TENDER DOCUMENTS

SUBSECTION 6.37

MISCELLANEOUS PRODUCTS FOR CONCRETE WORK

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SUBSECTION 6.37 MISCELLANEOUS PRODUCTS FOR CONCRETE WORK

6.37.1 GENERAL

6.37.1.1 This subsection describes the requirements relating to the main products for concrete works covered by this Contract.

6.37.1.2 Any specific requirements pertaining to the products covered by this Contract are set out on the drawings and in Section 4 *Special Technical Conditions*.

6.37.1.3 The requirements relating to demolition work are described in subsection 6.21 *Demolition and Removal*.

6.37.1.4 The requirements relating to the reinforcement are described in subsection 6.31 *Reinforcing Steel for Concrete*.

6.37.1.5 The requirements relating to formwork are described in subsection 6.32 *Formwork*.

6.37.1.6 The requirements relating to cast-in-place concrete are described in subsection 6.33 *Cast-in-Place Concrete*.

6.37.1.7 The requirements relating to filling cracks by injection are described in subsection 6.35 *Injection*.

6.37.1.8 The requirements relating to the addition of post-tensioning are described in subsection 6.36 *Prestressing*.

6.37.2 MEASUREMENT UNITS

6.37.2.1 The measurement units and respective symbols thereof used in this subsection are described as follows:

Measurement unit	Designation	Symbol
area	square meter	m^2
area	square millimeter	mm^2
force	newton	N
length	meter	m
length	centimeter	cm
length	millimeter	mm
mass	gram	g
mass	kilogram	kg
stress, pressure	megapascal	MPa
stress, pressure	kilopascal	kPa
viscosity	millipascal-second	mPa-sec
electric resistance	ohm	Ω
temperature	Celsius degree	°C
volume	liter	L

6.37.3 GALVANIC ANODES

6.37.3.1 REFERENCE STANDARDS

6.37.3.1.1 The **Contractor** shall perform all work related to the galvanic anode installation in accordance with the requirements of the following standards and documents to which the provisions of this Contract are added:

6.37.3.1.1.1 (ASTM) ASTM International:

- ASTM A615/A615M *Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement*;
- ASTM A1064/A1064M *Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete*;
- ASTM B6 *Standard Specification for Zinc*;
- ASTM B418 *Standard Specification for Cast and Wrought Galvanic Zinc Anodes*.

6.37.3.2 MATERIALS

6.37.3.2.1 Galvanic anodes

6.37.3.2.1.1 The galvanic anodes shall consist of a zinc core coated with a cementitious mortar such and shall be the product *Sika Galvashield XP* manufactured by Sika Canada Inc. or equivalent authorized by the Engineer.

6.37.3.2.1.2 The galvanic anodes shall meet the following requirements:

6.37.3.2.1.2.1 the zinc core shall have a minimum mass of 60 g and comply with standard ASTM B6;

6.37.3.2.1.2.2 the zinc core shall be casted around two (2) steel connector wires compliant with standard ASTM A1064/A1064M;

6.37.3.2.1.2.3 the connector wires shall be continuous (without splices);

6.37.3.2.1.2.4 the connector wires shall end with loops to facilitate the fixing thereof to the reinforcing bars;

6.37.3.2.1.2.5 the zinc core shall be coated with a highly alkaline cementitious mortar having a minimum pH of 14;

6.37.3.2.1.2.6 the cementitious coating shall be free of sulphates, chlorides, bromide or any other corrosive substance likely to affect the reinforcing steel;

6.37.3.2.1.2.7 the galvanic anodes shall prevent corrosion.

6.37.3.2.2 Coating mortar

6.37.3.2.2.1 The coating mortar shall be a cementitious mortar having an electrical resistivity of less than 15,000 Ω • cm.

6.37.3.3 INSPECTION AND STORAGE

6.37.3.3.1 The delivery, storage and handling of the anodes shall be carried out in strict conformity with the manufacturer's recommendations. The delivery slips shall be submitted to the Engineer upon request.

6.37.3.4 EXECUTION OF WORK

6.37.3.4.1 Fourteen (14) days prior to the start of work, the **Contractor** shall submit to the Engineer, for review, the technical data sheet on the various products as well as the galvanic anode installation method.

6.37.3.4.2 The **Contractor** or subcontractor thereof, if any, shall be a galvanic anode installer recommended by the manufacturer.

6.37.3.4.3 The **Contractor** shall maintain an up-to-date record of the data and measurements related to the anode installation. That record shall be provided to the Engineer upon request.

