

# CONCRETE PRODUCTION FACILITIES CERTIFICATION PROGRAM



## ADUIT CHECK LIST WITH INSTRUCTIONS

PLANT DESIGNATION:	_____
CIVIC ADDRESS:	_____
	_____
COMPANY OPERATING PLANT	_____
CONTACT PERSON	_____
PHONE	_____
CELL	_____
NAME OF CERTIFYING ENGINEER	_____
AUDIT DATE	_____



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**CONCRETE**  
even smarter than you think™

## FORWARD

The Atlantic Concrete Association, the representative organization of ready mixed concrete producers in the Atlantic Provinces, performs several important functions for its members. One of these functions is the circulation among its members of technical information about ready mixed concrete plant equipment and facilities, so that member company plants may be built and maintained to meet current requirements and Standards. To enable the producer members of the Association to provide assurance to their customers that the equipment is in good operating condition and has the proper capability of producing quality concrete, the Association offers this booklet entitled, "Audit Check List for Concrete Production Facilities Certification Program" (the check list), prepared under the direction of the Quality and Professional Affairs Committee. This manual is based on the National Ready Mixed Concrete Association (NRMCA) Plant Certification Check List and has been modified to reflect current Canadian Standards Association (CSA) requirements for plant, equipment, and materials. Plant certification has been a mandatory requirement of producer membership since 1984.

The "Certificate of Conformance for Concrete Production Facilities" (Certificate) is widely recognized by municipal, provincial, and private specifying authorities, as well as Canadian Standards Association's CSA Standard A23.1. It is extensively used as a basis of concrete producer qualification and product approval to supply concrete.

This publication details the requirements for verifying that the ready mixed concrete production facility is satisfactory. The results of the verification permit the producer member to display a Certificate of Conformance which confirms to the purchaser that the facility is physically capable of producing good quality concrete.

To be eligible for a Certificate of Conformance, the plant must be inspected by a registered professional engineer or by an assistant under his/her employ and conform to the check list contained herein. In addition to carrying the signature and seal of the inspecting engineer, the Certificate must be signed by the principal company executive attesting that all equipment will be maintained within requirements of the check list.

The Association chooses a qualified professional engineer to perform the inspection and remunerates the engineer for this service. Membership dues must be paid for the Association to initiate an inspection. A fee of \$450.00 per plant location, as well as \$25.00 per delivery vehicle, will be charged to the producer after the inspection to help offset the inspection costs. These fees are subject to change at the discretion of the Board of Directors. The Association endeavors to conduct the inspection visits in a timely manner and at a mutually agreeable time with the producer member. It is expected that the producer's plant will be in readiness for a successful inspection and the Association will only pay for one plant visit by the inspecting engineer. If further inspections are required for a successful certification the certifying engineer will bill these to the Association who in turn will bill the producer at cost. Inspections on demand, especially for relocated mobile batch plants during the certificate validation period, will be accommodated to the best ability of the Association within four weeks of request. Inspections on demand that do not occur within scheduled visits to the area of operation can cause undue financial hardship to the Association and the full cost of inspections on demand, will be borne by the producer member.

Certification is provided to each member producer in accordance with the procedures and limitations described herein for a two-year term. New producer members will be subjected to annual audits for the first four years of membership. It is required that the check list be executed by an engineer from outside the producer company and chosen by the Association. It should be noted that the inspecting engineers, in signing the Certificate, stake their professional reputation on the evaluation having been objective and thorough. At any time, purchasers may compare plant attributes with the check list to satisfy themselves that the Certificate provides valid evidence of production capability. The same prerogative exists regarding the company's official pledge to maintain the equipment properly. At the discretion of the Association, audit inspections during the validation period may be conducted. The producer member is expected to cooperate with the inspecting engineer to accommodate the in-term audit provided the producer member is given three working days' notice by the inspecting engineer. Refusal to accommodate the audit is cause for forfeiture of the plant certificate.

**This publication is the property of the Atlantic Concrete Association and shall not be duplicated, in any form, in whole or in part without the written permission of the Association. The check list is provided to the member concrete producer for the sole purpose of obtaining a "Certificate of Ready Mixed Concrete Production Facilities" only. The requirements of this document may change without notice. The use of the check list for the benefit of non-member producers may result in legal action by the Association.**

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# AUDIT CHECK LIST FOR CONCRETE PRODUCTION FACILITIES CERTIFICATION PROGRAM

## GENERAL

This section provides guidance to ready mixed concrete producers in qualifying their plants for certification by a registered professional engineer under the system developed by the Quality and Professional Affairs Committee of the Atlantic Concrete Association. This section is intended also to assist the examining engineer in performing the plant inspection quickly and accurately. The producer's plant staff should cooperate with the engineer to expedite the inspection and, where possible, to correct deficiencies in plant installations or operations. During inspection of production facilities and delivery vehicles, it is the responsibility of the inspecting engineer or his/her assistant to be familiar with applicable safe practices and adhere to the safety policies of the concrete producer.

Any producer member in good standing may obtain, free of charge, one (1) copy of this check list for each plant to be inspected. The manual contains (i) a check list of plant facility requirements (ii) a Member's Agreement and (iii) an Engineer Information Form. When properly executed, these provide the information necessary to establish eligibility for Certificate of Conformance for Concrete Production Facilities. The engineer needs to submit the Engineer Information Form only once to the Association.

The check list itemizes requirements for plant facilities and equipment used in the production of ready mixed concrete. A separate check list must be completed by a professional engineer for each plant inspected.

Each item in the check list is to be checked by, or under the supervision of, a professional engineer who will, in each case, enter "✓" in the space provided if the requirement is met. If the item is not applicable to the type of plant being inspected, "N" will be entered in the space provided. If the symbol is "F", indicating a noncompliance, an explanatory note should be appended to describe the reason for, or degree of, failure. A symbol must be entered in each space.

