

1. CONCRETE CIP SPECIFICATIONS

- PART 1 - GENERAL**  
QUALITY ASSURANCE
- CONCRETE SUPPLIER: A FIRM EXPERIENCED IN PRODUCING READY-MIXED CONCRETE THAT COMPLIES WITH ASTM C 94 REQUIREMENTS FOR PRODUCTION FACILITIES AND EQUIPMENT. COMPLY WITH ACI 301, "SPECIFICATION FOR STRUCTURAL CONCRETE."
  - MANUFACTURER CERTIFIED ACCORDING TO NRMCA'S "CERTIFICATION OF READY MIXED CONCRETE PRODUCTION FACILITIES." CERTIFICATION SHALL NOT BE MORE THAN TWELVE MONTHS OLD.
  - TESTING AGENCY QUALIFICATIONS: AN INDEPENDENT AGENCY, QUALIFIED ACCORDING TO ASTM C 1077 AND ASTM E 329 FOR TESTING INDICATED, AS DOCUMENTED ACCORDING TO ASTM E 548.
  - PERSONNEL CONDUCTING FIELD TESTS SHALL BE QUALIFIED AS ACI CONCRETE FIELD TESTING TECHNICIAN, GRADE 1, ACCORDING TO ACI CP-01 OR AN EQUIVALENT CERTIFICATION PROGRAM.
  - PERSONNEL PERFORMING LABORATORY TESTS SHALL BE ACI CERTIFIED CONCRETE STRENGTH TESTING TECHNICIAN AND CONCRETE LABORATORY TESTING TECHNICIAN (GRADE I). TESTING AGENCY LABORATORY SUPERVISOR SHALL BE AN ACI CERTIFIED CONCRETE LABORATORY TESTING TECHNICIAN (GRADE II).
  - CONCRETE CONTRACTOR QUALIFICATION: CONCRETE CONTRACTOR SHALL INCLUDE IN THEIR BID PACKAGE TO THE GENERAL CONTRACTOR, A MINIMUM OF THREE SIMILAR AND SUCCESSFUL PROJECTS THAT CLEARLY INDICATES THE CONCRETE CONTRACTOR'S ABILITY TO SUCCESSFULLY PERFORM THE WORK AND TO ACHIEVE THE INTERIOR SALES FLOOR SLAB TOLERANCES REQUIRED IN THIS SPECIFICATION. THE CONCRETE CONTRACTOR'S TEAM SHALL HAVE PARTICIPATED IN THE MAJORITY OF THESE PROJECTS, AND THAT TEAM SHALL REMAIN THE SAME THROUGHOUT THE DURATION OF THIS PROJECT. CONCRETE CONTRACTOR'S QUALIFICATION SHALL BE SUBMITTED AS PART OF THE BID PACKAGE. BASED ON EXPERIENCE, THE OWNER HAS THE RIGHT TO REJECT THE CONCRETE CONTRACTOR.
  - LIQUID DENSIFIER / SEALER AND JOINT FILLING APPLICATION: ALL GENERAL CONTRACTORS BIDDING OR NEGOTIATING A HARBOR FREIGHT PROJECT SHALL CONTACT EUCLID CHEMICAL TO OBTAIN A LIST OF TRAINED APPLICATION LOCATIONS WITHIN THE GEOGRAPHIC REGION OF THE PROJECT. GENERAL CONTRACTORS SHALL SOLICIT AND ACCEPT PRICING ONLY FROM THOSE APPLICATIONS AS PROVIDED BY EUCLID CHEMICAL. **THE TRAINED APPLICATION LOCATIONS SELECTED FOR THE INITIAL APPLICATION OF LIQUID DENSIFIER / SEALER SHALL BE THE SAME AS FOR THE JOINT FILLING AND ADDITIONAL APPLICATION OF LIQUID DENSIFIER / SEALER.**
  - PHILIP BRANDT: EUCLID CHEMICAL - 877-438-3826 / PBRANDT@EUCLIDCHEMICAL.COM  
CONCRETE SALES FLOOR PRE-INSTALLATION CONFERENCE: AT LEAST 30 DAYS PRIOR TO THE START OF THE CONCRETE SLAB CONSTRUCTION, THE GENERAL CONTRACTOR SHALL CONDUCT A MEETING TO REVIEW THE PROPOSED CONCRETE MIX DESIGNS AND TO DISCUSS THE REQUIRED METHODS AND PROCEDURES TO ACHIEVE THE REQUIREMENTS OF THIS SPECIFICATION. THE GENERAL CONTRACTOR SHALL SEND A PRE-CONCRETE CONFERENCE AGENDA TO ALL ATTENDEES 10 DAYS PRIOR TO THE SCHEDULED DATE OF THE CONFERENCE.
  - THE GENERAL CONTRACTOR SHALL REQUIRE RESPONSIBLE REPRESENTATIVES OF EVERY PARTY CONCERNED WITH THE CONCRETE WORK TO ATTEND THE CONFERENCE, INCLUDING, BUT NOT LIMITED TO THE FOLLOWING:
    - GENERAL CONTRACTOR: PROJECT MANAGER AND SUPERINTENDENT
    - TESTING AGENCY: RESPONSIBLE FOR CONCRETE MIXES, QUALITY CONTROL, FLOOR TOLERANCE TESTING, ETC.
    - READY-MIX CONCRETE PRODUCER: CONCRETE MIX DISCUSSION
    - CONCRETE CONTRACTOR
    - CHEMICAL ADMIXTURE MANUFACTURER
    - EUCLID CHEMICAL: LIQUID DENSIFIER SEALER AND JOINT FILLER MANUFACTURER
    - TRAINED APPLICATOR: LIQUID DENSIFIER SEALER AND JOINT FILLING APPLICATION
  - PHILIP BRANDT: EUCLID CHEMICAL - 877-438-3826 / PBRANDT@EUCLIDCHEMICAL.COM
  - MINUTES OF THE MEETING SHALL BE RECORDED, TYPED AND PRINTED BY THE GENERAL CONTRACTOR AND DISTRIBUTED TO ALL CONCERNED PARTIES, INCLUDING THE OWNER, ARCHITECT, STRUCTURAL ENGINEER AND HARBOR FREIGHT PROJECT MANAGER, WITHIN THREE DAYS OF THE MEETING.
  - THE MINUTES SHALL INCLUDE A STATEMENT BY THE CONCRETE SUPPLIER STATING THAT THE PROPOSED CONCRETE MIX DESIGNS WILL PRODUCE THE CONCRETE QUALITY REQUIRED BY THESE SPECIFICATIONS.
  - THE MINUTES SHALL INCLUDE A STATEMENT BY THE GENERAL CONTRACTOR THAT THE PROPOSED CONCRETE MIX DESIGNS WILL PROVIDE APPROPRIATE WORKABILITY AND SETTING TIMES, TO ENSURE THAT THE CONCRETE CONTRACTOR CAN ACHIEVE THE REQUIREMENTS OF THIS SPECIFICATION.

