

Field Test Procedure for the Nitrite Ion in Plastic Concrete
(M/T Chem. Proc. C-21.0) Rev. 20070809
(For use in plastic concrete samples)

*** This procedure does not purport to address all the safety concerns associated with its use. It's the responsibility of the user of this procedure to establish appropriate health and safety practices and dispose of hazardous materials in an approved manner.*

SCOPE

Mix water is extracted from plastic concrete using “absorbent dots” of filter paper (0.280” diameter). The dots are transferred to a container where the nitrite is extracted using Distilled water. A test strip is dipped into the solution and read after 15 seconds but within 30 seconds. Readings indicate the concentration of nitrite in the mix water.

REFERENCES:

M/T Chemical Procedure C-20.0, C-20.1, C-20.2

LIMITATIONS and SAFETY

1. Wear appropriate gloves and safety equipment including safety glasses.
2. **The results gained from this procedure are FOR INFORMATION ONLY at the present time.**
3. Ensure that **none of the plastic concrete in the area contacts the hands** or the apparatus as contamination will spoil the tests performed.
4. The Nitrite Ion Test Strips are sensitive to storage and age. See the Checklist (Table 2) in “Field Kit” for more information.

APPARATUS FOR TESTING PLASTIC CONCRETE

1. Four Plastic 150 mL cups or equivalent with volume graduations (No lid needed)
2. #41 Whatman® Filter Paper (12.5 cm) (2 boxes of 100) *[Revised from #40 to #41]*
3. 0.280” diameter “Absorbent Dots” punched from #41 Whatman® Filter Paper (12.5 cm)
Note: The punches used to produce the absorbent dots for this procedure is the “Master” brand, three-hole punch (Center Hole). No other punch is acceptable unless the hole is measured and is the same (0.280 inches). Punch out dots with ONLY one sheet of #41 at a time.
5. Two glass stirring rods
6. Black & Decker® Workbench or equivalent and a windscreen fabricated from cardboard and plywood—(NOT ROUTINELY FURNISHED: For windy /adverse weather conditions)
7. BD® 10cc (2 each) & 60 cc Syringe (2 each) – Luer-Lok® without needles
8. Tooth picks and/or tweezers
9. Pre-formed Avery® #5161 or #5163 (large) Labels with Dot Matrix Table(Figure 1)
10. Clean paper towels or hand towels (nitrite-free)
11. Logbook and Office Supplies (include the labels)
12. Sample Cards with Dot Matrix Labels(2) attached. (50 each)
13. Five gallon carboy for distilled water (For new locations only)
14. 5/8” Hammer Drill SDS Bit – Dewalt #DW5446

REAGENTS

1. EM Science™ Nitrite (NO₂⁻) Ion Test Strips (Keep cool and dry after opening. *Keep refrigerated before opening*) Cat # M100071 (pack of 100) from Fisher-Scientific™ (2 tubes of 100 for Field Kit)
2. Clean Nitrite Free Distilled Water (at least 1 gallon)
3. 10 part per million Nitrite ion solution Standard in Test Tubes, 100mm, Screw Top,

PROCEDURE FOR TESTING PLASTIC CONCRETE FOR NITRITE ION

1. This step may be done in an office environment. Prepare the filter papers for testing inside a suitable shelter away from wind and contaminants. Place 8 (eight) filter dots in the center portion of a piece of #41 filter paper. Arrange them so they do not touch using a toothpick. Cover the dots with another piece of #41 paper and fold the edges of the paper so as to contain the dots and prevent their movement.
2. Check the strips for accuracy with the 10 part per million standard. **See the Checklist (Table 2) for more information.**
3. Once a concrete cylinder has been cast and the top of the cylinder leveled, **with clean hands** place the layered filter paper on top of the cylinder and press the center portion gently into the wet concrete so that all layers of the paper are uniformly wet with water from the concrete. *Ensure the dots are fully saturated.*
4. Refer to Table 1 for how much distilled water to inject based on the mix design using the 10 cc or 60 cc syringe. Place the first dilution amounts(based on mix) in each labeled cup.
5. Unfold the edge of the filter paper carefully so as to expose the dots. Don't allow the bottom of the filter paper to contact the cup ! Using a clean toothpick, transfer two dots to a labeled 150 mL plastic cup and make sure the dots are covered with distilled water to prevent them from blowing away. Repeat the transfer of two more dots to the second cup.
6. Stir each cup for no less than 15 seconds. Wipe the stirring rod after each stir.
7. Only test one cup of dots at a time. Open the canister with the test strips, remove one, close the canister and place the strip in the solution for 1 second.
8. Gently shake off the excess and wait 15 seconds. Read off the value using the comparator provided on the test strip canister within 30 seconds.
9. Fill in the appropriate box on the “Dot Matrix” grid label. Typical boxes are filled in on Figure 1 as an example.

