

CSA A23.1/A23.2: 2024 Updates



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Materials - Aggregates

- Definitions of **Returned Hardened Concrete (RHC)** and **Reclaimed Concrete Material (RCM)** are added to the document.
- **RCM** is subcategorized into two types:
 - **Type 1:** where a single source of concrete is utilized and an expectation of greater consistency.
 - **Type 2:** where multiple sources of concrete are processed together at a single production site.
- **Clause 4.2.3.1** is updated to include limitations on the use of recycled-concrete aggregates from areas known to contain damaging sulphides.
- **Clause 4.2.3.2.2** and **Table 12** are updated with limitations on the properties of virgin aggregates, RCM and RHC before any blending process.

Materials - Aggregates

- **Clause 4.2.3.4.1** is updated to allow the inclusion of A maximum of either **30%** of **RHC** or **RCM** in a blended aggregate as well as restrictions based on exposure class.
- The below sections were updated accordingly:
 - **CSA A23.2-15A** (Standard Practice for petrographic examination of aggregates)
 - **CSA A23.2-27A** (Standard Practice to identify risk of alkali-reactivity of aggregates and to identify measures to avoid deleterious expansion in concrete)
 - **Annex O** (Aggregate made from recycled concrete for use in hydraulic cement concrete)

Concrete Production

- **Clause 5.2.5.5.1:** Delivery tickets can be provided in either paper or electronic format, as long as the ticket includes all necessary information (such as plant location, truck number, etc.).
- Moving Mass Concrete **Section 7.6.3** to **Section 8.2.**
- **Clause 8.2.2.4.2:** Changes to the allowable maximum concrete temperature in mass placements with SCM to not exceed 85 °C for concrete incorporating:
 - 25% class F or CI fly ash;
 - 35% class CH fly ash;
 - 35% slag; or
 - 10% metakaolin.
- **Annex E** (Informative) has been expanded with additional information on mass concrete.

Concrete Production

- **Clause 8.13:** Incorporating extensive updates regarding shotcrete to reflect current best practices in ACI 506R.
- Harmonization with CSA A3000 by the addition of ground glass pozzolans, GH (4 to 15% alkali content) and GL (4% or less alkali content) to be used in HVSCM. The allowable dosages are 40% in HVSCM-1 and 30% in HVSCM-2.
- As per **Clause 8.5.3 Note 5**, ground glass is not considered effective in mitigating issues related to high concrete temperatures, such as delayed ettringite formation (DEF). Therefore, it is not factored into the HVSCM calculation when determining the maximum allowable temperature for high-performance concrete

Aggregates Testing

- Referencing of **CSA A23.2-30A**, **CSA A23.2-24C**, and **CSA A23.2-25C** for the purposes of qualification and acceptance.
- **CSA A23.2-2A:** clarification for the calculation of the fine aggregate sieve analysis results with washed samples.
 - **10.1** If a fine aggregate sample was tested in CSA A23.2-5A, the total dry sample mass shall be used prior to washing in CSA A23.2-5A as the basis for calculating all of the percentages.
- **CSA A23.2-25A:**
 - Removal of autoclave expansion test in harmonization with CSA A3000.
 - Additional guidance for the timing of zero readings.

Aggregates Testing

- **CSA A23.2-26A:** clarification of the scope for use only with quarried carbonates and its unsuitability for sand, gravels, or non-carbonate rock types.
 - **3.2** This Test Method is only applicable to carbonate rocks from bedrock quarries. It is not applicable to non-quarried aggregates (sands and gravels) or to quarried rock of non-carbonate rock types.
- **CSA A23.2-30A:** removal of Clause 6.3 on Uniformity, and the addition of Table 2 for additional testing requirements for RHC & RCM aggregates prior to blending with virgin aggregate..

Concrete Testing

- **CSA A23.2-24C:**
 - **6.2** For fibre reinforced concrete, the manufacturer, trade name, type, and quantity of the used fibres are required for qualification of concrete.
 - **6.3** The owner may also request submission of Environmental Product Declarations (EPDs) for environmental impact evaluation of concrete mixes. Reference to CRMCA's "A Guideline For Specifying Low Carbon Ready Mixed Concrete In Canada" is added.
 - Reorganization of material test methods and clarification of sampling requirements for acceptance testing.