A Certificate of Conformance cannot be issued to a plant that does not meet the requirements of the check list. The engineer's seal and signature must appear on the Verification of Inspection page herein with the other information required including the specific designation of the plant and the date of inspection. Facilities that fail to meet the minimum standards described herein shall be re-audited within four weeks of the date of the original audit. The cost of the additional audit will be invoiced by the Association to the producer member at cost.

An official of the producer company must sign the Member's Agreement contained herein, and the Certificate of Conformance for Concrete Production Facilities when issued by the Association.

The certifying engineer shall submit the original copy of the check list and accompanying documents to the Chairperson of the Quality and Professional Affairs Committee (or designate) of the Atlantic Concrete Association. A digital copy of these documents shall be submitted to the Executive Director of the Association. A copy of each should be provided to the producer member for record keeping and for appropriate reference. A copy is to be retained by the inspecting engineer. In order to save paperwork, it is permissible to scan and/or make photocopies of the original check list for the files of the engineer and producer, however, the original should be submitted to Quality and Professional Affairs Committee of the Atlantic Concrete Association as noted above.

The Certificate becomes invalid two (2) years after the inspection date, upon change of ownership of the plant, relocation of the plant from the location described on the certificate, and/or default in payment of annual Association dues.

The Certificate may be revoked at the discretion of the Atlantic Concrete Association.

# SAMPLE CERTIFICATE OF CONFORMANCE



## Certificate of Conformance for Concrete Production Facilities

### Producer Member

(Company, Production Facilities Owner)

### Atlantic Canada

(Production Facilities Location)

THIS IS TO CERTIFY THAT

has been inspected by the undersigned Professional Engineer for conformance with requirements of the audit check list for "Concrete Production Facilities Certification Program" published by the Atlantic Concrete Association. As of the inspection date, the facilities met requirements for production.

**This company will maintain these facilities in compliance with the check list requirements and will correct promptly any deficiencies that develop.**

\_\_\_\_\_  
(Signature of Inspecting Engineer)

2020 01 22

(Inspection Date (year month day))

2021 01 22

(Certificate Expiration Date (year month day))

(Seal)

**NOTICE:** The Check List indicates only that plant facilities are satisfactory for the production of concrete when properly operated. Conformance of the concrete itself with specification requirements must be verified by usual inspection methods in accordance with sales agreements. The certificate is considered valid when accompanied with a current Certificate of Membership issued by ACA.

*Unauthorized reproduction or misuse of this certificate may result in legal action.*

## **INSPECTION PROCEDURES**

The references listed at the end of this booklet provide useful information for evaluating the production facilities. It is expected that the examining engineer will employ professional judgement in interpreting the requirements and will use technical assistance where it is needed. The guidance provided in the Notes is for instruction only and does not modify the requirements of certification.

The object of inspection and certification is to assure adequate facilities, and it must therefore be assumed that the producer will cooperate fully to provide the inspecting engineer with working space, labour, and access to equipment. It is most desirable that, wherever possible, the engineer supplies information to and work with the producer to correct deficiencies as the inspection progresses. It will be the responsibility of the engineer to establish that the information on the Certificate of Conformance is correct before signing and sealing the document.

A Certificate of Conformance for Concrete Production Facilities will be provided by the Quality and Professional Affairs Committee, Atlantic Concrete Association, upon receipt of a properly executed check list indicating that the plant facilities meet the objective requirements of the check list and upon full payment of producer member dues for the current year.

# 1.0 MATERIAL QUALITY, STORAGE, AND HANDLING

## 1.1 General

- 1.1.1 All materials used in the production of ready mixed concrete shall conform to the applicable CSA standards.

The inspecting engineer shall satisfy themselves that member producers are committed to production of ready mixed concrete using materials conforming to the relevant CSA standards. The member producer is required to provide written confirmation, dated within the previous twelve (12) months, showing relevant test data for the materials used in concrete production and meeting the applicable standards. Includes but not limited to cementitious materials, aggregates, water, additives and admixtures.

**Note 1:** The Check List indicates only that plant facilities are satisfactory for the production of concrete when properly operated with quality materials. Conformance of the concrete produced with specification requirements must be verified by usual testing and inspection methods in accordance with the applicable CSA test methods.

## 1.2 Cementitious Materials

- 1.2.1 Bins or silos tight and with free movement to discharge opening.
- 1.2.2 Where storage is provided for different types of cement or cementitious materials, different materials are isolated to prevent intermingling or contamination.
- 1.2.2.1 Intra-plant handling prevents contamination.
- 1.2.2.2 All cementitious feed pipes are marked and designated.

## 1.3 Aggregates

- 1.3.1 Stockpiles or other storage located to prevent contamination; arranged to assure that as each aggregate is removed from its stockpile or other storage is distinct and not intermingled with others.
- 1.3.2 Procedures for unloading and building stockpiles, or other storage methods such as to prevent harmful segregation and degradation.
- 1.3.3 Intra plant handling and transportation, such as to prevent harmful segregation, degradation, and contamination.
- 1.3.4 Separate storage bins or compartment for each size and type of aggregate properly constructed and charged to prevent mixing of different sizes or types.

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## 1.4 Water

1.4.1 Adequate supply, with pressures sufficiently constant or regulated to prevent interference with accuracy of measurement.

1.4.2 Quality control program for use of slurry water: As a minimum, the producer shall identify the impact of the use of slurry water on typical concrete mixes.