- PART 2 - PRODUCTS**  
MATERIALS
- CONCRETE MATERIALS:
    - PORTLAND CEMENT: ASTM C 150/ C150M, TYPE I, TYPE II OR TYPE /II. USE ONE BRAND OF CEMENT THROUGHOUT THE PROJECT.
    - COARSE AND FINE AGGREGATES: ASTM C 33. COMBINED AGGREGATE GRADATION FOR SLABS ON GRADE AND OTHER DESIGNATED CONCRETE SHALL BE 8% - 18% FOR LARGE TOP SIZE AGGREGATES (1½") OR 8% - 22% FOR SMALLER TOP SIZE AGGREGATES (1" OR ¾") RETAINED ON EACH SIEVE BELOW THE TOP SIZE AND ABOVE THE NO. 100 SIEVE.
      - UNLESS INDICATED OTHERWISE ON DRAWINGS, INTERIOR AND EXTERIOR SLABS ON GROUND (4"-5" NOMINAL THICKNESS), AS WELL AS FOOTINGS, PIERS AND BEAMS SHALL HAVE A MAXIMUM COARSE AGGREGATE SIZE OF 1" (#57 STONE).
    - WATER: COMPLYING WITH ASTM C 94.
    - AIR-ENTRAINING ADMIXTURE (INTERIOR CONCRETE): AIR-ENTRAINING ADMIXTURE SHALL NOT BE ADDED FOR INTERIOR CONCRETE.
    - AIR-ENTRAINING ADMIXTURE (EXTERIOR CONCRETE): ASTM C-260. ADMIXTURE MANUFACTURER SHALL PROVIDE WRITTEN CERTIFICATION THAT THE AIR-ENTRAINING ADMIXTURE IS COMPATIBLE WITH OTHER REQUIRED ADMIXTURES. ALL EXTERIOR SLABS SHALL BE AIR-ENTRAINED. ACCEPTABLE PRODUCTS: EUCLID CHEMICAL AEA-92 OR AIR 40; BASF MICRO AIR, W.R. GRACE DARAVAIR OR DAREX.
    - WATER-REDUCING ADMIXTURE: ASTM C494. TYPE A CONTAINING NOT MORE THAN 0.05% CHLORIDE IONS. ACCEPTABLE PRODUCTS: EUCLID CHEMICAL EUCON SERIES; BASF POZZOLITH SERIES; W.R. GRACE WRDA OR DARACEM SERIES.
    - WATER-REDUCING, RETARDING ADMIXTURE: ASTM C494. TYPE D CONTAINING NOT MORE THAN 0.05% CHLORIDE IONS. ACCEPTABLE PRODUCTS: EUCLID CHEMICAL RETARDER 75; BASF POZZOLITH SERIES OR DELVO; W.R. GRACE DARATARD 17.
    - HIGH RANGE WATER-REDUCING ADMIXTURE (SUPERPLASTICIZER): ASTM C494. TYPE F OR G CONTAINING NOT MORE THAN 0.05% CHLORIDE IONS. ACCEPTABLE PRODUCTS: EUCLID CHEMICAL EUCON 37; BASF RHEOBUILD 1000; W.R. GRACE DARACEM-100.
    - WATER-REDUCING, NON-CORROSIVE ACCELERATING ADMIXTURE: ASTM C494. TYPE C OR E CONTAINING NOT MORE CHLORIDE IONS THAN ARE PRESENT IN MUNICIPAL DRINKING WATER. THE ADMIXTURE MANUFACTURER MUST HAVE LONG-TERM, NON-CORROSIVE TEST DATA FROM AN INDEPENDENT TESTING LABORATORY (OF AT LEAST A YEAR'S DURATION) USING AN ACCEPTABLE ACCELERATED CORROSION TEST METHOD SUCH AS THAT USING ELECTRICAL POTENTIAL MEASURES. ACCEPTABLE PRODUCTS: EUCLID CHEMICAL ACEL-GUARD 80/90 OR NCA; BASF NC34 OR POZZUTEC 20; W.R. GRACE POLARSET.
    - PROHIBITED ADMIXTURES:
      - CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 0.05% CHLORIDE IONS ARE NOT PERMITTED.
      - FLYASH IS ONLY PERMITTED IN EXTERIOR CONCRETE IN AREAS KNOWN FOR ALKALI SILICA REACTIVITY (ASR). (MAXIMUM OF 15%)
    - MACRO-SYNTHETIC FIBERS: COMPLY WITH ASTM C1116. "STRUCTURAL" FIBERS SHALL BE A PATENTED COARSE MONOFILAMENT, SELF-FIBRILLATING, POLYPROPYLENE/POLYETHYLENE FIBER WITH A MINIMUM TENSILE STRENGTH OF 73XSI AND MINIMUM LENGTH OF 2 INCHES. ACCEPTABLE MACRO-SYNTHETIC FIBER (NO SUBSTITUTIONS): EUCLID CHEMICAL "TUF-STRAND SF". PHILIP BRANDT - 877-438-3826 / PBRANDT@EUCLIDCHEMICAL.COM
  - RELATED MATERIALS:
    - EVAPORATION RETARDER: WATERBORNE, MONOMOLECULAR FILM FORMING, MANUFACTURED FOR APPLICATION TO FRESH CONCRETE.
      - ACCEPTABLE MANUFACTURER: EUCLID CHEMICAL "EUCOBAR"
    - INTERIOR CURING: ASTM C-309 WITH A MAXIMUM VOC CONTENT OF 350G/L. THE INTERIOR SALES FLOOR SLAB SHALL BE CURED USING A REDUCED ODOR, DISSIPATING OR REMOVABLE LIQUID MEMBRANE FORMING CURING COMPOUND.
      - ACCEPTABLE MANUFACTURER: EUCLID CHEMICAL "KUREZ DR VOX" OR "KUREZ DR 100."
    - INTERIOR LIQUID DENSIFIER / SEALER: SODIUM SILICONATE CONTAINING AT LEAST 24% SOLIDS BY WEIGHT. MANUFACTURER OF LIQUID DENSIFIER AND SEALER MUST BE CONTACTED PRIOR TO BIDDING FOR PRICING AND APPLICATION REQUIREMENTS.
      - ACCEPTABLE MANUFACTURER: EUCLID CHEMICAL "EUCO DIAMOND HARD"
    - INTERIOR SEMI-RIGID POLYUREA JOINT FILLER: COMPLY WITH ACI 302, SHALL BE A TWO (2) COMPONENT, 100% SOLIDS, UV RESISTANT COMPOUND, WITH MINIMUM SHORE "A" HARDNESS OF 80. COLOR TO MATCH ADJACENT CONCRETE SURFACES.
      - ACCEPTABLE MANUFACTURER: EUCLID CHEMICAL "QUIKJOINT UVF"
    - EXTERIOR CURING: ASTM C 1315 WITH A MAXIMUM VOC CONTENT OF 700 G/L. ALL EXTERIOR CONCRETE SLABS SHALL BE CURED USING A LIQUID MEMBRANE-FORMING CURING COMPOUND.
      - ACCEPTABLE MANUFACTURER: EUCLID CHEMICAL "SUPER DIAMOND CLEAR VOX."
    - EXTERIOR URETHANE JOINT SEALANT: ASTM C 920-86, TYPE S, GRADE NS, AND CLASS 25 INDUSTRIAL GUN GRADE POLYURETHANE SEALANT SHALL EXHIBIT A SHORE "A" HARDNESS OF 40 AND AN ELONGATION OF 250%.
      - ACCEPTABLE MANUFACTURER: EUCLID CHEMICAL "EUCOLASTIC 1 NS/SL"