Concrete Testing

- **CSA A23.2-25C:**
 - **7.1.1** Where there is more than one set of test results representing the same concrete sampled consecutively from the same load at the same sampling location, all test results shall be considered by the owner, not just results from independent laboratories.
 - **7.1.3** If any test specimen shows distinct evidence of improper sampling, making, initial curing, transporting, de-moulding, handling, laboratory curing, or testing, the test specimen shall be identified by the laboratory as non-compliant with the requirements of **CSA A23.1/CSA A23.2** and all parties listed in Clause 6 of this Standard Practice shall be notified.
 - **7.1.3** If non-compliant specimens are tested, the results are invalid and shall not be used for the purposes of concrete rejection or statistical analysis.

Concrete Testing

- **CSA A23.2-25C:**
 - **7.1.3** Non-compliant samples can be discarded or kept for examination if requested.
 - Reorganization of material test methods and clarification of sampling requirements for acceptance testing.
- **CSA A23.2-26C:**
 - **9.1.4** More guidelines regarding test specimens' dimensions, preparations, and curing period.
 - **10.5** clarifications regarding sponge materials for bulk resistivity and mandating of re-saturation of the sponge with conductive solution after each resistivity measurement.

Concrete Testing

- **CSA A23.2-27C:** Test Method for evaluating the fluid penetration resistance and surface durability of formed concrete surfaces using rate of absorption profiling — For prequalification of performance-based curing alternatives
 - New test method to determine the resistance to fluid penetration of a cast slab of a concrete mixture
 - Can be used for as a prequalification for evaluation of performance-based curing alternatives to **CSA A23.1 Table 19**, Types 2 and 3 curing requirements.
 - Provide an alternative to the rapid chloride permeability test.
 - May be used to optimize curing practices for durability performance and assess accelerated curing regimes.

Tables Updates

- **Clarifications to exposure classes in Table 1**
 - **C-XL, C1, C2, C3 & C4** exposure classes now prioritize chloride and corrosion protection, regardless of reinforcement.
 - **A-XL, A1, A2, A3 & A4:** The term 'reinforced' has been removed; concrete is now classified as either structural or non-structural.
 - **N-CF** exposure class was updated to include concrete not or only exposed to very limited cycles of freezing and thawing while in an air-dry condition.

Tables Updates

- **The addition of bulk resistivity (BR) testing as an alternative to rapid chloride penetrability (RCP) testing to Table 2**
 - With the owner's approval, chloride penetrability limits can be replaced with resistivity limits (CSA A23.2-26C), which have to be established during project qualification testing, for exposure classes **C-XL, C1, A1, and A-XL**.
 - The owner can specify a different age for testing.

Tables Updates

- **Table 5:**

- The contractor's responsibilities in Performance Alternative were updated to emphasize the importance of plastic concrete requirements for constructability (Slump, Slump flow, workability, and finishability).
- The addition of **Note 5** to highlight the importance of avoiding the specification of concrete materials or proportions, which can limit the contractor and producer's capacity to fulfill the owner's performance needs.
- The addition of **Note 6** to provide guidance on slump, slump flow, and acceptable tolerances.
- The addition of **Note 7** to provide guidance on the selection of the exposure limits.

Tables Updates

- **Table 3, 6, and 7:**
 - Harmonization with **CSA A3000** by the removal of MH, MHL, LH, LHL cements and the addition of MSL and HSL.
 - Updated guidance clarifies that for Type HSb/HSe blended cements, meeting the 6-month expansion limit in **CSA A3004-C8** negates the need for a full-year test. If the 1-year limit is met, the 6-month results are irrelevant.
 - Removal of the note from **Table 6**, which stated that HS cement shall not be used in reinforced concrete exposed to both chlorides and sulphates.
 - The addition of a note to **Table 6** to allow the use of hydraulic cements conforming to the requirements of **ASTM C1157**, when approved by the owner.

