

Results: Blended Cements Survey - 2012

Recently, ASTM and AASHTO have approved changes to their blended cement specifications, ASTM C595 and AASHTO M 240, respectively. The changes allow for a new type of blended product (Type IL) that can contain 5-15% limestone as an ingredient. These changes follow years of extensive research and testing, and also a significant level of field performance history in the US, Canada, and Europe. The addition of 5-15% ground limestone in a blended product provides significant sustainability benefits without sacrificing performance. To reap the sustainability benefits, the challenge remaining is for the transportation industry to adopt these new materials into the existing specification structure and utilize these materials to the extent possible.

The purpose of this survey is to determine the remaining barriers to implementation. Given the environment of limited resources, another purpose of this survey is to determine the best approach for pooling resources to accomplish implementation. Please put an X in the box next to your response and provide comments where indicated:

1) In the foreseeable future, is your agency planning to include the use of Type IL cements in pavement construction?

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| 9 | a. Yes |
| 3 | b. No |
| 3 | c. We will consider it after more testing: either laboratory or field testing, or both. |
| 3 | d. Other (Please comment.) |

IL: We would allow it if a cement company decides to produce it, but meetings with various Associations would be needed to discuss mix design parameters.

IN: INDOT is currently doing a research study to evaluate the effects of increased limestone dust in cements. This will probably be completed next year. It is important to note that INDOT has not seen the use of any blended cements for road or bridge work.

MI: Probably require a special provision to clarify.

2) Do you feel the biggest need is for additional laboratory and field testing of these materials, or do you think ample testing has been performed but the results need to be accumulated into a single report for review by your agency?

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|---|--|
| 1 | a. Need more laboratory testing |
| 3 | b. Need more field testing |
| 4 | c. Need both more laboratory and field testing |
| 4 | d. Enough testing has been performed; it needs to be assembled into a single document for our agencies review. |
| 7 | e. Other (Please comment.) |

IL: There is not much information on using this cement with cementitious materials to address alkali-silica reaction.

WA: Not having seen all the documentation it is difficult to rule out further testing in the field and lab. It would be helpful if in there was one location that assembled all research documents that would be available online to agencies for review.

MO: MoDOT has seen very little data for Type 1L blended cement making it difficult to determine if enough testing has been performed. MoDOT has conducted limited testing involving permeability and strength.

IN: INDOT is currently doing a research study to evaluate the effects of increased limestone dust in cements. This will probably be completed next year. It is important to note that INDOT has not seen the use of any blended cements for road or bridge work.

IA: We implemented a testing protocol to compare base cement with the IL cement.

CO: Our DOT has had several projects ASTM C1157 cement with positive results.

WI: Need more field testing – Which we plan to do on real time projects.

SD: Unsure.

MN: I think everything to this point in time needs to be assembled into a single document so we do not have to rely in part on what the cement industries provide.

3) If more testing is performed, is your agency willing to conduct that testing in cooperation with other states as part of a pooled-fund project?

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- a. Yes
- b. No
- c. Maybe, depending upon the scope of the pooled-fund project.

IN: It is important to note that INDOT has not seen the use of any blended cements for road or bridge work.

CO: Personnel cutbacks preclude this.

4) Beyond field and laboratory testing, what do you see as the biggest hurdle(s) to implementing Type IL cement in your agency's specifications? (Please comment.)

NY: The time necessary to implement new specification language is our only hurdle.

IL: It will take some time to work out the mix design parameters which must include mitigation measures for alkali-silica reaction.

UT: No large hurdles. With a confidence level gained through lab testing we would likely allow implementation. We already allow ASTM C 595 cements with some restrictions.

OK: There is none. It is in AASHTO M240, therefore it is in our specification.

AL: Proving the savings achieved, which limestone producers (for Type IL Cement) use as a major selling point.

WA: Another concern is addressing potential forms of sulfate attack when using high limestone containing cements such as Type IL cement. Recommendations and reports on mitigating this risk would be helpful. Current research available appears to be limited on the potential of sulfate attack on Type IL cement.

LA: Biggest hurdle is getting the states to accept it for AASHTO. No more testing is required to implement Type IL cements.

TX: Transferring knowledge to concrete suppliers, contractor, and DOT field personnel about the materials and its potential advantages and disadvantages (if any) so they gain a comfort level with using the material.

MO: No major obstacles other than acceptable performance using Type 1L blended cement.

IN: There has to be a market for blended cement. To date I have not seen any interest by paving contractors or ready-mix producers to use any blended cement for INDOT work, let alone a Type IL.

IA: Biggest hurdle is usually because it is new and different from what engineers are used to. Although it is common practice here to use ternary mixes, there are still some who will not implement the use.

CO: NA – we have allowed.

MI: Our Standard Specifications for Portland cement do not explicitly require C150 Type I cement, nor do they explicitly prohibit C595 cements for all applications. Some areas (patching concretes and mortars) explicitly refer to Type I/IA, whereas, the pavement and structural concrete sections reference the "cement" section (which describes both ASTM references). Hence, if all concerns are successfully addressed relative to the performance of C595 Type IL, we will probably opt to provide clarification to our cement specifications via special provision.

WI: We do not see any large hurdles. We plan an interim implementation period with a nominal limit of 10% limestone content, followed by eventually increasing our spec to the full 15% allowed in the ASTM spec if performance at 10% is satisfactory.

SD: Unsure as at the moment SDDOT does not allow any blended cements.

GA: Long-term durability/performance

MN: I do not see hurdles other than potential long term performance which seems to be not of great concern based on projects constructed to this point in time.

5) As a member of NCC, do you support the consortium providing technical oversight of a pooled-fund project that provides the necessary information for your agency to adopt Type IL cement?

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- a. Yes
- b. No

IN: Yes, but only if the INDOT research leaves unanswered questions. It is important to note that INDOT has not seen the use of any blended cements for road or bridge work.

CO: Yes, if valid reasons exist.