

# OPSS 1350 Material Specification for Concrete – Materials and Production



Date: December 10, 2024

Comments received by TCP:

Comment ID	Organization	Comment	MTO Response
434-1	Large Volume Precast Component Supplier	<p>1350.05.05 Cementing Materials a) Slag up to 25% Recommendation</p> <p>For mass concrete elements such as footings, box girders, approach slabs or abutments allowing 30% slag would help with temperature control.</p> <p>Buried structures &amp; concrete structures that are not exposed to salt shall be allowed to use higher percentage of slag. OPSS 1821.05.03 Nov 2022 for dry cast does allow up to 40% of slag why not up to 30% for wet cast</p>	<p>MTO is currently looking into increasing the slag limit for buried elements not exposed to deicing chemicals and not at risk of scaling and is planning to conduct trial(s). A non-standard special provision will be created for the trial(s).</p>
434-2	Large Volume Precast Component Supplier	<p>1350.05.05 Proprietary Patching Materials OPSS Section Change states: "Proprietary patching materials shall be from the Ministry's List of Concrete Patching Materials. The list shall be obtained from the Contract Administrator."</p> <p>Recommendation: the list be added to DSM and available on the portal.</p>	<p>The latest Ministry's List of Concrete Patching Materials can be obtained from the Contract Administrator.</p>
436-1	Individual	<p><b>1350.04.01.01.02</b> – This section is extremely prescriptive. There is no need to specify the use of a Type A or D water reducer. Plant-added superplasticizers should be at the concrete producer's / Contractor's option in a performance specification. The specification also states that the standard concrete set is within 3 hours, which is not correct... the concrete industry would have to add an accelerator in many cases to achieve a 3-hour initial set time.</p>	<p>Plant-added superplasticizer is at the concrete producer's/Contractor's option where RCP is a performance requirement. Where RCP is an acceptance requirement, the Contractor can add the superplasticizer at the batch plant or on site. Where RCP is not specified, superplasticizer must be added on site. This requirement has not changed. Most concrete used in MTO applications includes RCP as an acceptance requirement.</p> <p>MTO specifies use of water reducer which is consistent with industry best practices to ensure long-term durability of concrete structures (i.e. obtaining the required concrete workability using chemical admixtures, not water).</p> <p>MTO has requested clarification regarding the comment about the use of accelerator and will address that comment once more information is received.</p>

Comment ID	Organization	Comment	MTO Response
436-2	Individual	<p><b>1350.04.02.01.01</b> – I am struggling with this list of a – f. Items a and E relate to different concrete production and placement location methods. Item b is a placement and consolidation method for ready mixed concrete. Items C and D overlap since different “<b>sources of materials</b>” includes different sources of admixtures. Item F is not defined in the standard at all.</p>	<p>There may be some overlap, but both lists are needed to avoid confusion.</p>
436-3	Individual	<p><b>1350.04.02.01.01</b> – The concrete delivery ticket cannot contain two mix design numbers, and the concrete industry does not utilize mix codes assigned by third parties.</p>	<p>MTO will review the element code further. The element codes will be removed for this update.</p>
436-4	Individual	<p><b>1350.04.02.01.05</b> – What exactly is required to comply with “<b>Documentation for aggregates used in concrete demonstrating compliance with the requirements of OPSS 1002</b>”. Shouldn’t confirmation that the aggregates are on the DSM list be sufficient since conformance testing has already been reviewed by the MTO?</p> <p>We would also note that the admixture industry will not supply compatibility certification letters for products from other suppliers. We would request that <b>item d be deleted</b>.</p>	<p>Listing on the aggregates sources list would not be sufficient, current test data would need to be submitted demonstrating that the aggregate used meets the requirements of OPSS 1002.</p> <p>Bullet D, regarding compatibility certification letters was removed.</p>
436-5	Individual	<p><b>1350.05.03</b> – During recent industry consultations, the MTO indicated that they would be identifying applications that are not impacted by scaling that can utilize more than 25% slag or 10% fly ash but we do not see that included in the specification. We would suggest that the SCM replacement levels be completely removed for items such as: <b>structural elements below the frost line, mass concrete elements, caissons, bridge piers that are not within 10 metres of a second road</b> (bridges over waterways).</p>	<p>MTO is currently looking into increasing the slag limit for buried elements not exposed to deicing chemicals and not at risk of scaling and is planning to conduct trial(s). A non-standard special provision will be created for the trial(s).</p>

