

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C260-94, Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309-94, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494-92, Specification for Chemical Admixtures for Concrete.
 - .4 ASTM D1751-83(1991), Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A5-93, Portland Cement.
 - .2 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.
 - .3 CAN/CSA-A23.2-04, Methods of Test for Concrete.

1.2 STANDARD

- .1 Concrete materials and methods of construction to CAN/CSA-A23.1 unless otherwise specified.

1.3 TESTING AND INSPECTION

- .1 Concrete testing to CAN/CSA-A23.1 by testing laboratory designated by Contract Administrator.
- .2 Give Contract Administrator minimum of seven (7) days notice prior to each concrete pour.

1.4 SAMPLES

- .1 Submit samples in accordance with Section 01330 - Submittal Procedures.
- .2 At least four (4) weeks prior to commencing work, inform Contract Administrator of proposed source of aggregates and provide access for sampling.

1.5 CERTIFICATES

- .1 Submit certificates in accordance with Section 01330 - Submittal Procedures.
- .2 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.

- .3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.6 CO-ORDINATION

- .1 Coordinate with Division 15 for any repair necessary during pouring of concrete.
- .2 Division 15 will maintain air pressure inside the buried pipe throughout the concrete pour and a minimum of 24 hours after the concrete emplacement is completed.

Part 2 Products

2.1 MATERIALS

- .1 Portland cement: to CAN/CSA-A5.
 - .2 Supplementary cementing materials: to CAN/CSA-A23.5.
 - .3 Water: to CAN/CSA-A23.1.
 - .4 Aggregates: to CAN/CSA-A23.1.
 - .5 Air entraining admixture: to ASTM C260.
 - .6 Chemical admixtures: to ASTM C494. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather placing.
 - .7 Concrete retarders: to ASTM C494. Do not allow moisture of any kind to come in contact with the retarder film.
 - .8 Non-shrink grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: 50 MPa at 28 days
 - .9 Polyethylene film: 6 mil thickness to CAN/CGSB-51.34.
 - .10 Curing compound: to CAN/CSA-A23.1 and to ASTM C309.
 - .11 Premoulded joint fillers:
 - .1 Bituminous impregnated fibre board: to ASTM D1751.
- ### **2.2 MIXES**
- .1 Proportion concrete in accordance with CAN/CSA-A23.1, to give quality and yield for concrete as indicated. Refer to Structural Drawings, General Notes for mix proportions and strengths.

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Contract Administrator's approval before placing concrete. Provide seven (7) days notice prior to placing of concrete.
- .2 Pumping of concrete is permitted only after approval of equipment and mix by Contract Administrator.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Contract Administrator's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .6 Do not place load upon new concrete until authorized by Contract Administrator.

3.2 COLD WEATHER REQUIREMENTS

- .1 In the event "Possutec 20" as manufactured by Master Builders is used, relaxation of the following bill be considered.
- .2 When the air temperature is at or below 5° C or when there is a probability of it falling to that limit during the placing or curing period, cold weather requirements shall be applicable.
- .3 Provide heating equipment or heating plant on the job ready for use when concrete is being placed during cold weather. Such equipment shall be adequate for the purpose of maintaining the required temperature during the placing and curing of the concrete. The methods used for heating shall be acceptable to the Engineer. Equipment inducing carbon monoxide gas to come into contact with concrete work shall not be acceptable.
- .4 Concrete shall not be placed on or against reinforcing, formwork, earth or any surface that is at a temperature less than 5° C.
- .5 When being placed the concrete shall have a temperature of not less than 10° C nor more than 30° C
- .6 The temperature of the concrete at all surfaces shall be maintained at not less than 20° C for three days, or at not less than 10° C for five days after placing.
- .7 Means shall be provided to humidify the air within enclosures and to keep the concrete and formwork continuously moist if dry heat is used.

- .8 The concrete shall be kept above freezing temperature for a period of seven days and shall be kept from alternate freezing and thawing for at least fourteen days after placement.
- .9 At the end of the specified protection period, the temperature of the concrete shall be reduced gradually at a rate not exceeding that shown in Table 17 of CSA CAN3-A23.1-M77.
- .10 Accelerator or so-called antifreeze compounds shall not be permitted unless otherwise approved by Contract Administrator.
- .11 All protective coverings shall be kept clear of the concrete and form surfaces to permit free circulation of air and shall be maintained intact for at least 24 hours after the artificial heat is disconnected.
- .12 On slip formed work, newly poured surfaces exposed of exterior weather conditions shall be protected to avoid exposure to adverse effects of wind, rain and low temperatures.