**Note 2:** Slurry water is the fluid derived from the concrete reclaiming process containing constituents of returned concrete such as aggregate fines, cementitious materials, and admixtures. Facilities utilizing treated wash water shall conduct the following testing on a semi-annual basis as identified in CSA A23.1 – clause 4.2.2.4:

- Confirm that the strength of 25 MPa or higher concrete produced with this water is equal or greater than 90% of the 28 day compressive strength of a control mixture using water from an acceptable source.

## 1.5 Admixtures

1.5.1 Storage tanks for liquid admixtures appropriately labelled as to contents and located to prevent damage by freezing or contamination.

**Note 3:** Protection of admixtures from freezing is required even if the plant does not produce concrete in cold weather. The inspecting engineer can accept a letter from the admixture supplier indicating that the admixtures are being stored at specific plant locations do not need protection from freezing.

1.5.2 Provision shall be made for venting and straining facilities and for flushing, draining and cleaning the storage tanks.

1.5.3 Agitation provided for liquid admixtures that are not stable solutions. It is recommended that such liquid admixtures be agitated prior to use if the ready mixed concrete plant has been inoperative for more than three (3) months, or as recommended by the admixture supplier.

1.5.4 Each admixture shall be measured and discharged separately.

## 1.6 Winter Protection

1.6.1 When a plant produces concrete regularly in freezing weather, heating facilities for water and/or aggregates provided to ensure that concrete temperatures at batching conform to Table 14 of CSA A23.1.

**Note 4:** If this requirement is not met and the facility is in an area where weather records show an average of more than five (5) days per year when the minimum temperature is 0°C or below, the Certificate of Conformance will carry the notation that the **"Facility does not meet all requirements for furnishing concrete in freezing weather"**.

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## 2.0 BATCHING EQUIPMENT

### 2.1 Scales

The engineer will only accept mechanical inspection and calibrations as performed by a qualified technical staff employed by a scale manufacturer or authorized scale company. The scale manufacturer or scale company must take responsibility to ensure the mechanics are in good working order as per industry standards and calibration tolerances are met for each scale. The acceptance will be the acceptance of all the requirements of the ACA Scale Check Data Form, completed and signed by authorized personnel. A sample copy of the Scale Check Data Form is found in Appendix A of this booklet.

#### General Information

- 2.1.1 Each scale comprising a suitable system of levers or load cells which will weigh consistently within the tolerance specified in the Scale Check Data Form, with loads indicated either by a beam with a balance indicator or a full-reading dial or digital display verifying accuracy.
- 2.1.2 Company official agrees to verify accuracy of scales to specified tolerances every 180 days for plants operating year-round. For seasonal plants, the scales shall be checked and calibrated immediately upon plant opening and within 180 days hence.
- 2.1.3 Each scale shall be calibrated at minimum of two points; at 20 and at a minimum of 80 percent of the scale capacity.
- 2.1.4 The scale manufacturer or scale company shall supply necessary documentation that government approved tests weights are used, which are certified and traceable.
- 2.1.5 The scale manufacturer or scale company shall provide a procedure or check list which is used for the inspection and to document all mechanical checks, calibrations test results, and any deficiencies in the scale or weighing system.
- 2.1.6 The scale manufacturer or scale company shall sign the ACA Scale Check Data Form, certifying that all requirements have been met. All scale check and calibration reports/records must be kept on the site and shall be available for inspection at all times.
- 2.1.7 Confirmation  
Scale Check Data Form is on record at the plant, signed and certified by inspecting scale technician.

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## 2.2 Batchers - General

The plant is generally described as follows:

(The following items are for general plant description only and are not considered compulsory items.)

	Permanent <input type="checkbox"/>	Portable <input type="checkbox"/>	
Dry Batch:	A batching system where the raw materials are batched by weight or volume and then fed into a truck mixer for final mixing.		<input type="checkbox"/>
Central Mixing:	A batching system where the raw materials are batched by weight or volume and fed into a mixing vessel within the facility for either initial or final mixing (partial mixing is usually referred to as " <b>shrink mixing</b> ").		<input type="checkbox"/>
Decumulative:	A dry batching system that doesn't use weigh hoppers for the measurement of the raw materials. Instead, the system weighs the entire holding bin and discharges material into the truck mixer until specified weight of material has been loaded into the truck mixer.		<input type="checkbox"/>
Slurry Batching:	A batching system that pre-blends the mixing water and the cement into a slurry prior to discharge into the truck mixer.		<input type="checkbox"/>
	BATCH	→ TRUCK MIXER	<input type="checkbox"/>
	BATCH	→ STATIONARY MIXER	→ TRUCKER MIX <input type="checkbox"/>
	BATCH	→ STATIONARY MIXER	→ AGITATING <input type="checkbox"/>
	BATCH	→ STATIONARY MIXER	→ NON-AGITATING <input type="checkbox"/>
2.2.1	Batchers for weighing materials consist of suitable containers freely suspended from a scale system and equipped with the necessary charging and discharging mechanisms. Batchers shall be inspected to ensure they are freely suspended before and after loading.		<input type="checkbox"/>
2.2.2	Cementitious materials are weighed on a scale and in a weigh hopper separately from other ingredients. Cement shall be batched prior to the batching of any other supplementary cementitious materials.		<input type="checkbox"/>
2.2.3	Batchers are capable of receiving rated load without contact of the weighed materials with the charging mechanism.		<input type="checkbox"/>
2.2.4	Cementitious material batchers equipped with dust seal between charging mechanism and hopper, installed in such a way that weighing accuracy will not be affected; weigh hopper vented to permit air escape; hopper is free from accumulations and self-cleaning to ensure complete discharge.		<input type="checkbox"/>
2.2.5	Batcher charging mechanism designed and operated to stop flow of material within the weighing tolerances specified in Section 2.3 and preventing loss of material when closed. Discharge mechanism and gates shall be inspected for wear.		<input type="checkbox"/>
2.2.6	Vibrators and other appurtenances installed and operated, so as not to affect the accuracy of weighing.		<input type="checkbox"/>
2.2.7	Wind protection sufficient to prevent interference with weighing accuracy.		<input type="checkbox"/>