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436-6	Individual	<p><b>1350.05.03</b> – Delete “<b>For tremie concrete, the minimum cementing material content shall be 415 kg per cubic metre of concrete</b>”. This is a prescriptive requirement not a performance requirement. We would welcome the opportunity to identify the performance requirements for tremie concrete placements at the committee level but at a minimum Tremie concrete should have a specification requirement that is not based on cement content.</p>	<p>This requirement is set to minimize the risks that are specific to tremie concrete. It is important to highlight that for such applications, it is not possible to assess the quality of the concrete placed in the deep foundations. QA concrete samples taken before placing the concrete may not represent the condition of the placed concrete, especially if the fresh concrete is exposed to water.</p> <p>Specifying a minimum cement content in tremie concrete is a standard practice used by other jurisdictions. Some jurisdictions specify the cement content as a percentage increase (10-15%) over cement content in normal applications. The minimum cement content is established based on existing common practices and previous MTO experience.</p>
436-7	Individual	<p><b>1350.05.04.01</b> – The cement and concrete industries at the national level have moved to support Type II and Type III Environmental Product Declarations (EPDs) in 2023. The Federal Treasury Board has implemented a performance based system for Greenhouse Gas Reductions (GHG) for all federally funded projects with at least 100 m<sup>3</sup> of ready mixed concrete. We have highlighted these initiatives at past ORBA Structures Committee meeting but we see no proposed changes from the prescriptive systems the MTO has followed in the past. We would request that a standalone meeting be scheduled to address these critical sustainability issues.</p>	<p>MTO is open to schedule a meeting to further discuss EPDs.</p>

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436-8	Individual	<p><b>1350.05.04.01</b> – Self Consolidating Concrete was a new ready mixed concrete product in the Ontario marketplace about 25 years ago. SCC is no longer “new” and its utilization shouldn’t be subject to a <b>project specific request</b> on every project. The standard needs to leave the choice of the use of this product to the contractor.</p>	<p>SCC is more challenging to produce, and less forgiving compared to regular concrete. MTO conducts many trials for SCC for both cast-in-place and precast applications every year. The outcome of these trials demonstrates the difficulty of producing acceptable SCC.</p> <p>The contractor has the option to submit a proposal, and demonstrate, through successful completion of a trial, that an acceptable SCC mix, with adequate flow, and no segregation, as specified in the NSSP for SCC can be produced.</p>

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436-9	Individual	<p data-bbox="449 154 1285 386"><b>1350.05.04.02 &amp; 1350.05.04.03</b> – OPSS 1350 PROV remains the only standard in Ontario that doesn't utilize the CSA A23.1/.2 Exposure Class requirements. This standard also sets concrete performance requirements <b>that are less stringent than the minimum performance requirements of the CSA A23.1/.2 standard</b> in contradiction to the bridge code (S-6) and the Ontario Building Code.</p> <p data-bbox="449 659 1285 753">This standard also ignores the CSA A23.1/.2 requirements for a maximum W/CM ratio and prescriptively specifies concrete slump in contradiction to the CSA Standard.</p> <p data-bbox="449 894 1285 989">We would ask that the MTO ensure conformance with the CSA A23.1/.2 standard and ensure adherence to S-6 minimum requirements.</p> <p data-bbox="449 1094 1285 1292">We request a follow-up meeting with the Chief Engineer regarding the potential impacts on public safety associated with setting concrete performance requirements that are less stringent than those specified in the Ontario Building Code since these lesser requirements migrate their way into commercial and municipal projects.</p>	<p data-bbox="1310 154 2024 621">MTO uses Ontario Provincial Standard Specifications (OPSS) and ministry-specific special provisions in contract documents to specify concrete requirements in terms of strength and durability, which have been proven to result in strong and durable concrete for highway infrastructure applications. CSA 23.1/.2 has different minimum performance requirements because the testing age is 2 to 3 months, which is contractually impractical. Testing such as compressive strength and RCP are set to be tested at 28 days and the requirements for those tests are based on the testing age. Regarding CSA S6, section 8 specifies a compressive strength of 30 MPa, which is consistent with MTO specifications.</p> <p data-bbox="1310 659 2024 857">MTO does not specify the w/cm ratio because it cannot be verified or tested for in the field. In addition, the target slump is selected by the contractor and is not specified. OPSS 1350 specifies the maximum slump and the slump tolerance, which is consistent with the approach used in CSA 23.1/.2.</p> <p data-bbox="1310 894 2024 1060">Please note that CSA A23.1 does not consider aspects of durability specific to highway infrastructure such as traffic volume or service life requirements (e.g. 75 years for bridges) which MTO must take into consideration when developing specifications to ensure durability.</p> <p data-bbox="1310 1094 2024 1260">This request was sent anonymously by an individual, therefore it is unknown which organization the individual represents. Stakeholders, including industry associations, are encouraged to follow established communication protocols with the Ministry.</p>