3.3 CONSTRUCTION

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
- .2 Sleeves and inserts.
 - .1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by Contract Administrator.
 - .2 Where approved by Contract Administrator, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm (4" x 4") not indicated, must be approved by Contract Administrator.
 - .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Contract Administrator before placing of concrete.
 - .4 Check locations and sizes of sleeves and openings shown on drawings.
 - .5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Finishing.
 - .1 Interior flat slabs to be exposed or to receive epoxy, carpet, sheet vinyl or other covering requiring a smooth surface: Initial finishing operations followed by final finishing comprising of mechanical floating and steel

trowelling as specified in CAN/CSA-A23.1. to produce hard, smooth, dense trowelled surface free from blemishes; finishing tolerance classification: Flat.

- .2 Use procedures acceptable to Contract Administrator or those noted in CAN/CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.
- .3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
- .4 Rub exposed sharp edges of concrete with carborundum to produce 3 mm (1/8") radius edges unless otherwise indicated.

.4 Joint fillers.

- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Contract Administrator. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
- .2 Locate and form construction, expansion joints as indicated. Install joint filler.

3.4 Curing

- .1 Cure and protect concrete in accordance with CAN/CSA A23.1.

3.5 WATERSTOPS

- .1 Install waterstops to provide continuous water seal. Do not distort or pierce waterstop in such a way as to hamper performance. Do not displace reinforcement when installing waterstops. Use equipment to manufacturer's requirements to field splice waterstops. Tie waterstops rigidly in place.
- .2 Use only straight heat sealed butt joints in field. Use factory welded corners and intersections unless otherwise approved by Contract Administrator.

3.6 SITE TOLERANCE

- .1 Concrete tolerance in accordance with CAN/CSA-A23.1 and to tolerance schedule as indicated.

3.7 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Contract Administrator in accordance with CAN/CSA-A23.1 and Section 01450 - Quality Control.
- .2 Contract Administrator will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

- .3 Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2.
- .4 Inspection or testing by Contract Administrator will not augment or replace General Contractor's quality control nor relieve him of his Contractual responsibility.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- .1 This section includes the following.
 - .1 Applying Sealer and Hardener, and polishing concrete to specified finish level.
 - .2 Related Work:
 - .1 Section 03300 Cast-In-Place Concrete

1.2 REFERENCES

- .1 American Society for Testing and Materials:
 - .1 ASTM-C779, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
 - .2 ASTM G23-81, Ultraviolet Light & Water Spray
 - .3 ASTM C805, Impact Strength
- .2 American Concrete Institute
 - 1. ACI 302. 1R-89, Guide for Concrete Floor and Slab Construction
- .3 Other Test:
 - 1. Reflectivity

1.3 SUBMITTALS

- .1 Comply with pertinent provisions of Section 01330 - Submittal Procedures.
 - .1 Provide submittal information within 35 calendar days after the contractor has received the Contract Administrator's notice to proceed.
- .2 Product data:
 - .1 Submit special concrete finishes manufacturer's specifications and test data.
 - .2 Submit special concrete finishes describing product to be provided, giving manufacturer's name and product name for the specified material proposed to be provided under this section.

- .3 Submit special concrete finishes manufacturer's recommended installation procedures; which, when approved by the Contract Administrator, will become the basis for accepting or rejecting actual installation procedures used on the work.
- .4 Submit special concrete finishes technical data sheet giving descriptive data, curing time, and application requirements.
- .5 Submit special concrete finishes manufacturer's Material Safety Data Sheet (MSDS) and other safety requirements.
- .6 Follow all special concrete finishes published manufacturer's installation instructions.

.3 Test Reports:

- .1 Provide certified test reports, prepared by an independent testing laboratory, confirming compliance with specified performance criteria.

1.4 QUALITY ASSURANCE

.1 Installer Qualifications:

- .1 Use an experienced installer and adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.
- .2 The special concrete finish manufacturer shall certify applicator.
- .3 Applicator shall be familiar with the specified requirements and the methods needed for proper performance of work of this section.

.2 Manufacturer's Certification:

- .1 Provide letter of certification from concrete finish manufacturer stating that installer is certified applicator of special concrete finishes, and is familiar with proper procedures and installation requirements required by the manufacturer.

.3 Mock-ups:

- .1 Apply mock-ups of each type finish, to demonstrate typical joints, surface finish, color variation (if any), and standard of workmanship.
- .2 Build mock-ups approximately 50 square feet in the location indicated or if not indicated, as directed by the Contract Administrator.