6.37.3.4.4 The existing reinforcement shall be released from the concrete and cleaned of any rust by means of abrasive blasting and dust shall be removed by means of air blasting in the locations where the galvanic anodes will be installed.

6.37.3.4.5 In the locations where the galvanic anodes will be installed, the clearance between the concrete and the reinforcing bars shall allow a free space between the galvanic anode of at least 20 mm or 6 mm more than the diameter of the repair concrete coarse aggregate, whichever is the largest dimension.

6.37.3.4.6 Before installing the galvanic anodes, the **Contractor** shall check, with a multimeter, the electrical continuity of the exposed reinforcing bars in the repair area.

6.37.3.4.6.1 A resistance established between 0 and 1 Ω confirms the electrical continuity.

6.37.3.4.7 In the case of a concrete repair without addition of new reinforcing bars, the galvanic anodes shall be fastened to the cleaned reinforcing bars around the perimeter of the repair.

6.37.3.4.8 The galvanic anodes shall be installed according to the spacing indicated on the drawings or according to the spacing calculated by the manufacturer's engineer who is a member of the *Ordre des ingénieurs du Québec* (OIQ).

6.37.3.4.9 In the case where a new reinforcing bar bed is added in the repair area, the **Contractor** shall comply with the following requirements, without however being limited thereto:

6.37.3.4.9.1 establish the electrical continuity between the existing reinforcing bars and the new bars by securely installing metal wires between the existing and the new reinforcing bars. The new electrical connections shall be carried out according to a 1000 mm x 1000 mm grid in order to ensure maximum electrical conductivity;

6.37.3.4.9.2 check the electrical continuity as specified in paragraph 6.37.3.4.6;

6.37.3.4.9.3 install the galvanic anodes on the new reinforcing bar bed according to a maximum 600 mm x 600 mm grid and over the perimeter indicated on the drawings.

6.37.3.4.10 The spacing between the anodes shall be modified at the request of the Engineer.

6.37.3.4.11 The galvanic anodes shall be fastened to the reinforcing bars so that the repair concrete provides a 25 mm cover.

6.37.3.4.12 The galvanic anodes shall be securely fastened to the reinforcing bars with steel connector wires.

6.37.3.4.13 After the installation, the electrical conductivity of each anode with the reinforcing bar on which it is installed shall be checked. A resistance reading ranging between 0 and 1 Ω shall be made.

6.37.3.4.14 After having checked the electrical conductivity, the **Contractor** shall completely coat the anodes with the coating mortar, ensuring that the mortar completely fills the space between the anode and the existing concrete so as to establish an ionic conductivity therewith.

6.37.3.4.15 The galvanic anodes shall be fastened to the deepest layer of exposed reinforcing steel as indicated on the drawings. The fastener shall be such that the galvanic anode cannot move from its position and that it is positioned so as to maximize the electrical conductivity.

6.37.3.4.16 The electrical conductivity between the anodes and the reinforcing bars shall be checked with a multimeter measuring device. The electrical conductivity of the new and existing reinforcing steel shall be measured and recorded in a report, a copy of which shall be submitted to the Engineer.

6.37.3.4.17 The placement of the repair concrete shall be carried out taking care to avoid moving and damaging the galvanic anodes.

6.37.4 FORMWORK LINING

6.37.4.1 REFERENCE STANDARDS

6.37.4.1.1 The **Contractor** shall install the formwork lining in accordance with the following standards and documents to which the provisions of this Contract are added:

6.37.4.1.1.1 (CAN/CGSB) Canadian General Standards Board:

- CAN/CGSB-4.2 No. 37 *Textile Test Methods: Fabric Thickness;*
- CAN/CGSB-4.2 No. 9.1 *Textile Test Methods: Breaking Strength of Fabrics - Strip Method - Constant-time-to-break Principle;*
- CAN/CGSB-148.1 No. 7.3 *Grab Tensile Test for Geotextiles*.