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- 2.2.8 Separate dispenser for each liquid admixture in regular use, except that more than one admixture can be batched through a single dispenser if the admixtures are compatible or if the dispenser is flushed with water after each cycle.
- 2.2.9 Each admixture dispenser capable of measurement within tolerances specified in clause 2.3.2 and equipped with a calibrated container, in which the admixture may be collected to verify the accuracy of measurement.
- 2.2.10 Piping free of leaks and properly valved to prevent backflow or siphoning and to ensure that the measured amount is discharged.
- 2.2.11 For admixtures, other than accelerating admixtures, silica fume slurry, corrosion inhibitors, shrinkage reducing admixtures, and viscosity modifying admixtures, used at less than 1,600 mL per 100 kg of cementitious material, each dispenser of liquid admixtures equipped with a visual or other means of providing a gross check to batching personnel of the amount of admixture batched during each cycle, within  $\pm 20$  percent. The gross check shall be independent of the accuracy, function, or operation of the primary metering device.
- Note 5:** This gross check is required to help the batching personnel prevent large overdoses or deficiencies of admixture due to dispenser malfunction in any batch, which could cause great changes in fresh and/or hardened concrete properties. Examples of performing a gross check include:
- collecting the measured quantity of admixture in a dispenser measuring unit during each cycle and holding it for a short period to permit a visual check; or
  - measuring the dispensed quantity through the use of an independent meter to obtain a rough check on the amount measured by observation of a volumetric indicator.
- Admixtures used at rates of 1,600 mL per 100 kg of cementitious material or greater are exempt from the independent check required in 2.2.11.
- Note 6:** When the company operating the batch plant or delivery units regularly batches an admixture at the job site, the dispenser must comply with the requirements of clauses 2.2.9 and 2.3.2. Occasional addition of admixtures at the job site to adjust entrained air content, etc., is not subject to the dispenser requirements of clauses 2.2.8 and 2.2.9 above.
- 2.2.12 Water meters equipped with a cut off device capable of stopping the flow within the tolerances specified in clauses 2.2.11 and 2.3.2; cut off device free from leaks when closed.
- 2.2.13 Water meters equipped with a volume-setting device capable of being set to increments at least as small as one gallon or a register capable of being read to one gallon, or both. For water-measuring equipment that is graduated in units of kilograms (or pounds) instead of litres (or gallons), use 1 litre (or 10 pounds) as the basic increment.
- 2.2.14 Water meters shall provide an indication, visible to batch personnel, of the volume batched at any point in the metering operation.

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## 2.3 Accuracy of Plant Batching

2.3.1 For weighed ingredients, accuracy of batching is determined by comparison between the desired mass and the actual scale reading; for volumetric measurement of water and admixtures, accuracy is determined by checking the discharged quantity either by mass on a scale or by volume in an accurately calibrated container. To ensure the batching system meets the tolerances, the analysis of random 15 consecutive samples should demonstrate that for eighty (80) percent of the reading, no result shows a deviation exceeding twice the above noted tolerances.

2.3.2 Materials shall be batched to within the tolerances noted in the following table:

Ingredient	Full Scale Capacity	Tolerance	Rating
<b>Cementitious Materials</b>	<30 %	not less than required, not more than 4 % in excess of required mass	<input type="checkbox"/>
	>30 %	± 1 % of required mass	<input type="checkbox"/>
<b>Aggregates</b> (If the mass setting system provides compensation for free moisture of aggregates, the tolerance applies to the accuracy of the measurement of the corrected mass.)	individual weigh batchers	± 2 % of required mass	<input type="checkbox"/>
	cumulative >30 %	± 2 % of required mass	<input type="checkbox"/>
	cumulative <30 %	± 0.3 % of scale capacity or ± 3 % of required mass, whichever is less	<input type="checkbox"/>
<b>Water</b> (by mass or volume)	<30 %	± 1.5 %	<input type="checkbox"/>
	>30 %	± 1 %	<input type="checkbox"/>
	All sources	± 3 %	<input type="checkbox"/>
<b>Admixtures</b>	---	± 3 % of required amount, or ± 30 ml, whichever is greater	<input type="checkbox"/>

2.3.3 Producer member agrees to recheck batching accuracy of volumetric water batching devices (including water meters) and dispensers of liquid admixtures not less frequently than 180 days. An example of a form to record the semi-annual checks on the batching accuracy of the dispensers is provided in Appendix B. Please refer to Member's Agreement in Section 10.

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## 2.4 Batching Systems – Definitions and Components

A usual problem will be to distinguish between automatic and semiautomatic systems or between semiautomatic and manual systems. The former two can be distinguished as follows: In an automatic system, the entire sequence of measurement of all major ingredients - cementitious materials, aggregates, and water - is actuated by a single operation (e.g. pushing a button or inserting a card) after which the cycle is completed without further attention. In a semiautomatic system, the weighing of an ingredient is actuated separately by the operator; but is terminated automatically when the proper amount has been reached. In manual operation, the operator accomplishes cut-off of a material at the proper quantity. The system shall be classed as manual if any major ingredient – cementitious materials, aggregate, or water - is batched manually. One of the three batching systems must be identified and marked as complying with the check list. The remaining systems would be marked as "N", not applicable.

**Note 7:** Any weigh-batcher control which does not fully meet the requirements for semi-automatic, semi-automatic interlocked, or automatic weigh-batcher controls is considered manual if it can be operated to meet the requirements of this section.