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436-10	Individual	<p><b>1350.05.04.03</b> – Slump requirements of Table 1 do not conform with the slump requirements of <b>CSA A23.1 – clause 4.3.2.3.2</b>. Update to match the CSA standard (a tighter slump tolerance does not result in better concrete). As outlined previously, concrete slump is to be selected <b>by the Counteractor</b> based on their method of concrete placement and construction methods.</p> <p>The Contractor should indicate on the Mix Design submission their target slump and the acceptance tolerance of CSA A23.1/.2 clause 4.3.2.3.2 should then define jobsite acceptance or rejection. Additionally, the concrete industry adds superplastiziers primarily at the concrete plant. The specification should not require jobsite additions of these products unless the Contractor/Concrete Producer feel this is more appropriate.</p>	<p>OPSS 1350 allows the contractor to identify the target slump, and specifies tolerances in Table 1, as well as a maximum slump, to minimize the risk of segregation. If higher workability is needed, the contractor can propose the use of SCC.</p> <p>Plant-added superplasticizer is at the concrete producer's/contractor's option where RCP is a performance requirement. Where RCP is an acceptance requirement, the contractor can add the superplasticizer at the batch plant or on site. Where RCP is not specified, superplasticizer must be added on site. This requirement has not changed. Most concrete used in MTO applications includes RCP as an acceptance requirement.</p>
436-11	Individual	<p><b>1350.06.02</b> – The ready mixed concrete industry and the contractors have been requesting the expanded use of the mobile concrete mixers, <b>not their elimination</b>. Why are these mixers not acceptable when the Contractor and the Concrete Producer are proposing their use and are willing to certify that they will provide concrete that meets all MTO performance requirements?</p>	<p>MTO is currently at the demonstration/trial stage looking at the use of mobile mixers for low-risk, low-cost, non-structural applications only. Mobile mixers are not being considered for structural applications. A non-standard special provision will be created for the trial(s).</p> <p>Prior trial of a mobile concrete mixer witnessed by MTO confirmed MTO's concerns with this technology and highlighted the need for more evaluation.</p> <p>MTO has discussed the use of mobile mixers with Concrete Ontario and has provided comments. MTO is waiting for feedback from Concrete Ontario to continue this discussion.</p>

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436-12	Individual	<p><b>1350.07.04.03</b> – Many concrete producers no longer utilize a “<b>automated printing device</b>” (aka Dot Matrix Printer) and have moved to electronic delivery tickets that are produced when the concrete load is batched at the plant. Approximately 50% of the concrete trucks in the province now have “<b>electronic tablets</b>” for the recording of jobsite additions and times, so the requirement for “<b>in writing</b>” cannot be met since the data is in electronic form.</p>	<p>MTO has provided Concrete Ontario with documents outlining requirements and concerns regarding the use of e-tickets on MTO contracts, several years ago but submissions for evaluation and assessment of these systems have not been received by MTO. MTO has also shared IT requirements again this year with Concrete Ontario. The requirements cover several aspects of e-ticketing including security, integrity of the data and access to the data by MTO. This requires further discussion with the industry. However, in a recent stakeholder meeting with the concrete industry, the concrete industry informed MTO that most producers are using and plan to continue using paper ticketing for MTO work.</p>
436-13	Individual	<p><b>1350.07.05.07</b> – The Within-Batch Uniformity requirements of Table 2 do not conform to CSA A23.1 – Table 13. Please update Table 2 to conform to the requirements of CSA A23.1/.2.</p>	<p>There is no significant difference between the within-batch uniformity requirements of OPSS 904 and CSA A23.1 Table 13.</p> <ul style="list-style-type: none"> <li>• Density (MTO: 32 &amp; 50, CSA: 30 &amp; 50kg/m<sup>3</sup>)</li> <li>• Air (MTO: 0.7 &amp; 1.0, CSA: 0.8 &amp; 1.0)</li> <li>• Slump (MTO/CSA: 30 &amp; 50mm)</li> </ul>
436-14	Individual	<p><b>1350.08.01.01</b> – Update to read “<b>The individual test results shall be provided to the Contractor and Concrete Producer as they become available</b>”. CSA A23.1/.2 requires the Owner to provide concrete test results to the Concrete Producer within 5 business days of the test report being issued.</p>	<p>OPSS 1350 forms part of the contract, which is between the Ministry and the Contractor. This comment is related to a communication channel between the Contractor and their concrete supplier. MTO does not have a contractual relationship with the concrete supplier.</p>