- .3 Notify Contract Administrator seven (7) days in advance of dates and times when mock-ups will be constructed.
- .4 Obtain from the Contract Administrator approval of mock-ups before starting construction.
- .5 If the Contract Administrator determines that mock-ups do not meet requirements, demolish and remove them from the site and cast others until mock-ups are approved.
- .6 Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed work.
- .7 Approved mock-ups may become part of the completed work if undisturbed at time of substantial completion.

.4 Protection

- .1 No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention of contact is therefore required.
- .2 All hydraulic powered equipment must be diapered to avoid staining of the concrete.
- .3 No trade will park vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.
- .4 No pipe cutting machine will be used on the inside floor slab.
- .5 Steel will not be placed on interior slab to avoid rust staining.
- .6 Acids and acidic detergents will not come into contact with slab.
- .7 All trades must be informed that the slab must be protected at all times.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials in original containers, with seal's unbroken, bearing manufacturer labels indicating brand name and directions for storage.
- .2 Dispense special concrete finish material from factory numbered and sealed containers. Maintain record of container numbers.

1.6 PROJECT CONDITIONS

- .1 Environmental limitations:

- .1 Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
 - .2 Concrete Floor Flatness rating recommended at least 40, where possible.
 - .3 Concrete Floor Levelness rating recommended at least 30, where possible.
 - .4 Concrete must be cured a minimum of 45 days or as directed by the manufacturer before application of Retro Plate can begin.
 - .5 Application of Retro-Plate shall take place 10 days prior to installation of equipment and substantial completion, thus providing a complete, uninhibited concrete slab for application.
- .2 Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS AND MANUFACTURERS

- .1 Hardening/Sealing Agent
 - .1 Retro-Plate 99, manufactured by Advanced Floor Products, Inc., P.O. Box 50533, Provo, Utah 84605, 801-812-3420.
 - .1 Performance Criteria:
 - i. Abrasion Resistance: ASTM C779 – Up to 400% increase in abrasion resistance.
 - ii. Impact Strength: ASTM C805 – Up to 21% increase impact strength.
 - iii. Ultra Violet Light and Water Spray: ASTM G23-81 – No adverse effect to ultra violet and water spray.
 - iv. Reflectivity: Up to 30% increase in reflectivity.
 - .2 Concrete Preservative & Stain Repellent to be Concrete Preservative P-2 (2 Coats) Distributed by Antex Western.
 - .3 Certified Applicator.

Antex Western Ltd.
Winnipeg, Manitoba Canada
Ph 204-633-4815 Fax 204-633-0550
Contact: Sal Maida
Email sal@antexwestern.com

- .4 Products of the above mentioned manufacturer are acceptable. Alternative manufacturers maybe considered provided their products are equal or exceed the quality specified. Alternatives must be submitted to the Contract Administrator at least seven (7) days prior to bid due date. Acceptance will be established by addendum.

2.2 RELATED MATERIALS

- .1 Neutralizing Agent:
 - .1 Tri-sodium Phosphate
- .2 Water:
 - .1 Clean Potable

PART 3 EXECUTION

3.1 SURFACE CONDITIONS:

- .1 Examine substrate, with installer present, for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.
- .2 Verify that base slab meet finish and surface profile requirements in Division 3 Section "Cast-In-Place Concrete," and Project Conditions above.
- .3 Prior to application, verify that floor surfaces are free of construction latents.

3.2 APPLICATION

- .1 Start any of the floor finish applications in presence of manufacturer's technical representative.
- .2 Sealing, Hardening and Polishing of Concrete Surface
 - .1 Concrete must be in place a minimum of 45 days or as directed by the manufacturer before application can begin.
 - .2 Only a certified applicator shall apply Retro-Plate 99. Applicable procedures must be followed as recommended by the product manufacturer and as required to match approved test sample.

- .3 Achieve waterproofing, hardening, dust-proofing, and abrasion resistance of the surface without changing the natural appearance of the concrete, except for the sheen.
- .4 Grind to Specified Depth & Polish Finish. Schedule as Follows;

P Conc -3 (Deep Grind 5mm Grind Depth) Gloss 1800 Grit Finish
- 5. Apply 2 Coats of P2 Concrete Preservative & Stain Repellent (As per manufactures recommendations).

3.3 WORKMANSHIP AND CLEANING:

- .1 The premises shall be kept clean and free of debris at all times.
- .2 Remove spatter from adjoining surfaces, as necessary.
- .3 Repair damages to surface caused by cleaning operations.
- .4 Remove debris from jobsite
 - .1 Dispose of materials in separate, closed containers in accordance with local regulations.

3.4 PROTECTION:

- .1 Protect finished work until fully cured in accordance with manufacturer's recommendations.

END OF SECTION