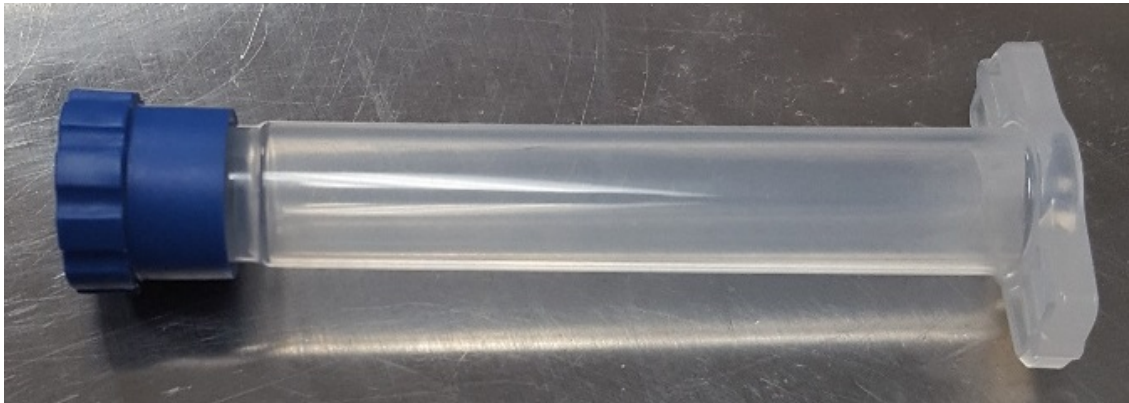
- Test at 70-75 degrees Fahrenheit
- 8 - 25X - 400X Photo Capture 8 LED AV Digital Microscope Endoscope Magnifier Loupe Camera TV-Out
- Q-See 16-Channel Analog HD DVR
- EFD Ultimus liquid dispenser
- Air compressor.
- Test Oil supplied by USBC
- Syringe Kit O BRL/PIST 3CC CL/WH 50
- Syringe Tip 27GA GP .008X.25 Clear 50P
- Syringe Adapter ASM O 3CC BL
- USBC Approved Ball and Syringe Stand
- Computer Monitor
- Ball cups
- 8-Camera Stand



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Procedure:

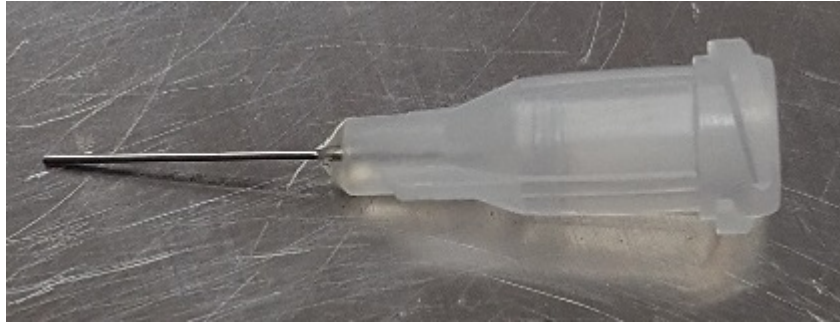
1. Place cap on syringe and fill 1/3 full of supplied oil (see image below).



2. Place blue plunger in syringe, **making sure to leave an air gap between the oil and the plunger** (see below).



3. Hold syringe horizontally, and place needle tip on syringe. Use “clear plastic” tip for oil dropper test (TIP 27GA GP .008X.25 below).



4. Connect adapter with air hose to the syringe. (Completed Syringe below)





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5. Turn on the DVR, monitor, and camera power strip. Select the 3*3 image display setting from the pop-up icon bar at the bottom of the monitor (shown below).



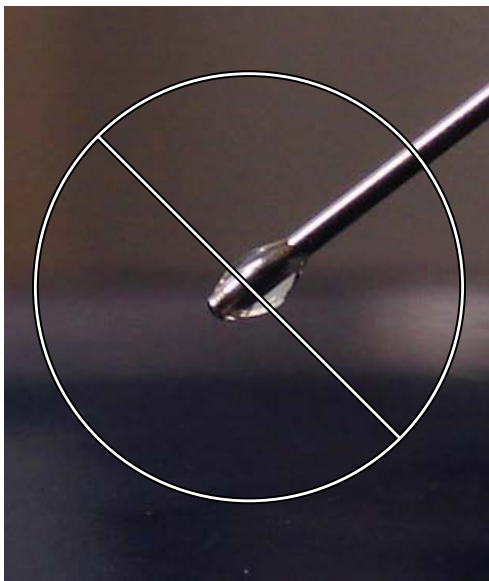
6. Turn on the Ultimius liquid dispenser. Locate and open the valve that supplies compressed air to the regulator going to the dropper (shown below).