10. Double the dilution in the cup(See Table 1 for examples) and then repeat Step 6, 7, & 8.
11. The completed label is now on the backside of the sample card(s). A second card may be attached but identify it in case of mix up and then staple it to the original.
12. Let the Concrete Technician cap the cylinder, then write “CI Only” on the cap and spray paint it a red color for reference or identify it so this cylinder’s powder sample can be correlated with the “Dot” matrix label.
13. Clean up any contaminated apparatus and prepare for the next concrete sample.
14. Each concrete truck and the final component should be checked using the “SPOT CHECK” tabs. Using these tabs simply walk along the cast component and stick the tab in the fresh concrete to saturate the indicator. It should turn BRIGHT PURPLE . If it does not turn this color there is **not enough nitrite or no nitrite** in that portion of component.

Table 1:

Gals mix (actual)	2 dots [mL]	Should give a Nitrite tab reading value of:
4.0 X 10	40 Then 80	10 5
3.2 X 10	32 Then 64	10 5
3.0 X 10	30 Then 60	10 5
2.5 X 10	25 Then 50	10 5
2.0 X 10	20 Then 40	10 5
Basically this means that 10 mL is used for each gallon of CI in the mix.		
Example: If the mix is known to have a 2.0 gal spec this requires initial addition of 20 mL distilled water in the cup, test, then dilute to 40 mL, and test again. Do one cup at a time.		

**** FIELD CHECKLIST ON NEXT SHEET ****

TABLE 2: CHECKLIST BEFORE PERFORMING C-21.0 PLASTIC TEST

1. Punch out “dots” from #41 filter paper, do so only with an approved hole puncher provided at the office. When punching “dots” use ONLY one sheet of #41 filter paper at a time. Make sure you have enough “dots” in a plastic ziplock bag.
2. Make enough “dot sandwiches”, while in office, from the #41 filter paper for the day’s pour(s). Ensure the “dots” are not stuck together or high C-21 readings will occur.
3. Check strips for accuracy with the 10 part per million standard.
 - a) If the strip does not read correctly write on the tube “For SPOT check only.”
 - b) Get another tube of strips and check for accuracy.
4. When opening a new tube of strips, write the date it was opened on the tube label. Use “For SPOT check only” after the tube has been opened 30 days.
5. Prepare the yellow cards with stick-on labels. (Notify the Chemical Lab when labels are getting low).
6. Store opened test strips as dry and cold as possible (do not FREEZE), and DO NOT refrigerate after opened!

Figure 1:

CUP I													
2 DOTS	0	±	2	±	5	±	10	±	20	±	40	±	80
20 mL							X						
25 mL													
30 mL													
32 mL													
40 mL					X								
50 mL													
60 mL													
64 mL													
80 mL													

CUP II													
2 DOTS	0	±	2	±	5	±	10	±	20	±	40	±	80
20 mL							X						
25 mL													
30 mL													
32 mL													
40 mL					X								
50 mL													
60 mL													
64 mL													
80 mL													

Revision: 20040122: In Apparatus for Testing Plastic Concrete Lined out the workbench apparatus and added the dessicator apparatus.

6. Glass or plastic dessicator with indicating dessicant for storage. ~~Black & Decker® Workbench or equivalent and a windscreen fabricated from cardboard and plywood~~

REVISION: 20040823: In Apparatus for Testing Plastic Concrete added number 13.

13. Five gallon carboy for distilled water storage.

REVISION: 20070223: In Apparatus for Testing Plastic Concrete removed number 5.

- 5. Graduated Cylinder 100 mL (not required)
- In #6 a windscreen is always needed if performing the testing outside so the strikethrough is removed from “Black & Decker® Workbench or equivalent and a windscreen fabricated from cardboard and plywood”.

REVISION 5: 20070809: NO PROCEDURE CHANGES

In Apparatus for Testing Plastic Concrete reduced/added/removed some items as follows:

- In #1 changed three to four. This allows the user to have an extra distilled water cup.
- In #5 changed three to two. Two glass rods are sufficient.
- In #6, removed the “Glass or plastic desiccator...” sentence. The nitrite strip vials have a built in desiccator in the lid. This was originally used as additional insurance against moisture but desiccators are difficult to maintain. Existing desiccators will continue to be maintained.
- In #7, changed the quantities to two.
- In #13 added the statement “For new locations only”. Multiple five gallons containers should not be needed on any jobsite for this test.
- Added #14 so a drill bit is included.

In REAGENTS section, changed some items as follows:

- In #1 change the quantity to 2 tubes of 100. The volume of tests has gone down significantly. If additional test strips are needed, a request should be submitted to the M&T Chemical Lab personnel responsible for nitrite testing.