- CONCRETE MIXES
- COMPLY WITH ACI 301 REQUIREMENTS FOR CONCRETE MIXES.
  - CONCRETE MIXES SHALL BE PROPORTIONED ACCORDING TO ACI 301, FOR NORMAL-WEIGHT CONCRETE DETERMINED BY EITHER LABORATORY TRIAL MIX OR FIELD TEST DATA.
  - COMPRESSIVE STRENGTH (28 DAYS):
    - INTERIOR SLAB: 4000 PSI, WITH A MAXIMUM WATER/CEMENT RATIO OF .53, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
    - INTERIOR SLAB: 4000 PSI, WITH A MAXIMUM WATER/CEMENT RATIO OF .45, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
      - CONCRETE MATERIALS INCLUDED IN THE MIX DESIGN SHALL BE THE SAME MATERIALS PROVIDED TO THE PROJECT, AND SHALL BE PREPARED BY AN INDEPENDENT TESTING LABORATORY APPROVED BY THE OWNER. PER ACI REQUIREMENTS, IF SUFFICIENT BACKUP DATA IS NOT AVAILABLE, THE LABORATORY MIX SHALL EXCEED THE DESIRED JOB STRENGTH OF CONCRETE BY 1,200 PSI. FOUR COPIES OF THE MIX SHALL BE SUBMITTED TO THE OWNER BEFORE CONCRETE WORK BEGINS.
  - SLUMP: CONCRETE SHALL HAVE A MAXIMUM SLUMP OF 5½" FOR INTERIOR AND EXTERIOR CONCRETE. UNLESS INDICATED ON DRAWINGS, ALL OTHER CONCRETE SHALL NOT EXCEED A 4" SLUMP.
  - MACRO-SYNTHETIC FIBER ADDITION: ALL INTERIOR AND EXTERIOR SLABS ON GROUND CONCRETE SHALL CONTAIN THE SPECIFIED MACRO-SYNTHETIC FIBER USED AT A RATE OF NO LESS THAN 5.0 LBS./CUBIC YARD. ACTUAL FIBER DOSAGE MAY VARY BASED ON JOB SITE CONDITIONS AND SHALL BE CALCULATED BY STRENGTH EQUIVALENCY TO CONVENTIONAL REINFORCEMENT REQUIREMENTS. REQUIRED INFORMATION MAY INCLUDE, BUT NOT BE LIMITED TO SITE PREP, SUBBASE AND CONCRETE PROPERTIES, CURING AND LOADING CONDITIONS. THE "ENGINEER OF RECORD" SHALL CONTACT EUCLID CHEMICAL TO DISCUSS ACTUAL PROJECT CONDITIONS AND THE RESULTANT REQUIRED FIBER DOSAGE RATE. FIBERS MAY BE ADDED AT PLANT LOCATION OR JOB-SITE AND SHALL BE MIXED IN CONCRETE FOR A MINIMUM OF 4 MINUTES. EUCLID CONTACT: MIKE MAHONEY - 216-692-8301 / DON MILLER - 216-692-8140.
  - ADJUSTMENT TO CONCRETE MIXES: MIX ADJUSTMENTS MAY BE REQUESTED BY THE GENERAL CONTRACTOR WHEN CHARACTERISTICS OF MATERIALS, JOB CONDITIONS, WEATHER, TEST RESULTS OR OTHER CIRCUMSTANCES WARRANT, AT NO ADDITIONAL COST TO THE OWNER AND AS ACCEPTED BY THE OWNER. LABORATORY TEST DATA FOR REVISED MIX AND STRENGTH RESULTS MUST BE SUBMITTED TO AND ACCEPTED BY THE OWNER PRIOR TO WORK. CONCRETE TESTING AND INSPECTION AGENCY AND CONCRETE CONTRACTOR SHALL VERIFY THAT THE CONCRETE MIX DESIGN WILL PRODUCE CONCRETE THAT MEETS THE SPECIFICATIONS AS SPECIFIED HERE. IN ADDITION, THE GENERAL CONTRACTOR AND CONCRETE CONTRACTOR SHALL VERIFY THAT THE WORKABILITY, FINISHABILITY AND SETTING TIMES ARE APPROPRIATE FOR CONCRETE INSTALLATIONS. PLACEMENT SHALL BE MADE BY CONCRETE TRUCK CHUTE. IF CONCRETE PUMPING IS REQUIRED, THE PROPORTIONS ESTABLISHED ABOVE SHALL NOT BE ALTERED TO SUIT THE CAPABILITIES OF THE PUMPING EQUIPMENT. FOR CONCRETE CONTAINING MACRO-SYNTHETIC FIBERS, ADDITIONAL WATER REDUCER MAY BE NECESSARY. THE ADDITION OF WATER IS NOT PERMITTED INTO CONCRETE MIXTURE AFTER ADDITION OF MACRO-SYNTHETIC FIBERS.