Tables Updates

- **Table 8:**
 - Harmonization with **CSA A3000** by the addition of GH (4 to 15% alkali content) and GL (4% or less alkali content) to be used in HVSCM.
 - A note has been added to demonstrate that Type GH pozzolan with alkali-silica reactive aggregates requires a ternary or quaternary blend proven effective by **CSA A23.2-14A** testing (expansion <0.040% at 2 years).

Tables Updates

- **Table 13:**
 - New additional guidance notes for in-batch uniformity as follows:
 - If all test ranges are within the acceptance limit, the concrete is uniform.
 - If any test range exceeds the rejection limit, the concrete is non-uniform.
 - If any range falls between the limits, test the next batch. If that range exceeds the acceptance limit, the concrete is non-uniform.
- **Table 21:**
 - Updating the Floor Flatness [FF] and Floor Levelness [FL] values and classifications in harmonization with **ACI 117**.

Construction Practices

- "Steel Troweling" was replaced with "Troweling" in the entire document to recognize the use of other materials in trowel manufacturing.
- Updating **Table 2** to disallow the use of air entrainment in trowel-finished concrete.
- Additional guidelines are added to **Clause 7.3** such as:
 - Contraction joints to be installed in square patterns with a maximum length-to-width ratio of 1.5:1.
 - Sawcut contraction joints are not required in structural mass concrete slabs on ground.
- **Clause 7.5.3.2** is updated with considerations and stipulations when applying a moisture-sensitive floor covering such as the thickness of the vapour retarding membrane.

Construction Practices

- Merging **Section 6.4.2.2.1** into **Section 7.5.3.10**.
- Updated requirements for slab on ground thickness tolerance in **Clause 7.5.3.10** as follows:
 - The average thickness should not be more than 15 mm less than the specified thickness
 - No individual measurement is more than 30 mm less than the specified thickness.
 - For average thickness calculations, any sample exceeding the specified thickness by more than 30 mm will be considered as having a 30 mm excess.
- Clarifications regarding evaporation application in **Section 7.6.1** as follows:
 - Shall be applied immediately after placement and between any finishing operations, according to the manufacturer's instructions.
 - shall not be finished into the concrete surface immediately after application.

Construction Practices

- The addition of ASTM E1155M for the use of customary unit devices to measure F-numbers in **Clause 7.7.1.4** (Floor flatness [F_F] and floor levelness [F_L] measurements)
- **Table 21:** Updating the Floor flatness [F_F] and floor levelness [F_L] values and classifications in harmonization with ACI 117.
- The addition of **ASTM C1315** (Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete) for curing materials acceptance in **Clause 7.8.2.2.**

Construction Practices

- **Clause 8.3:** Updated definition for architectural concrete.
- **Clause 8.3.3.5** added for requirements for mock-ups samples. Mock-ups, built to match the finished work, shall be assessed under realistic conditions, representative of the construction work including lighting. Appearance will be judged from 6m or more unless specified otherwise.
- **Clause 8.6:** Updated definition for self-consolidating concrete as well as viscosity.
- **Clause 8.6.5 Note 1** added to emphasize that SCC generally needs no vibration, and should be placed continuously. In the case of placing SCC on gelled layers before reaching the initial set, a brief vibration (2-3s) can be applied, with caution to avoid excessive formwork pressure, to prevent pour lines.

Annexes Updates

- Annex on special cements removed; **Annex R** moved to **Annex A**;
- Annex on concrete surface tolerances removed; **Annex T** moved to **Annex E**;
- **Annex E**: updated for mass concrete;
- **Annex H**: updated for fibre-reinforced concrete;
- Annex on high-performance concrete removed; **Annex U** moved to **Annex I**;
- Annex on concrete made with carbon dioxide as an additive merged with **Annex M**;

Annexes Updates

CSA A23.1/.2 (2024) Annexes

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Links

To purchase “**CSA A23.1/23.2 (2024)**” click [here](#)

To download “**A Guideline for Specifying Low-Carbon Ready-Mixed Concrete in Canda**” click [here](#)



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