6.37.4.1.1.2 (MTQ) Ministère des Transports du Québec:

- MTQ – *Normes – Ouvrages routiers*, Tome VII *Matériaux*, chapitre 3 *Béton et produits connexes,*

6.37.4.2 MATERIALS

6.37.4.2.1 The formwork lining shall be a nonwoven needle-punched geotextile fabric meeting the following requirements, without however being limited thereto:

6.37.4.2.1.1 material: polyester, polypropylene or cotton;

6.37.4.2.1.2 thickness: 0.5 to 0.9 mm, in accordance with standard CAN/CGSB-4.2 N° 37;

6.37.4.2.1.3 loss of thickness under a pressure of 200 kPa: < 10%;

6.37.4.2.1.4 minimum tensile strength at break: 200 N, in accordance with standard CAN/CGSB-4.2 N° 9.1 or CAN/CGSB-148.1 N° 7.3;

6.37.4.2.1.5 Minimum absorption capacity: 0.35 L/m².

6.37.4.3 EXECUTION OF WORK

6.37.4.3.1 At least fourteen (14) days prior to the start of the formwork lining installation, the **Contractor** shall submit to the Engineer, for review, the technical data sheet on the formwork lining.

6.37.4.3.2 The wood or steel formwork shall haven been cleaned of any concrete residues, sawdust or any formwork release agent or oil before installing the formwork lining.

6.37.4.3.3 The formwork lining shall be dry at the time of installation.

6.37.4.3.4 The formwork lining shall be stretched during installation in order to avoid the formation of folds and pockets.

6.37.4.3.5 The formwork lining shall be fixed to the formwork by means of staples or an adhesive for wooden formwork or by means of an adhesive for steel formwork. The adhesive shall be the product *Super 77* manufactured by 3M, or equivalent authorized by the Engineer.

6.37.4.3.6 The **Contractor** shall install the formwork lining in accordance with the method recommended by the manufacturer.

6.37.4.3.7 The **Contractor** shall install the formwork lining on all the surfaces that come into contact with the fresh concrete.

6.37.4.3.8 Prior to placing the concrete, the **Contractor** shall protect the formwork lining from adverse weather conditions, concrete splatter and release agents.

6.37.4.3.9 The formwork lining shall be dry at the time of the concrete placement.

6.37.4.3.10 The formwork lining cannot, without the prior approval of the Engineer, be reused.

6.37.5 CONCRETE WATERPROOFERS

6.37.5.1 REFERENCE STANDARDS

6.37.5.1.1 The **Contractor** shall carry out all concrete waterproofing work in accordance with the following standards and documents to which the provisions of this Contract are added:

6.37.5.1.1.1 (ASTM) ASTM International:

- ASTM D5095 *Standard Test Method for Determination of the Nonvolatile Content in Silanes, Siloxanes and Silane-Siloxane Blends Used in Masonry Water Repellent Treatments*

6.37.5.1.1.2 (MTQ) Ministère des Transports du Québec:

- MTQ – *Cahier des charges et devis généraux (CCDG) Construction et réparation*
- MTQ – *Normes – Ouvrages routiers*, Tome VII *Matériaux*, chapitre 3 *Béton et produits connexes* :
    - Norme 3601 *Imperméabilisants à béton*

6.37.5.1.1.3 (NCHRP) National Cooperative Highway research program:

- NCHRP – Report 244 *Concrete Sealers for protection of Bridge Structures*

6.37.5.2 MATERIALS

6.37.5.2.1 The concrete waterproofer shall be a silane silicone polymer in accordance with standard NCHRP 244 and shall meet the following requirements, without however being limited thereto:

6.37.5.2.1.1 have a solids content higher than 40% by weight in accordance with standard ASTM D5095;

6.37.5.2.1.2 have a minimum density of 0.86 kg/L;

6.37.5.2.1.3 have a maximum viscosity of 30 mPa-s at 23°C;

6.37.5.2.1.4 shall not alter the concrete finish and be invisible when dry.

6.37.5.2.2 The concrete waterproofer shall be low-volatile organic compounds (VOCs) in accordance with Environment and Climate Change Canada's requirements.

6.37.5.2.3 The concrete waterproofer shall be the product *Sikagard SN40 Lo-VOC* manufactured by Sika Canada Inc. or equivalent authorized by the Engineer.

6.37.5.2.4 The concrete waterproofer shall ensure a minimum of 80% reduction of water and chloride penetration.

6.37.5.3 DELIVERY AND STORAGE

6.37.5.3.1 The concrete waterproofer shall be delivered at the worksite in sealed containers which shall bear a label containing the following information, without however being limited thereto:

6.37.5.3.1.1 the names of the manufacturer and of the product;

6.37.5.3.1.2 the manufacturer's instructions for the application;

6.37.5.3.1.3 the production lot or batch number;

6.37.5.3.1.4 the container volume;

6.37.5.3.1.5 the expiry date.

6.37.5.3.2 the concrete waterproofer shall be stored at temperatures ranging between 30°C and -18°C.