- 2.4.1 **Manual Control** - a device for measuring cementitious materials, aggregates, or water consisting of charging, weighing and discharge apparatus, with gates or valves actuated manually and with the accuracy of the measuring operation dependent upon the operator's visual observation of the scale.
- 2.4.2 **Semiautomatic Control** - a device for measuring cement, aggregates, or water consisting of charging, weighing and discharge apparatus in which the gates or valves are separately opened manually to weigh the material but are closed automatically when the desired mass of the material has been reached. It is interlocked to assure that the discharge mechanism cannot be opened until the mass is within the tolerance specified in Clauses 2.3.1, or 2.3.2 for the weighed ingredient.
- 2.4.3 **Automatic Control** - device for measuring cementitious materials, aggregates, or water consisting of charging, weighing, and discharging apparatus such that, when the mechanism is actuated by a starter switch, the gates and valves will open automatically for the start of the weighing operation and close automatically when the designated mass of the material has been reached. Interlocking of the automatic controls shall assure that:
- .1 The charging device cannot be actuated until the scale has returned to zero balance within plus/minus 0.3 percent of its capacity.
  - .2 The charging device cannot be actuated if the discharge mechanism is open.
  - .3 The discharge device cannot be actuated if the charging mechanism is open.
  - .4 The discharge device cannot be actuated until the designated mass is within the tolerance specified in clause 2.3.2 above. When different kinds of aggregate or different kinds of cementitious materials are weighed cumulatively on a single scale, interlocked sequential controls shall be provided for each material.

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## 2.5 Recorders

Devices that provide a permanent record of the quantity of cementitious materials, aggregate, water, or admixture measured into a particular batch of concrete shall:

- 2.5.1 be properly locked and capable of being interlocked;
- 2.5.2 provide for identifying the particular batch with the truck in which it was dispatched;
- 2.5.3 register both the target and actual quantity of each ingredient batched; and
- 2.5.4 register empty balance.

## 3.0 CENTRAL MIXER

A central mixer is a non-mobile mixer installed at the plant for the purpose of mixing the concrete completely (central mixing) or partially (shrink mixing).

- 3.1 For central mixing operations, the mixer at the plant shall be capable of producing uniform concrete in the mixing time regularly employed, or in the time designated in the current edition of CSA A23.1, whichever is less.
- 3.2 Equipped with a timing device that will not permit the batch to be discharged before the predetermined mixing time has elapsed.
- 3.3 Procedures for measuring the uniformity of mixed concrete from central mixers are provided in clause 5.2.4.5 of CSA Standard A23.1. In using this evaluation, the engineer should require that the materials be batched, and the equipment be operated in accordance with the methods regularly employed in operation of the plant.

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## 4.0 TRUCK MIXERS

Truck mixers are concrete mixers mounted on trucks or other vehicles used for the complete mixing of concrete ingredients after they have been batched at the plant. Each acceptable truck mixer shall conform to the following requirements.

**Note 8:** The inspecting engineer will evaluate all truck mixers, agitating units and non-agitating equipment used to deliver concrete from the plant. The evaluation will be based on a study of the records of truck mixer purchase, operation and maintenance. Units that meet the following requirements will be considered satisfactory.

Evaluation of delivery units must of necessity involve some subjective judgement. Particularly in large fleets, defects may exist in a small percentage of units as they approach the time for scheduled maintenance or rehabilitation. It can be assumed, however, that these will not constitute more than ten (10) percent of the fleet at any one time. The record of acceptable and unacceptable units is intended to provide a general picture of condition. A purchaser may require up-to-date evaluations, if he intends to restrict the use of questionable units.

- 4.1 Charging and discharge openings, chutes, and mixer drum fins in good condition; free from appreciable accumulations of cementitious material or concrete and with hopper and chute surfaces clean and smooth. Interior drum condition satisfactory; free from appreciable accumulations of hardened concrete, blades free of excessive wear.
- 4.2 Drum of such size that the rating as a mixer -- in volume of mixed concrete -- does not exceed sixty-three (63) percent of the gross volume of the mixer, disregarding blades. This requirement is met by all mixers' carrying a rating plate of the Truck Mixer Manufacturer's Bureau (TMMB).
- 4.3 Mixers affixed with a plate by the manufacturer showing the gross volume of the drum; the rated maximum mixing capacity; the rated maximum agitating capacity; the minimum and maximum mixing and agitating speeds for the drum, blades, or paddles. The recommended operating speed for mixing which must be in the range of four (4) to twenty two (22) rpm of the drum; demonstrated capability to operate satisfactorily within the recommended range.
- 4.4 On units equipped to batch mixing water, equipment to be in proper working condition; gauge glasses clean and legibly graduated; water pump or injection system in working order with unobstructed nozzles and without leakage into mixer drum. During inspections in winter months (November 15 to March 31), the inspecting engineer may accept missing sight glasses if they have been removed to prevent breakage from freezing. All fittings and the graduated sight glass label must be in place so that the installation of the sight glass can be readily made. Water measurement spot checked and found accurate within  $\pm$  one percent of mixing water capacity or  $\pm$  one gallon (4.5 litres) whichever is greater.
- 4.5 In the event that the mixer blade wear exceeds ten (10%) percent, or the mixer design has been significantly altered, the inspecting engineer will consider the mixer satisfactory only when that unit demonstrates compliance with the concrete uniformity test specified in clause 5.2.4.5 of CSA Standard A23.1. Where uniformity tests are required, the cost of the tests shall be borne by the producer.
- 4.6 Certification of a truck mixer fleet will not be granted if the number of unacceptable units exceeds ten percent of the number of truck mixers available for use.

Engineer's Initials \_\_\_\_\_

## 5.0 AGITATORS

Agitators are drums or containers, mounted on trucks or other vehicles in which central-mixed concrete is kept sufficiently in motion during delivery to prevent segregation.