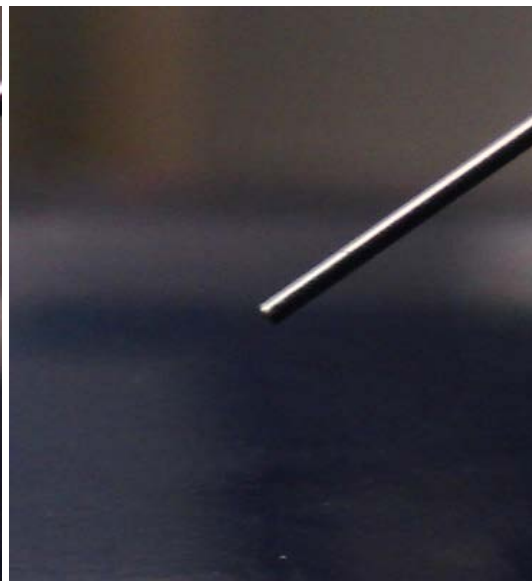


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7. Locate and turn on the air compressor. Then, open the valve to supply compressed air to the air line.
8. Open “Oil Absorption Worksheet” and go to the Oil Absorption Worksheet tab.
9. Fill out ball brand, ball name, serial number, and color being tested.
10. On the DVR monitor, double-click on the image of the camera being used for the first drop. This will enlarge the camera image, allowing you to easily see the running time in the top left corner.
11. Place bowling ball (prepared with 500 grit Abralon) on the USBC Approved Ball and Syringe stand under the oil dropper needle with desired test location positioned straight up. Each ball will be tested with 3 drops in each color.
12. Step on the dispenser pedal to confirm the pressures. Adjust dispenser to the correct settings of 9.0 psi for output (timer should be set to .0500 sec.) and 0.8 psi for vacuum pressure immediately after pedal is released.
13. Remove any oil from the needle tip with a microfiber towel just prior to moving needle into its final application position. Needle should not have any visible oil (or other contaminants) on the tip. (shown below).

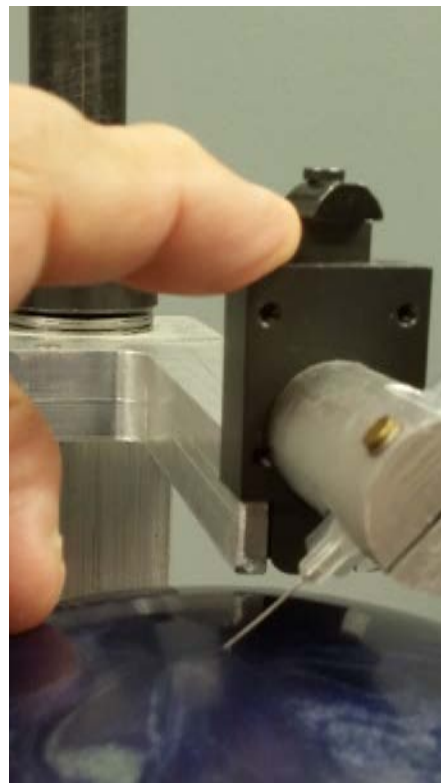
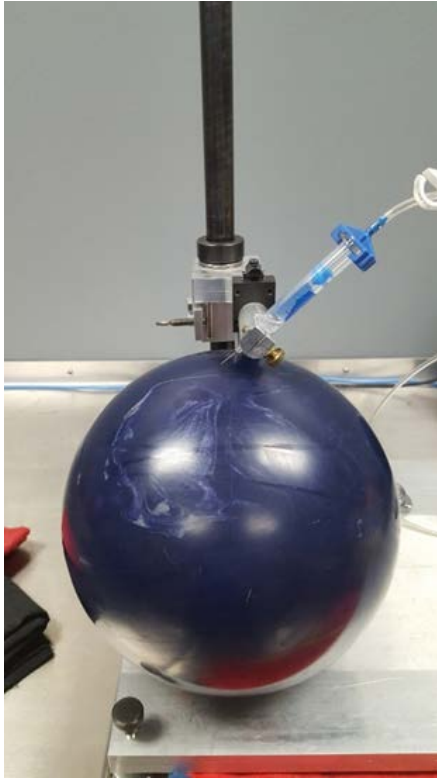


No



Yes

14. Swing the applicator over the ball moving the needle to the application site, ensure the applicator arm is steady, and lower needle until it just touches the ball surface (shown below).