- G. INTERIOR CONCRETE: CONCRETE SHALL BE DESIGNED TO MEET 4000 PSI COMPRESSIVE STRENGTH @ 28 DAYS AND EXHIBIT ≤0.04% SHRINKAGE @ 28 DAYS. THE MIX SHALL CONTAIN APPROXIMATELY 12 CUBIC FEET OF #57 AGGREGATE (1" TOP SIZE), THE SPECIFIED WATER REDUCING ADMIXTURE AND A MAXIMUM WATER / CEMENT RATIO OF 0.53 (MAX.). AIR-ENTRAINMENT IS PROHIBITED. PROPOSED MIX DESIGN SHALL BE SIMILAR TO THE FOLLOWING MIX:

INTERIOR SALES FLOOR PROTOTYPE MIX:	
MATERIALS	PROTOTYPE MIX
CEMENT	517-564 lbs.
FLY ASH/SLAG	PROHIBITED
COARSE AGGREGATE	12 CUBIC FEET +/- .50 (#57 STONE)
FINE AGGREGATE	7 CUBIC FEET +/- (ADJUST AS NECESSARY)
WATER CONTENT	250 - 300 lbs.
AIR CONTENT (ENTRAPPED AIR ONLY)	3.0%(MAX.)
WATER REDUCER (TYPE A/F)	3oz.-10oz./100wt +/- (MID-RANGE)
WATER/CEMENT RATIO	0.53 (MAX.)
INITIAL SLUMP (WATER)	3"
FINAL SLUMP (WITH WATER REDUCER)	5.5" (MAX.)
MACRO SYNTHETIC FIBER (TUF-STRAND SF)	3 lbs./CUBIC YARD (MIN.)
MAXIMUM SHRINKAGE	≤ 0.04% @ 28 DAYS

- H. EXTERIOR CONCRETE: CONCRETE SHALL BE DESIGNED TO MEET 4000 PSI COMPRESSIVE STRENGTH @ 28 DAYS AND EXHIBIT ≤0.04% SHRINKAGE @ 28 DAYS. THE MIX SHALL CONTAIN APPROXIMATELY 12 CUBIC FEET OF #57 AGGREGATE (1" TOP SIZE), THE SPECIFIED WATER REDUCING ADMIXTURE AND ACHIEVE A MAXIMUM WATER / CEMENT OF 0.45. AIR-ENTRAINMENT SHALL BE AS SPECIFIED. PROPOSED MIX DESIGN SHALL BE SIMILAR TO THE FOLLOWING PROTOTYPE MIX:

EXTERIOR SIDE YARD PROTOTYPE MIX:	
MATERIALS	PROTOTYPE MIX
CEMENT	517-564 lbs.
FLY ASH/SLAG	PROHIBITED, EXCEPT IN AREAS OF KNOWN ALKALI SILICA REACTIVITY
COARSE AGGREGATE	12 CUBIC FEET +/- .50 (#57 STONE)
FINE AGGREGATE	7 CUBIC FEET +/- (ADJUST AS NECESSARY)
WATER CONTENT	250 - 300 lbs.
AIR CONTENT (ENTRAPPED AIR ONLY)	6.0%(MAX.)
WATER REDUCER (TYPE A/F)	3oz.-10oz./100wt +/- (MID-RANGE)
WATER/CEMENT RATIO	0.45 (MAX.)
INITIAL SLUMP (WATER)	3"
FINAL SLUMP (WITH WATER REDUCER)	5.5" (MAX.)
MACRO SYNTHETIC FIBER (TUF-STRAND SF)	5 lbs./CUBIC YARD (MIN.)
MAXIMUM SHRINKAGE	≤ 0.04% @ 28 DAYS

PART 3 - EXECUTION

- INSTALLATION (GENERAL)
- FORMWORK: DESIGN, CONSTRUCT, ERECT, SHORE, BRACE, AND MAINTAIN FORMWORK ACCORDING TO ACI 301.
    - FORM WORK: FORM ALL SLABS, STAIRS AND OTHER FORMED CONCRETE WITH METAL FORMS OR ¾" PLYWOOD. FOR EXPOSED SURFACES USE FORMS WITH AN UNDAMAGED FACEL.
  - VAPOR RETARDER: ASTM E 1643 (IF INDICATED ON DRAWINGS): INSTALL, PROTECT, AND REPAIR VAPOR-RETARDER SHEETS; PLACE SHEETS IN POSITION WITH LONGEST DIMENSION PARALLEL WITH DIRECTION OF POUR.
    - PLASTIC VAPOR RETARDER FOR CONCRETE FLOOR SLAB SHALL BE 10-MIL (MINIMUM) POLYETHYLENE. SEAL VAPOR RETARDER COMPLETELY AROUND ALL PIPES AND CONDUITS. INSPECT VAPOR RETARDER THOROUGHLY AND REPAIR ALL PUNCTURES AND TEARS IMMEDIATELY PRIOR TO PLACING CONCRETE. ALL LAPS SHALL BE 18" MINIMUM, AND SEALED WITH A COMPLETELY CONTINUOUS PRESSURE SENSITIVE TAPE