- 5.1 Each acceptable agitator shall conform to the requirements of Clause 4.0 except that the drum or container must be of such size that the rating as an agitator (in volume of mixed concrete) does not exceed the volumes as listed in the TMMB chart for capacities.
- 5.2 Agitating units shall be provided with a plate showing the mixer manufacturer's recommended operating speed for agitating, which must not be more than six (6) rpm.
- 5.3 Agitating units must have the capability to operate at the recommended speed.

## 6.0 NON-AGITATING UNITS

Non-agitating units are containers, mounted on trucks or other vehicles, for delivering central-mixed concrete, not constructed or equipped to keep the mass of concrete in motion in the container. Each acceptable non-agitating unit shall conform to the following requirements.

- 6.1 Interior surface smooth and watertight, with rounded corners.
- 6.2 Gates or other means provided for controlled discharge of concrete
- 6.3 Interior free from excessive accumulation of hardened concrete and from obstruction or deterioration sufficient to interfere with proper discharge of concrete.

Engineer's Initials \_\_\_\_\_



## 8.0 TICKETING SYSTEM

8.1 Provision on delivery ticket for the following information:

8.1 a)	Name of ready mixed concrete plant and plant location if company operates more than one plant.	<input type="checkbox"/>
8.1 b)	Date and serial number of ticket.	<input type="checkbox"/>
8.1 c)	Name of purchaser/contractor.	<input type="checkbox"/>
8.1 d)	Identification of mixer truck driver.	<input type="checkbox"/>
8.1 e)	Specific job designation (name and location).	<input type="checkbox"/>
8.1 f)	CSA exposure class and designation of concrete identifiable with terminology used in the job specifications.	<input type="checkbox"/>
8.1 g)	Volume of concrete in cubic metres (yards).	<input type="checkbox"/>
8.1 h)	Truck number.	<input type="checkbox"/>
8.1 i)	Cumulative total and/or load number.	<input type="checkbox"/>
8.1 k)	Time stamped when loaded or time of first mixing of the cement and aggregate.	<input type="checkbox"/>
8.1 l)	Ordered air content and slump or slump flow.	<input type="checkbox"/>

8.2 Provision on delivery ticket to record the following information following discharge:

8.2 a)	Time that the load arrived on the project.	<input type="checkbox"/>
8.2 b)	Time that discharge of the load started.	<input type="checkbox"/>
8.2 c)	Time that discharge of the load was completed.	<input type="checkbox"/>
8.2 d)	Extra water added (and units) at the request of the recipient of the concrete and their signature.	<input type="checkbox"/>
8.2 e)	Amount of admixture added after batching.	<input type="checkbox"/>

8.3 The following information should be provided on the ticket, if available.

8.3 a)	Time when field testing commenced.	<input type="checkbox"/>
8.3 b)	Name of testing and inspection company and on-site personnel performing the inspection.	<input type="checkbox"/>
8.3 c)	Location of test.	<input type="checkbox"/>
8.3 d)	Slump or slump flow and air content test results.	<input type="checkbox"/>

**NOTE:** Separate and specific text boxes for the items of 8.3 are not required on the printed ticket, provided space is available for the information to be written.

8.4 Additional information designated by the owner and required by the project specifications shall be furnished upon request.

Engineer's Initials \_\_\_\_\_

## 9.0 VERIFICATION OF INSPECTION AND APPLICATION FOR CERTIFICATE

The undersigned, a professional engineer registered in the province of the plant location, has conducted an inspection of the concrete production facility described as:

---

---

(please print: member company, plant designation, and civic address)

and asserts that in their professional judgment, the information provided on this audit check list is accurate and complete.

---

Date

---

Signature of Professional Engineer

---

Name of Professional Engineer (please print)

(Seal)

---

Address (please print)

---

Signature of Assistant to Engineer Conducting Inspection

---

Name of Assistant to Engineer Conducting Inspection (please print)

---

Address (please print; if different from address for Professional Engineer)

Engineer's Initials \_\_\_\_\_

## 10.0 MEMBER'S AGREEMENT

### 10.1 Scales

The undersigned agrees that all scales in the plant described will be checked at intervals not exceeding those prescribed in Clause 2.1.2 by an authority acceptable to the Atlantic Concrete Association for conformance with Clauses 2.1.2 and 2.1.3 of the Audit Check List for "Certification of Ready Mixed Concrete Production Facilities". The undersigned also agrees that the batching accuracy of all volumetric admixture dispensers and all water batching devices in the plant will be checked at intervals not exceeding 180 days or if the plant is moved from the location described at the time of original inspection. Any failure to meet the tolerance (0.40 percent of scale capacity throughout the range of use) will be promptly corrected. If, for any reason, correction is delayed, the batch weights of any concrete delivered will be adjusted to assure positively against a deficiency in unit cement content or an excess of water-cementitious materials ratio.

### 10.2 Material Quality

The undersigned agrees to use materials in the noted production facility meeting the requirements of the applicable CSA standards and produce concrete meeting the requirements of the current edition of CSA Standard A23.1 for the specified use.

\_\_\_\_\_  
*Signature of principal company official*

\_\_\_\_\_  
*Name, please print*

\_\_\_\_\_  
*Title, please print*

\_\_\_\_\_  
*Date*

**Non-compliance with the requirements of this agreement can result in loss of ACA membership.**

Name, Title and Address for Certificate to be Mailed:

<b>Name:</b>	
<b>Title:</b>	
<b>Company Name:</b>	
<b>Address:</b>	

Engineer's Initials \_\_\_\_\_

## 11.0 ENGINEER INFORMATION FORM

To be submitted to the Atlantic Concrete Association with completed digital copy of Check List for "Certification of Ready Mixed Concrete Production Facilities".

---

Name

---

Address

---

Résumé of experience in ready mixed concrete production facilities.