6.37.5.4 EXECUTION OF WORK

6.37.5.4.1 The concrete shall be cured for a minimum period of twenty-eight (28) days prior to waterproofing thereof.

6.37.5.4.2 The surfaces shall be clean and dry before the waterproofer application.

6.37.5.4.3 Between seven (7) days and twenty-four (24) hours before the waterproofer application, the surfaces to be waterproofed shall be treated by wet abrasive blasting or high-pressure water blasting in order to obtain a surface free of any coating, curing material, laitance, oil, paint, rust or other dirt. Within the same period, the treated surfaces shall then be cleaned by water blasting at a pressure of 15 MPa and a flow of 20L/min with a concentrated circular jet nozzle at a nozzle-concrete surface distance of 150 mm to 200 mm, so as to obtain a surface free of any debris.

6.37.5.4.4 The equipment used for the wet abrasive blasting shall be equipped with a filter that removes oil. The **Contractor** shall demonstrate the filter's efficiency to the Engineer before using the equipment.

6.37.5.4.5 The waterproofer can be applied only if the ambient temperature and that of the surfaces to be waterproofed are above 5°C and that there is no risk of freezing during the twelve (12) hours following the placement.

6.37.5.4.6 Protective measures shall be taken to prevent the waterproofer from coming into contact with the asphalt or with other materials that constitute the surfaces adjacent to those that are to be treated.

6.37.5.4.7 The waterproofer shall be applied in two (2) cross layers at a rate of 0.33 L/m^2 per layer using a Chapin Viton manual low-pressure sprayer or equivalent authorized by the Engineer.

6.37.5.4.8 The treated surfaces shall be protected from rain and splatters for a period of six (6) hours following the waterproofer application.

6.37.6 JOINT SEALANT PRODUCT

6.37.6.1 REFERENCE STANDARDS

6.37.6.1.1 The **Contractor** shall carry out all joint sealant work in accordance with the following standards and documents to which the provisions of this Contract are added:

6.37.6.1.1.1 (ASTM) ASTM International:

- ASTM C920 *Standard Specification for Elastomeric Joint Sealants;*
- ASTM D2240 *Standard Test Method for Rubber Property-Durometer hardness;*
- ASTM D412 *Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers-Tension.*

6.37.6.2 MATERIALS

6.37.6.2.1 The sealant shall be a polyurethane-based one-component elastomeric product having the following characteristics, without however being limited thereto:

6.37.6.2.1.1 withstand a joint movement of ± 35% without tearing and/or coming off from the substrate;

6.37.6.2.1.2 be gray in color;

6.37.6.2.1.3 withstand adverse weather conditions and aging;

6.37.6.2.1.4 keep its durability and elasticity over temperatures ranging between -40°C and 77°C.

6.37.6.2.2 At a temperature of 23°C and relative humidity of 50%, the sealant shall meet the following requirements, without however being limited thereto:

6.37.6.2.2.1 tear strength of 8,5 N/mm in accordance with standard ASTM C920;

6.37.6.2.2.2 shore A hardness of 40 ± 5 at twenty-one (21) days in accordance with standard ASTM D2240;

6.37.6.2.2.3 tensile properties at twenty-one (21) days, following application, in accordance with standard ASTM D412:

6.37.6.2.2.3.1 tensile strength of 1.37 MPa;

6.37.6.2.2.3.2 elongation at break of 500%;

6.37.6.2.2.3.3 elastic modulus (100%) of 0.59 MPa.

6.37.6.2.3 The sealant shall be the product *Sikaflex 1a* manufactured by Sika Canada Inc. or equivalent authorized by the Engineer.

6.37.6.3 EXECUTION OF WORK

6.37.6.3.1 Unless otherwise indicated on the drawings, no primer is required before applying the sealant.

6.37.6.3.2 The sealant shall be applied when the air temperature ranges between 4°C and 38°C.

6.37.6.3.3 The joint to be sealed shall be clean and dry when the sealant is applied.

6.37.6.3.4 For best results, the sealant should be placed in the joint when the latter is halfway between the intended expansion and contraction.