CONCRETE PLACEMENT

- CARBON MONOXIDE / CARBON DIOXIDE EXPOSURE: IF THE BUILDING IS ENCLOSED/SALES FLOOR SLAB IS PLACED LAST, GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR MONITORING SALES FLOOR EXPOSURE TO EXCESSIVE EXHAUST GASES CONTAINING CARBON DIOXIDE (CO<sub>2</sub>) OR CARBON MONOXIDE (CO). TO MINIMIZE POTENTIAL DAMAGE TO INTERIOR CONCRETE FLOOR DURING SLAB PLACEMENT AND CURING PERIODS, MAXIMUM CO<sub>2</sub> LEVELS SHALL BE 4,500 PARTS PER MILLION AND MAXIMUM CO LEVELS SHALL BE 15 PARTS PER MILLION AT CONCRETE SURFACE WITHIN 5 FEET OF ANY SOURCE OF EXHAUST GASES. UNVENTED COMBUSTION HEATERS SHALL NOT BE IN OPERATION DURING CONCRETE PLACEMENT, AND EQUIPMENT INSIDE THE BUILDING DURING CONCRETE PLACEMENT SHALL BE LIMITED TO THE EQUIPMENT NECESSARY TO PLACE AND FINISH CONCRETE. ONLY ONE CONCRETE TRUCK SHALL BE IN THE BUILDING AT ANY GIVEN TIME, AND UNDER NO CIRCUMSTANCE SHALL THERE BE ANY EARTH MOVING EQUIPMENT, DUMP TRUCKS, GRADING EQUIPMENT, OR ANY OTHER MOTORIZED EQUIPMENT IN OPERATION UNTIL AFTER THE INTERIOR CONCRETE FLOOR IS PLACED AND PROTECTED BY SPECIFIED CURING METHOD. CARBON MONOXIDE AND CARBON DIOXIDE SHALL BE CHECKED USING AN APPROPRIATE METER FROM A COMPANY SIMILAR TO THE FOLLOWING: CEA INSTRUMENTS, INC., 16 CHESTNUT STREET, EMERSON, NJ 07630; PHONE (201-967-5660); WEBSITE: WWW.CEAINSTR.COM.
- COMPLY WITH REQUIREMENTS IN ACI 301 FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.
  - INSTALL CRUSHED STONE BASE TO THE MINIMUM COMPACTED THICKNESS AS INDICATED ON THE CONSTRUCTION DOCUMENTS. CRUSHED STONE SHALL BE COMPACTED TO 98% STANDARD PROCTOR DENSITY IN ACCORDANCE WITH ASTM D 1557. THE IN-PLACE DENSITY SHALL BE TESTED FOR COMPLIANCE NO MORE THAN 48 HOURS PRIOR TO CONCRETE PLACEMENT USING ASTM D 1556, ASTM D 2167, OR ASTM D 2922. ONE COPY OF TEST RESULTS SHALL BE FORWARDED TO THE OWNER.
  - COOPERATE WITH ALL OTHER TRADES. CONFER WITH ELECTRICAL, MECHANICAL, PLUMBING, CARPENTERS, STEEL WORKERS, ETC. MAKE SURE THAT ALL SLEEVES, ANCHOR, INSERT, CONDUIT, FLOOR BOXES, PIPES, FITTINGS, AND OTHER ITEMS ARE INSTALLED BEFORE PLACING CONCRETE. MAKE PROVISIONS FOR DOOR SADDLES, AND THRESHOLDS.
  - THE GENERAL CONTRACTOR SHALL ENSURE THE ACCURACY, PLACEMENT AND ALIGNMENT OF ALL UNDER-SLAB WORK. THE PLACEMENT OF ALL BOXES SHALL BE SQUARE, LEVEL AND TRUE IN ALL RESPECTS.
  - CONCRETE SHALL BE MIXED AND DELIVERED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C 94.
- COMPLY WITH ACI 305, "HOT WEATHER CONCRETE" AND ACI 306, "COLD WEATHER CONCRETE" FOR PROTECTION DURING PLACING, FINISHING AND CURING.
- FORM-RELEASE AGENT: COAT ALL REMOVABLE WOOD AND METAL FORMING WITH A VOC COMPLIANT, LIGHT VISCOSITY NON-STAINING, CONCRETE FORM-RELEASE AGENT. ALLOW EXCESS LIQUID TO DRAIN OFF BEFORE FORMS ARE PLACED.
- TRANSPORT: PLACE AT POINT OF USE AND CONSOLIDATE WITH A CONCRETE VIBRATOR. DO NOT ALLOW CONCRETE TO SEGREGATE. MAXIMUM FREE FALL FOR CONCRETE IS 3 FEET. A VIBRATOR IS REQUIRED FOR PLACEMENT OF CONCRETE IN WALLS, PIERS, FOOTINGS AND TURNDOVNS.
- CONCRETE PLACEMENT: PLACE ON FIRM, UNDISTURBED EARTH OR PROPERLY COMPACTED FILL. CONSOLIDATE BY VIBRATING, WITHOUT SEGREGATION. DO NOT PLACE CONCRETE WHEN TEMPERATURE IS 40°F AND FALLING OR WHEN FREEZING WEATHER IS PREDICTED WITHIN 24 HOURS.
  - PLACE CONCRETE WITHIN THE MINIMUM TEMPERATURE RANGE AS SPECIFIED IN ACI 301.
  - PROTECT CONCRETE AS REQUIRED IN ACI 301
  - CONCRETE SHALL NOT CONTAIN TYPE III, HIGH EARLY STRENGTH CEMENT, CALCIUM CHLORIDE, CORROSIVE ACCELERATORS OR ANTIFREEZE.
  - CONCRETE SHALL BE PLACED BEFORE INITIAL SET HAS OCCURRED AND IN NO EVENT AFTER IT HAS CONTAINED ITS WATER CONTENT FOR MORE THAN 1½ HOURS.
  - UNLESS OTHERWISE SPECIFIED, ALL CONCRETE SHALL BE PLACED UPON CLEAN, DAMP, SMOOTH SURFACES THAT ARE FREE FROM RUNNING WATER. SUBGRADE AND BASE SHALL BE PROPERLY CONSOLIDATED AND RUT-FREE.
  - CONCRETE SHALL NOT BE PLACED UPON SOFT MUD OR DRY POROUS EARTH. THE CONCRETE SHALL BE CONSOLIDATED AND WORKED, IN AN APPROVED MANNER, INTO ALL CORNERS AND ANGLES OF THE FORMS AND AROUND REINFORCEMENT AND EMBEDDED FIXTURES IN SUCH A MANNER AS TO PREVENT SEGREGATION OF THE COARSE AGGREGATE AS REQUIRED IN ACI 301.
- CAREFULLY PROTECT ALL MASONRY AND METAL BUILDING WALLS BY COVERING WITH WATERPROOF PAPER WHILE CONCRETE IS PLACED.