(Seal)

---

Signature

(This form need be completed only once)

Engineer's Initials \_\_\_\_\_

## 12.0 REFERENCES

1. CSA Standards A23.1:19, Concrete Materials and Methods of Concrete Construction, and A23.2:19, Test Methods of Test and Standard Practices for Concrete. (These two standards are published in one volume by Canadian Standards Association, 178 Rexdale Boulevard, Toronto, Ontario, M9W 1R3.)
2. Certification of Ready Mixed Concrete Production Facilities, Plant Certification Check List, QC Manual, Section 3, Twelfth Revision 2015. National Ready Mixed Concrete Association, 900 Spring Street, Silver Spring, Maryland 20910, [www.nrmca.org](http://www.nrmca.org).
3. Concrete Plant Standards (Metric), CPMB 100M-00, Twelfth Revision, November 2000. Concrete Plant Manufacturers Bureau, 900 Spring Street, Silver Spring, Maryland 20910, [www.cpmc.org](http://www.cpmc.org)
4. Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards, TMMB 100-05, Seventeenth Revision, March 2005. Truck Mixer Manufacturers Bureau, 900 Spring Street, Silver Spring, Maryland, 20910, [www.tmmb.org](http://www.tmmb.org)
5. Book of ASTM Standards, Volume 04.02, Concrete and Mineral Aggregates, ASTM, 1916 Race Street, Philadelphia, PA, 19103, [www.astm.org](http://www.astm.org)
6. Guide for Measuring, Mixing, Transporting, and Placing Concrete (ACI 304R). Available in the ACI Manual of Concrete Practice, Volume 2, or as a separate article from American Concrete Institute, 38800 Country Club Drive, Farmington Hills, Michigan, 48331 - 3439, [www.concrete.org](http://www.concrete.org)
7. Factors Affecting the Homogeneity of Ready Mixed Concrete, Report No. 1 (Phase 1, 1969) by D.L. Bloem and R.D. Gaynor. Available from National Ready Mixed Concrete Association (NRMCA) [www.nrmca.org](http://www.nrmca.org). Also, a Summary Paper appeared in the Journal of the American Concrete Institute, July, 1971.
8. Mixing Concrete in a Truck Mixer by Richard D. Gaynor and Jon I. Mullarky, NRMCA Publication No. 148, January, 1975.
9. Ready Mixed Concrete, Chapter 29, by R.D. Gaynor, Significance of Tests and Properties of Concrete and Concrete-Making Materials, ASTM STP 169D, 1978, pp. 471-502 (also NRMCA Publication No. 2P186, 2006).
10. Concrete Plant Operator's Manual, NRMCA Publication No. 2P159, 2005, [www.nrmca.org](http://www.nrmca.org).

**Note 9:** Although this document has been revised to relate it to metric terminology, it is recognized there will be instances where this has not yet replaced the imperial system of measurement. To provide for such cases, the imperial references contained in the previous document have been retained and are shown in brackets.

Engineer's Initials \_\_\_\_\_

# **APPENDIX A**

## Sample Scale Check Data Form

This form must be completed by a Scale Calibration Representative. One form **must** be completed every six months and kept on file at the Plant.



Atlantic Concrete Association  
Association béton Atlantique

301-3845 Joseph Howe Drive Tel: (902) 443-4456  
Halifax, NS B3L 4H9 Fax: (902): 404-8074  
E-mail: info@atlanticconcrete.ca  
Web site: www.atlanticconcrete.ca

## SCALE CHECK DATA FORM

### 1.0 SCALES GENERAL

Scale Purpose: \_\_\_\_\_

Scale Capacity: \_\_\_\_\_

This Scale Check Data Form outlines the minimum scale/weighing system requirements and tolerances that must be met. This agreement must be completed by qualified technical staff, employed by a scale company or authorized scale manufacturer. The completed agreement must be kept on record at the plant and submitted to the Auditing Engineer at the time of the plant audit to meet the requirements of Section 2.1 of the ACA Audit Check List for Concrete Production Facilities Certification Program.

Scales must be checked and calibrated in accordance with clause 1.4 of this document, or whenever alterations are made to the plant which may affect the weighing accuracy of the scales or whenever the plant is moved.

**Note:** Once the scale has been calibrated, the computer reading of that scale must be verified as an accurate representation of the digital readout over the range of the test weights.

		<b>PASS</b>	<b>FAIL</b>
1.1	Each scale consisting of a suitable system of levers or load cells which will weigh consistently within the tolerance specified in 1.5, with loads indicated either by a beam with a balance indicator, a full reading dial, or digital readout displaying accuracy in accordance with Clause 1.5.	<input type="checkbox"/>	<input type="checkbox"/>
1.2	Lever system scales so designed that centre of gravity of the gross load always lies within load pivots.	<input type="checkbox"/>	<input type="checkbox"/>
1.3	The following mechanical checks should be done on each weigh hopper: <ul style="list-style-type: none"> <li>- all pivots and bearings</li> <li>- the centre connection</li> <li>- hopper alignment</li> <li>- load cells tight and secure</li> <li>- all areas free of debris</li> <li>- safety rods, chains or cables</li> <li>- all hopper hangers</li> <li>- load cell alignment</li> <li>- all connection links</li> <li>- clean and lubricate (if required)</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>There must be no evidence of burring or wear.</b>		
1.4	Scales are checked and calibrated to specified tolerance of Clause 1.5 once for seasonal or portable plants which only operate at a maximum of six months, twice annually for plants operating greater than six months.	<input type="checkbox"/>	<input type="checkbox"/>
1.5	Each scale accurate to within plus/minus 0.40 percent of scale capacity throughout the range of use. Scale calibrations shall be done at a minimum of two points, one shall be at twenty (20) percent and the second shall be at a minimum of eighty (80) percent of the scale capacity.	<input type="checkbox"/>	<input type="checkbox"/>
1.6	The scale company shall only use test weights having a calibration traceable to the National Bureau of Standards.	<input type="checkbox"/>	<input type="checkbox"/>
1.7	Mass setting devices, such as scale-poisies, pointers, dials, punch cards, etc., capable of being set to 0.1 percent of total capacity of the scale. (No mass setting device is required for a dial scale in a manual plant.).	<input type="checkbox"/>	<input type="checkbox"/>
1.8	A scale check and calibration report or sticker is issued which states that each scale is checked to Clause 1.3 and calibrated to Clause 1.5.	<input type="checkbox"/>	<input type="checkbox"/>