6.37.6.3.5 The **Contractor** shall place the sealant with manual or pneumatic operation caulking equipment.

6.37.6.3.6 The appropriate dimensioning of the joints with a movement shall be in a ratio of 2:1 (width: depth).

6.37.6.3.7 The depth of a joint with a movement shall range between 6 mm and 13 mm.

6.37.6.3.8 The placement of a preformed backer rod is required for all joints with a movement.

6.37.6.3.9 The preformed backer rod shall be placed in accordance with Article 6.37.7 *Preformed Backer Rods.*

6.37.7 PREFORMED BACKER RODS

6.37.7.1 REFERENCE STANDARDS

6.37.7.1.1 The **Contractor** shall carry out all backer rod installation in accordance with the following standards and documents to which the provisions of this Contract are added:

6.37.7.1.1.1 (ASTM) American Society for Testing and Materials:

- ASTM D994 *Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)*;
- ASTM D1056 *Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber;*
- ASTM D1751 *Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)*;
- ASTM D1752 *Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction*.

6.37.7.2 MATERIALS

6.37.7.2.1 Preformed bituminous backer rod

6.37.7.2.1.1 The preformed bituminous backer rod shall be a bitumen-impregnated fibrous material compliant with standard ASTM D994 or standard ASTM D1751, in accordance with its intended use.

6.37.7.2.2 Preformed foam backer rod

6.37.7.2.2.1 The preformed foam backer rod shall be a semi-rigid closed cell foam material compliant with standard ASTM D1752.

6.37.7.2.3 Cylindrical foam backer rod

6.37.7.2.3.1 The cylindrical foam backer rod shall be a closed cell polyethylene foam cord.

6.37.7.2.4 The preformed backer rods shall be delivered in strips of the width and height indicated on the drawings.

6.37.7.2.5 The cylindrical foam backer rod shall have a diameter that is greater by 3 mm than the width of the joint to seal.

6.37.7.3 EXECUTION OF WORK

6.37.7.3.1 The backer rods shall be placed in accordance with the requirements of their respective manufacturers.

6.37.7.3.2 An anti-contamination strip shall be placed on a preformed bituminous backer rod prior to the application of a polyurethane-based sealant.

6.37.8 WATERSTOPS

6.37.8.1 REFERENCE STANDARDS

6.37.8.1.1 The **Contractor** shall carry out all waterstop installation work in accordance with the following standards and documents to which the provisions of this Contract are added:

6.37.8.1.1.1 Corps of Engineer:

- CRD-C 572 *Specifications for Polyvinylchloride Waterstop*.

6.37.8.2 MATERIALS

6.37.8.2.1 The waterstops shall consist of a composite whose basic resin is an unsplit polyvinyl chloride (PVC) with a central bulb in accordance with standard CRD-C 572.

6.37.8.2.2 The waterstops shall meet the following criteria:

6.37.8.2.2.1 withstand indefinitely loads up to 20 m when stretched by a 20 mm spacing between the monoliths;

6.37.8.2.2.2 essentially retain plasticity and elasticity at temperatures down to -32°C;

6.37.8.2.2.3 have high durability under the moisture, temperature and physical environment conditions to which they are subjected.

6.37.8.2.3 The waterstops shall have a minimum weight of 2.16 kg/m for a 150 mm width.

6.37.8.2.4 The joints executed in the waterstops shall be probed and as waterproof as the continuous waterstop and shall have a tensile strength and flexibility equal to at least 50% of that of the continuous waterstop.

6.37.8.2.5 At the request of the Engineer, the **Contractor** shall provide, for testing purposes, a 3 m long sample of the type of moulded waterstop for which review is required.

6.37.8.2.6 The sample shall be accompanied by a certificate identifying the material and certifying that it is the same in all respects as that used in the manufacture of the proposed waterstops.

6.37.8.2.7 The sample and the certificate shall be provided to the Engineer, at least fourteen (14) days before the delivery of the waterstops to the worksite.

6.37.8.3 EXECUTION OF WORK

6.37.8.3.1 The waterstop shall be installed so that the bubble is positioned at the center of the construction joint.

6.37.8.3.2 The waterstop shall be fixed to the reinforcing bars making sure that it is vertical and in the center of the element to be cast.

6.37.8.3.3 After the first pour, the **Contractor** shall clean the portion of the exposed waterstop of any concrete splatter.

6.37.8.3.4 Prior to the second pour, the **Contractor** shall ensure that the waterstop is fixed upright.

6.37.9 WATERPROOFING COATING

6.37.9.1 GENERAL

6.37.9.1.1 The requirements relating to the removal of a waterproofing coating are described in subsection 6.21 *Demolition and Removal*.