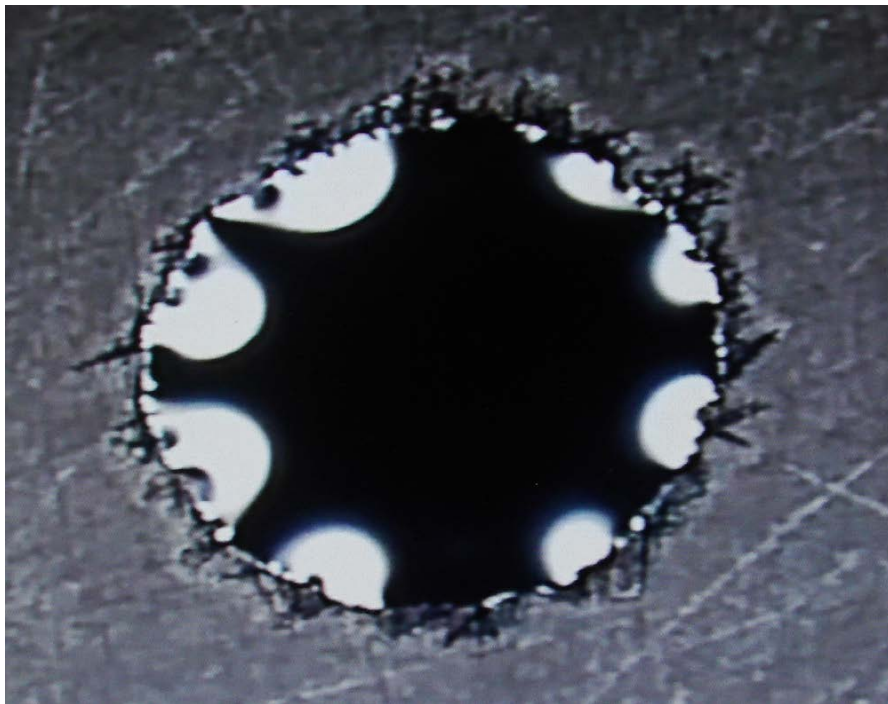
15. Press down on dispenser pedal to apply one drop of oil to the ball coverstock and release needle to allow spring to raise assembly straight up off the ball surface.

16. Swing the oil applicator arm away from the ball.



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17. Record the time shown on the DVR when drop was applied for your start time in the worksheet under “Start Time”.
18. Use a grease pencil to mark around the location of the oil drop on surface of the ball.
19. Place ball in ball cup and slide under camera so the oil drop is visible with the reflections of the LEDs from the camera showing in the oil drop. You may need to focus the image using the dial on the front of the camera.



20. Wait for oil drops to disappear from the camera image before analyzing data.

Note: Make sure you know which camera image corresponds to each camera on the line.



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Data Analysis

1. Once oil drop has disappeared from the camera image, double click on the DVR camera image for the ball you're processing to enlarge that image.
2. Right-click and select the playback button (shown in figure below) in the middle of the pop-up icon bar at the bottom of the screen.





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3. Locate the first point in the video where the oil is completely gone and all images past this point look the same. Time can be stopped if there is one small location that extends the oil absorption time. This most likely occurs at an intersection point of two deep sanding grooves or a small depression created by the oil dispensing syringe needle.

Note: As the playback video is rolling, click/scroll forward through the video until you believe the oil drop is gone. Use the 30-second fast forward and rewind buttons (shown below) to click back and forth through the video while it is playing. Look for the point both images look the same and pixels in the area of the oil drop have stopped shifting. Some ball shells create a permanent stain from the oil drop and this oil absorption time does not include waiting for the stain to disappear. Other shells have a color shift that will disappear in a short period of time. This time would be included in the oil absorption time as the oil is still visibly being absorbed into the shell.



4. Record the time the oil is no longer visible on the DVR as the end time for oil absorption on the Oil Absorption Worksheet under Finish Time. The worksheet will calculate the difference in times which is the oil absorption time for that test, and place that value in the Elapsed Time column for that ball.



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5. Test each color 3 times (outlined in step 11-20) on each ball. **The oil absorption time for a ball will be the average time for the 3 drops in the fastest color.** Therefore, a single-color ball requires only 3 drops. A two-color ball requires 3 drops in each color or 6 drops total.

6. To view the oil absorption time for each ball, open the Oil Absorption Summary tab on the “Oil Absorption Worksheet”. This spreadsheet auto-populates and determines the average oil absorption time for the fastest color within the test ball. The ball model data should be moved into the summary table. Each row of data in the summary table is for an individual color within a ball model. The column called “Avg. Mins” is the average time for each color within all the models. The oil absorption time for a ball will be the minimum value in this column for each ball. A pivot table that pulls out the minimum value for each ball is the easiest way to locate the oil absorption value for each ball. The oil absorption time for each ball model will be the average of the minimum value for the fastest color for each ball tested in that model.