		<b>PASS</b>	<b>FAIL</b>
<b>2.0</b>	<b>BEAM SCALES</b>		
2.1	The beam scale is provided with zero balance beam, balance indicator and separate weighing beam for each ingredient of a batch to be weighed on the same scale.	<input type="checkbox"/>	<input type="checkbox"/>
2.2	Beam poises are corrosion resistant, equipped with positive and accurate holding devices, and capable of being set to the minimum graduated interval which shall not be greater than 0.1 percent of capacity with a clear interval of not less than 0.8 mm (0.03 inches).	<input type="checkbox"/>	<input type="checkbox"/>
2.3	Balance indicators sufficiently sensitive to show movement when mass corresponding to 0.10 percent of scale capacity is placed in the batch hopper at a load equal to or greater than fifty (50) percent of scale capacity. The pointer travel at least five (5) percent of net rated capacity of largest weigh beam or ninety (90) kg (two hundred (200) pounds) whichever is less for underweight, and four (4) percent or forty-five (45) kg (100 pounds) whichever is less for overweight. Provision made for damping oscillation of indicator of pointer.	<input type="checkbox"/>	<input type="checkbox"/>
<b>3.0</b>	<b>LOAD CELL SCALES</b>		
3.1	Load cell scales arranged to transmit the load to one or more cells, directly or through a system of levers in such a way that the cell system registers the entire load accurately on the load-indicating device within the temperature range specified by the manufacturer.	<input type="checkbox"/>	<input type="checkbox"/>
3.2	Load cells should be mounted with the appropriate hardware which will cause the load cell to move freely causing no strain or fatigue.	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.0</b>	<b>DIAL INDICATING SCALES</b>		
4.1	The dial indicators and dial faces protected from dust.	<input type="checkbox"/>	<input type="checkbox"/>
4.2	Dials indicate the load in batches continuously from zero balance to full weighing capacity of scale.	<input type="checkbox"/>	<input type="checkbox"/>
4.3	The clear interval between gradations on the circular reading line of the dial face not less than 1 mm.	<input type="checkbox"/>	<input type="checkbox"/>
<b>5.0</b>	<b>DIGITAL-INDICATING SCALES</b>		
5.1	Equipped with a digital indicator or display protected from dust with numbers large enough for good readability; minimum numerical increment equal to or less than 0.1 percent of scale capacity.	<input type="checkbox"/>	<input type="checkbox"/>

This document shall bear the notation "P" Pass, "F" Fail or "N/A" Not Applicable for each item.

This document shall be signed by the Scale Manufacturer or Scale Company, certifying that the named plant meets all requirements of the ACA Scale Check Data Form.

\_\_\_\_\_  
Ready Mix Producer Company (please print)

\_\_\_\_\_  
Scale/Inspection Company (please print)

\_\_\_\_\_  
Plant Location (Civic Address) (please print)

\_\_\_\_\_  
Scale Company Representative (please print)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Ready Mix Facility Manager

\_\_\_\_\_  
Signature of Scale Company Representative

The described plant meets all requirements set out as of this date.

# **APPENDIX B**

## Sample Admixture Dispensing Equipment Calibration Form

## ADMIXTURE DISPENSING EQUIPMENT CALIBRATION CHECK FORM

For reference purposes the following excerpts are provided from Section 2, Batching Equipment, of the ACA Audit Check List for Concrete Production Facilities Certification Program 2020:

- 2.2.8 Separate dispenser for each liquid admixture in regular use, except that more than one admixture can be batched through a single dispenser if the admixtures are compatible or if the dispenser is flushed with water after each cycle.
- 2.2.9 Each admixture dispenser capable of measurement within tolerances specified in clause 2.3.2 and equipped with a calibrated container, in which the admixture may be collected to verify the accuracy of measurement.
- 2.2.10 Piping free of leaks and properly valved to prevent backflow or siphoning and to ensure that the measured amount is discharged.
- 2.2.11 For admixtures, other than accelerating admixtures, silica fume slurry, corrosion inhibitors and viscosity modifying admixtures, used at less than 1600 mL per 100 kg of cementitious material, each dispenser of liquid admixtures equipped with a visual or other means of providing a gross check to batching personnel of the amount of admixture batched during each cycle, within  $\pm 20$  percent. The gross check shall be independent of the accuracy, function, or operation of the primary metering device.
- 2.3.3 Producer member agrees to recheck batching accuracy of volumetric water batching devices (including water meters) and dispensers of liquid admixtures not less frequently than 180 days. Please refer to Member's Agreement in Section 10.

### Summary of Admixture Dispensing Equipment Calibration Check

DISPENSER №	PRODUCT	VOLUME		MEASURED ACCURACY	RECALIBRATE YES/NO <sup>1</sup>	PASS/FAIL
		TARGET	ACTUAL			
1						
2						
3						
4						
5						
6						
7						
8						

Note: <sup>1</sup> If "Yes", indicate date recalibration completed.

**CERTIFICATION COMPLETED BY (Please Print):** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_