6.37.9.2 REFERENCE STANDARDS

6.37.9.2.1 The **Contractor** shall carry out the placement of the waterproofing coating in accordance with the following standards and documents to which the provisions of this Contract are added:

6.37.9.2.1.1 (CAN/CSA) Canadian Standards Association:

- CAN/CSA-A23.1-04/A23.2-04 *Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete*.

6.37.9.2.1.2 (MTQ) Ministère des Transports du Québec:

- MTQ – *Cahier des charges et devis généraux* (CCDG) – *Construction et réparation.*

6.37.9.3 MATERIALS

6.37.9.3.1 The new waterproofing coating shall be the product *Vulkem 450/451* manufactured by Tremco or an equivalent authorized by the Engineer.

6.37.9.3.2 Primer

6.37.9.3.2.1 The primer used shall be the product *Vulkem 171* manufactured by Tremco compatible with the waterproofing coating or an equivalent authorized by the Engineer.

6.37.9.3.3 Base coat

6.37.9.3.3.1 The base coat shall be the product *Vulkem 450* manufactured by Tremco, a one-component elastomeric polyurethane coating that provides monolithic water-repellent protection to the concrete, or an equivalent authorized by the Engineer.

6.37.9.3.4 Top coat

6.37.9.3.4.1 The topcoat must be an aliphatic polyurethane coating, of a single component providing ultraviolet stability and resistance to the chemical attacks and shall be the product *Vulkem 351* manufactured by Tremco or equivalent authorized by the Engineer.

6.37.9.4 INSPECTION AND STORAGE

6.37.9.4.1 The products shall be stored in a room where they are protected from moisture and freezing.

6.37.9.4.2 Once the containers are opened, the product therein contained shall be used within twenty-four (24) hours.

6.37.9.5 EQUIPMENT AND TOOLS

6.37.9.5.1 The waterproofing products shall be applied as recommended by the manufacturer.

6.37.9.5.2 The products may be applied using rollers, brushes or spray guns. Where a spray gun is used, it is recommended that the product be diluted with xylol at a ratio of 1 L per 20 L of product prior to spraying.

6.37.9.6 EXECUTION OF WORK

6.37.9.6.1 Removal of the existing waterproofing coating.

6.37.9.6.1.1 The removal of the waterproofing coating shall be carried out in accordance with subsection 6.21 *Demolition and Removal*.

6.37.9.6.2 Placement of the new waterproofing coating

6.37.9.6.2.1 The **Contractor** shall install the new waterproofing coating in accordance with the manufacturer's instructions.

6.37.9.6.2.2 The **Contractor** shall prepare the surface in accordance with the manufacturer's recommendations. The **Contractor** shall submit to the Engineer the manufacturer's written certification confirming that the surface is suitable for the coating application.

6.37.9.6.2.3 Unless otherwise indicated by the manufacturer, the concrete shall have been placed at least twenty-eight (28) days prior to the application of the new membrane. If the membrane is applied earlier, the **Contractor** shall provide the Engineer with a written certification from the manufacturer confirming the validity of the product warranty.

6.37.9.6.2.4 The **Contractor** shall not apply a new coating to wet or contaminated surfaces. Before the product is applied, the measurements taken on the concrete by the **Contractor**, in the presence of the Engineer, shall confirm that the moisture content of the concrete is less than 6%.

6.37.9.6.2.5 The concrete surfaces to be covered shall be free of dirt, laitance, oil, grease or any other contaminants.

6.37.9.6.2.6 The minimum temperature shall be above +10°C when the product is applied.

6.37.9.6.2.7 Unless otherwise indicated by the Engineer, the **Contractor** shall place a waterproofing coating in the locations indicated on the drawings.

6.37.9.6.2.8 The placement of the waterproofing coating beyond the limits indicated on the drawings or required by the Engineer will not be measured for payment and shall be removed by the **Contractor** at no additional cost to the **Owner**.

6.37.9.7 QUALITY CONTROL

6.37.9.7.1 The quality control and the recommendations from the manufacturer of the new coating are the responsibility of the **Contractor**.

6.37.9.7.2 The **Contractor** shall ensure that the following requirements are met in accordance with the manufacturer's recommendations and those of this subsection:

6.37.9.7.2.1 surface preparation;

6.37.9.7.2.2 humidity level;

6.37.9.7.2.3 ambient and substrate temperatures;

6.37.9.7.2.4 application rate;

6.37.9.7.2.5 dry film thickness.

6.37.9.7.3 The **Contractor** shall check these requirements every day and incorporate them into a report that it shall submit to the Engineer at the end of work.

END OF SUBSECTION