FORMED SURFACE FINISHES

- ROUGH-FORMED FINISH: AS-CAST CONCRETE TEXTURE IMPARTED BY FORM-FACING MATERIAL WITH THE HOLES AND DEFECTIVE AREAS REPAIRED AND PATCHED, AND FINS AND OTHER PROJECTIONS EXCEEDING ¼" IN HEIGHT SHALL BE RUBBED DOWN OR CHIPPED OFF.
  - APPLY TO CONCRETE SURFACES NOT EXPOSED TO PUBLIC VIEW.
- SMOOTH-FORMED FINISH: AS-CAST CONCRETE TEXTURE IMPARTED BY FORM-FACING MATERIAL, ARRANGED IN AN ORDERLY AND SYMMETRICAL MANNER WITH A MINIMUM OF SEAMS. REPAIR AND PATCH THE HOLES AND DEFECTIVE AREAS. COMPLETELY REMOVE FINS AND OTHER PROJECTIONS. ALL EXPOSED CONCRETE WALLS ARE TO BE GROUDED AND HAND RUBBED.
  - APPLY TO CONCRETE SURFACES EXPOSED TO PUBLIC VIEW OR TO BE COVERED WITH A COATING OR COVERING MATERIAL APPLIED DIRECTLY TO CONCRETE, SUCH AS WATERPROOFING, DAMP-PROOFING, VENEER PLASTER, OR PAINTING.
  - DO NOT APPLY RUBBED FINISH TO SMOOTH-FORMED FINISH.
  - APPLY SMOOTH-RUBBED FINISH, DEFINED IN ACI 301, TO SMOOTH-FORMED FINISHED CONCRETE.
- TEXTURED UNFORMED SURFACES: AT TOPS OF WALLS, HORIZONTAL OFFSETS, AND SIMILAR UNFORMED SURFACES ADJACENT TO FORMED SURFACES, STRIKE OFF SMOOTH AND FINISH WITH A TEXTURE MATCHING ADJACENT FORMED SURFACES. CONTINUE FINAL SURFACE TREATMENT OF FORMED SURFACES UNIFORMLY ACROSS ADJACENT UNFORMED SURFACES, UNLESS OTHERWISE INDICATED.

CONCRETE FINISHES AND TOLERANCES

- GENERAL: UNLESS OTHERWISE NOTED BY OWNER, CONCRETE SALES FLOOR SLAB SHALL BE CAST IN ONE CONTINUOUS PLACEMENT. CONCRETE SHALL BE PLACED, SCREEDED, RE-STRAIGHTENED, AND FINISHED AS NECESSARY TO MEET THE F<sub>1</sub> AND F<sub>2</sub> TOLERANCE REQUIREMENTS. INTERIOR MACHINE TROWEL FINISH SHALL BE ACHIEVED WITHIN A 2"-3" TOLERANCE OF ALL WALLS, COLUMNS AND PARTITIONS. DO NOT WET CONCRETE SURFACES WHILE FINISHING CONCRETE.
  - LASER SCREEDS (REQUIRED), VIBRATORY SCREEDS, HIGHWAY STRAIGHTEDGES AND WOOD OR RESINOUS BULL FLOATS SHALL BE USED TO INITIATE SCREEDING AND FLOATING PROCESS TO FORM A UNIFORM AND OPEN-TEXTURED SURFACE PLANE BEFORE EXCESS MOISTURE OR BLEED WATER APPEARS ON THE SURFACE. A BACK-UP LASER SCREED IS REQUIRED DURING CONCRETE PLACEMENT OF THE INTERIOR SALES FLOOR SLAB. REMOVE EXCESS WATER BEFORE STARTING FLOATING OPERATIONS. DO NOT FURTHER DISTURB SURFACES BEFORE STARTING FINISHING OPERATIONS.
  - HIGHWAY STRAIGHTEDGE OPERATIONS SHALL CONTINUE BEFORE, DURING AND AFTER TROWELING OPERATION, UNTIL THE MINIMUM SPECIFIED FLOOR TOLERANCES ARE ACHIEVED.
  - TROWEL FINISH WITH TROWEL MACHINE EQUIPPED WITH ADJUSTABLE BLADES. TROWEL THE SURFACE SUFFICIENTLY TO PRODUCE A SMOOTH, TIGHT, ABRASION RESISTANT SURFACE. CARE SHALL BE TAKEN NOT TO OVERWORK OR BURN THE SURFACE. USE 6" WIDE FINISH STYLE STEEL-REINFORCED BLADES ON FINAL PASSES. FINISHING BLADES SHALL BE IN NEW CONDITION AND COMPLETELY CLEAN OF ANY DELETERIOUS MATERIALS.
  - PROTECTION: CARE SHALL BE TAKEN TO PROTECT THE INTERIOR SALES FLOOR. ENTRANCES SHALL INCLUDE CLEAN FLOOR MATS TO PREVENT MUD STAINS AND ALL EQUIPMENT ON THE FLOOR SHALL BE DIAPERED TO PREVENT SPILLS. CUTTING OILS ARE NOT ALLOWED ON THE SALES FLOOR SLAB AT ANY TIME DURING THE CONSTRUCTION PROCESS.
  - TROWEL FINISH (OTHER THAN SALES FLOOR): APPLY A HARD TROWEL FINISH TO SURFACES INDICATED AND TO FLOOR AND SLAB SURFACES EXPOSED TO VIEW OR TO BE COVERED WITH RESILIENT FLOORING, CARPET, CERAMIC OR QUARRY TILE SET OVER A CLEAVAGE MEMBRANE, PAINT, OR ANOTHER THIN FILM-FINISH COATING SYSTEM.
  - HEAVY BROOM FINISH: SIDE YARD, MAIN ENTRY, EXIT VESTIBULES, CART STORAGE, RAMPS, APRONS AND WALKS SHALL RECEIVE A HEAVY BROOM FINISH.