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437-1		<p>Ground granulated blast furnace slag (slag) or fly ash or a combination of the two materials and shall be restricted to the following proportions by mass of the total cementing material:</p> <p>a) Slag up to 25%.</p> <p>b) Fly ash up to 10%, except for silica fume overlays and HPC where up to 25% is permitted.</p> <p>c) A mixture of slag and fly ash up to 25%, except the amount of fly ash shall not exceed 10% by mass of the total cementing materials, in concrete other than silica fume overlays and HPC</p> <p><b>Restricting the proportions of slag and fly ash in the concrete mix can compromise the material's long-term durability, elevate the heat of hydration, and reduce sustainability—contradicting MTO's greenhouse gas (GHG) reduction initiative. Additionally, it restricts the ready-mix producer from optimizing their mix design to deliver the most suitable mix for the intended application. Overall, this requirement significantly affects concrete performance in Ontario.</b></p>	<p>The maximum replacement levels of SCMs are specified to ensure long-term durability. It is well established knowledge that the increase in slag and fly ash content can negatively impact the salt-scaling resistance of concrete. This is of particular concern in Ontario highway infrastructure where de-icing salts are used to ensure public safety during the winter season. It is critical to take into consideration not only the initial GHG reduction but also the long-term sustainability and lifecycle achieved by durable and long-lasting infrastructure.</p> <p>MTO is currently looking into increasing the slag limit for buried elements not exposed to de-icing chemicals and not at risk of scaling and is planning to conduct trial(s). A non-standard special provision will be created for the trial(s).</p>



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437-2		<p data-bbox="449 160 1289 423">1350.07.04.02 Discharge Time When concrete is transported to the site by means of agitating or mixing equipment, discharge of the concrete into the work shall be completed within 1.5 hours after introduction of the mixing water to the cement and aggregates, except when the air temperature exceeds 28 °C and the concrete temperature exceeds 25 °C, the concrete shall be discharged into the work within 1 hour after the introduction of the mixing water.</p> <p data-bbox="449 464 1289 626"><b>This requirement should be aligned with CSA A23.1, allowing for 2 hours and 1.5 hours respectively. With advanced admixtures now available, this restriction unnecessarily compromises concrete performance and results in added waste and costs from rejected loads.</b></p>	<p data-bbox="1310 464 2024 659">CSA A23.1 specifies concrete for a broad range of applications. The discharge time of 90 minutes, or 60 minutes during hot weather, in OPSS 1350, is specified for the durability of structures exposed to a harsh environment, with a minimum expected service of 75 years.</p> <p data-bbox="1310 699 2024 756">The reference to advanced admixtures is a topic area that MTO is interested in exploring further with industry.</p>

Comment ID	Organization	Comment	MTO Response
437-3		<p>1350.05.04.02 Hardened Concrete Requirements</p> <p>The MTO remains the only owner in Canada that does not conform to CSA A23.1 exposure classes. Specifying 30 MPa for bridges in contract documents is not only imprudent but also negligent, and the concrete industry in Ontario strongly disagrees with the MTO's approach to concrete specification. Although the MTO references CSA A23.1, it has no intention of adhering to its requirements, resulting in concrete that is not only less sustainable but also significantly more costly for taxpayers.</p>	<p>MTO's bridge designs and specifications meet the structural requirements as set out in the Canadian Highway Bridge Design Code (CHBDC), O. Reg. 104/97 Standards for Bridges, as well as MTO's Structural Manual, and are not deficient in strength.</p> <p>Regarding the 30 MPa requirement, it is well-established knowledge that higher compressive strength concrete does not necessarily mean more durable or sustainable concrete.</p> <p>MTO specifies 30 MPa strength at 28 days, while CSA 23.1 specifies 32-35MPa at 56 days. It is well established that concrete compressive strength increases as curing time is extended. Please note that the concrete compressive strength at 56 days is typically 10-15% higher than at 28 days. Therefore, specifying a slightly higher strength at 56 days compared to 28 days does not mean necessarily achieving a stronger concrete. MTO's approach achieves concrete with adequate strength and the necessary durability for highway infrastructure applications.</p> <p>CSA A23.1 specifies concrete for a broad range of applications and does not consider aspects of durability specific to highway infrastructure such as traffic volume or service life requirements (e.g. 75 years for bridges) which MTO must take into consideration when developing specifications to ensure durability. Please refer to the responses above for more details.</p> <p>Please refer to the response to comment 436-9</p>

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Not applicable	MTO	<p>Since posting to TCP, some additional minor edits were made to OPSS 1350, as follows:</p> <ul style="list-style-type: none"> <li>- In References section, added MTO form PH-CC-845 Daily Concrete Load Test Results, and added the form as a submission in Submission of Plastic Concrete Test Results subsection in the Production section.</li> <li>- In Design and Submission Requirements section, under Mix Design, General subsection, submission was changed back to 7 Business Days: A complete mix design submission shall be submitted for each specific concrete mix a minimum of 7 Business Days prior to the placement of that mix in the work.</li> <li>- In Design and Submission Requirements section, under Mix Design, Mix Design Number, the following sentence was added to bullet d): <i>When a revised mix design is submitted, only the latest revision shall be used.</i></li> </ul>	

**Comments received by email:**

Number	Organization	Comment	MTO Response
			No comments received by email during the TCP consultation.