- B. TOLERANCES: ACI 117, "SPECIFICATIONS FOR TOLERANCES FOR CONCRETE CONSTRUCTION & MATERIALS." THE GENERAL CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH FLOOR TOLERANCE TESTING. A COPY OF THE FINAL FLOOR TOLERANCE REPORT SHALL BE PROVIDED BY THE GENERAL CONTRACTOR TO OWNER WITHIN 24 HOURS OF RECEIVING THE REPORT FROM THE TESTING LABORATORY.
- ALL PERIMETER AREAS AND EDGES OF THE INTERIOR SALES FLOOR SHALL EXHIBIT THE SAME FINAL FINISH.

LOCATION	F <sub>1</sub> TOLERANCE	F <sub>2</sub> TOLERANCE	NOTES
INTERIOR SALES FLOOR	50	35	ACI 302: TYPE 5, SINGLE COURSE, HARD STEEL TROWEL FINISH
EXTERIOR CONCRETE	20	17	FLOATED AND/OR BROOMED SURFACE

CAST-IN-PLACE CONCRETE JOINTS

- GENERAL: JOINTS SHALL BE CUT AS INDICATED ON DRAWINGS, AND AS SOON AS THE SLAB WILL SUPPORT THE WEIGHT OF THE SAW AND OPERATOR AND WHEN CUTTING ACTION WILL NOT TEAR, ABRASE OR OTHERWISE DAMAGE THE CONCRETE SURFACE. CUTS MUST BE MADE BEFORE CONCRETE DEVELOPS RANDOM CONTRACTION CRACKS. EMPLOY SUFFICIENT NUMBER OF SAWS AND WORKERS TO COMPLETE CUTTING OF SAW JOINTS WITHIN 2 HOURS AFTER FINAL FINISH OF INTERIOR FLOOR SLAB. AFTER SAW CUTTING, IMMEDIATELY VACUUM UP AND REMOVE ALL RESIDUES COMPLETELY.
  - CONSTRUCTION JOINTS:
    - CONSTRUCTION JOINTS SHALL BE TRUE TO LINE WITH FACES PERPENDICULAR TO SURFACE PLANE OF CONCRETE (REFER TO DRAWINGS), SO AS NOT TO IMPAIR STRENGTH OR APPEARANCE OF CONCRETE
    - CONSTRUCTION JOINTS IN SLAB ON GRADE SHALL BE BUTT JOINTS WITH SQUARE PLATE DOWELS. DO NOT USE METAL KEYWAYS.
  - ISOLATION JOINTS: INSTALL JOINT-FILLER STRIPS AT JUNCTIONS WITH SLABS-ON-GRADE AND VERTICAL SURFACES, SUCH AS COLUMN PEDESTALS, FOUNDATION WALLS, GRADE BEAMS, AND OTHER LOCATIONS, AS INDICATED.
    - EXTEND JOINT FILLERS FULL WIDTH AND DEPTH OF JOINT, TERMINATING FLUSH WITH FINISHED CONCRETE SURFACE, UNLESS OTHERWISE INDICATED.
  - CONTROL JOINTS: FORM WEAKENED-PLANE CONTROL JOINTS, SECTIONING CONCRETE INTO AREAS AS INDICATED:
    - ALL SAW CUTTING SHALL BE ACCOMPISHED WITH A "SOFF-CUT" SAW, BY HUSQVARNA CONSTRUCTION PRODUCTS (800-288-5040), EQUIPPED WITH A PATENTED COLOR-CODED, DIAMOND BLADE AND SKID PLATE IN NEW CONDITION. CONCRETE SUBCONTRACTOR MUST HAVE DOCUMENTED SUCCESSFUL EXPERIENCE IN THE USE OF THIS METHOD PRIOR TO THIS PROJECT. USING A 1/8" THICK BLADE, CUT A MINIMUM OF 1" DEEP FOR 4" THICK SLABS AND 1¼" DEEP FOR 5" THICK SLABS. WHITE CHALK LINES AND CONCRETE DUST SHALL BE REMOVED COMPLETELY AND IMMEDIATELY AFTER CUTTING OPERATION.
    - RANDOM DEPTH CHECKS SHALL BE PERFORMED BY AN INDEPENDENT TESTING COMPANY TO CONFIRM THAT THE SPECIFIED DEPTH OF CUT IS MADE. ANY CUT(S) FOUND TO BE LESS THAN PROPER DEPTH SHALL BE RE-CUT TO THE PROPER DEPTH AND FILLED WITH SPECIFIED JOINT FILLER AT THE GENERAL CONTRACTOR'S EXPENSE.

INTERIOR SALES FLOOR PROTECTION AND CURING

- PROTECTION: PROTECT FRESHLY PLACED CONCRETE FROM PREMATURE DRYING AND EXCESSIVE COLD OR HOT TEMPERATURES. COMPLY WITH ACI 305 FOR HOT-WEATHER PROTECTION AND ACI 306 FOR COLD-WEATHER PROTECTION DURING PLACING AND CURING. FOR CONCRETE PLACEMENT DURING HOT, DRY AND WINDY CONDITIONS, GENERAL CONTRACTOR SHALL USE THE SPECIFIED EVAPORATION RETARDER AS PER MANUFACTURER INSTRUCTIONS TO MAINTAIN A MOIST CONDITION AND TO MINIMIZE PLASTIC DRYING SHRINKAGE CRACKING.
- INTERIOR SALES FLOOR SLAB PROTECTION: TAKE THE FOLLOWING MEASURES TO PROTECT THE INTERIOR SALES FLOOR:
  - WRAP OR DIAPER ALL MOTORIZED AND HYDRAULIC EQUIPMENT TO PREVENT FLUID LEAKS
  - PROVIDE NON-MARKING TIRES ON RUBBER TIRED VEHICLES OR EQUIP RUBBER TIRES WITH TIRE BOOTS MADE OF NYLON FABRIC
  - PROVIDE MATS AT ALL ENTRANCES TO PREVENT MUD STAINS
- INTERIOR CONCRETE CURING: THE INTERIOR SALES FLOOR SLAB SHALL BE CURED USING THE SPECIFIED DISSIPATING OR REMOVABLE LIQUID MEMBRANE-FORMING CURING COMPOUND. ALL APPLICATIONS SHALL BE MADE BY AN APPROVED APPLICATION OF THE MANUFACTURER IMMEDIATELY FOLLOWING FINAL FINISH. THE CONCRETE AND AIR TEMPERATURE SHALL BE ABOVE 50°F. SURFACE SHALL BE DAMP, BUT NOT WET AND CAN NO LONGER BE MARRED BY WALKING WORKMEN. APPLY "KUREZ DR VOX" OR "KUREZ DR 100" AT AN APPLICATION RATE OF 400SF/GALLON.
- EXTERIOR CONCRETE CURING: ALL INTERIOR CONCRETE SLABS SHALL BE CURED USING THE SPECIFIED LIQUID MEMBRANE-FORMING CURING COMPOUND. APPLICATION SHALL BE MADE BY AN APPROVED APPLICATION OF THE MANUFACTURER IMMEDIATELY FOLLOWING FINAL FINISH. CONCRETE AND AIR TEMPERATURE SHALL BE ABOVE 50°F. SURFACE SHALL BE CLEAN AND DAMP, BUT NOT WET AND CAN NO LONGER BE MARRED BY WALKING WORKMEN. APPLY "SUPER DIAMOND CLEAR VOX" AT AN APPLICATION RATE OF 400SF/GALLON.

INTERIOR CONCRETE JOINT FILLER

- GENERAL: DO NOT COMMENCE INSTALLATION OF SEMI-RIGID POLYUREA JOINT FILLER, LIQUID DENSIFIER / SEALER AND POLISHING PROCESSES UNTIL THE BUILDING IS COMPLETELY ENCLOSED, PERMANENT POWER AND LIGHTING IS OPERATING AND THE BUILDING IS THERMOSTATICALLY CONTROLLED. INSTALLATION OF THESE MATERIALS SHALL COMMENCE APPROXIMATELY TWO WEEKS PRIOR TO "FUTURE DATE."
- JOINT FILLER INSTALLATION: COMPLY WITH ACI 302 AS APPLICABLE TO MATERIALS, APPLICATIONS, AND CONDITIONS.
  - SURFACE CLEANING OF JOINTS: CLEAN JOINTS IMMEDIATELY BEFORE INSTALLING JOINT FILLER. REMOVE FOREIGN MATERIAL THAT COULD INTERFERE WITH ADHESION OF JOINT FILLER BY BRUSHING, GRINDING, BLAST CLEANING, MECHANICAL ABRADING, OR A COMBINATION OF THESE METHODS TO PRODUCE A CLEAN, SOUND SUBSTRATE CAPABLE OF DEVELOPING OPTIMUM BOND WITH JOINT FILLER. REMOVE LOOSE PARTICLES REMAINING FROM ABOVE CLEANING OPERATIONS BY VACUUMING OR BLOWING OUT JOINTS WITH OIL-FREE COMPRESSED AIR. ALSO REMOVE ALL LAITANCE AND FORM-RELEASE AGENTS FROM CONCRETE SURFACE. CLEAN NONPOROUS SURFACES WITH CHEMICAL CLEANERS OR OTHER MEANS THAT DO NOT STAIN, HARM SUBSTRATES, OR LEAVE RESIDUES COULD INTERFERE WITH ADHESION OF JOINT SEALANTS. ALL SURFACES TO BE FILLED SHALL BE CLEAN AND DRY.
  - MIXING: JOINT FILLER IS A TWO-PART PRODUCT REQUIRING MACHINE MIXING AND PLACING. PREMIX PART "B" SEPARATELY BEFORE USING. FOLLOW PUMP MANUFACTURER'S EQUIPMENT INSTRUCTIONS.
  - PLACEMENT: FOR PROPER LOAD TRANSFER, JOINTS MUST BE FILLED FULL DEPTH, BUT IN NO CASE SHOULD THE JOINT FILLER BE ANY LESS THAN 1" DEEP IN THE JOINT. NO BACKER ROD IS ALLOWED. JOINTS SHOULD BE OVERFILLED AND SHAVED LEVEL WITH THE SURFACE, GIVING THE FLOOR JOINTS
  - JOINT FILLER SEPARATION: THE APPROVED JOINT FILLING APPLICATION SHALL INCLUDE IN THEIR BID A COST PER LINEAL FOOT TO MAKE ONE RETURN TRIP TO REFILL JOINTS IF JOINT FILLER SIDEWALL SEPARATION OR SPLITTING EXCEEDS 1/16", OR IF SURFACE PROFILE IS CONCAVE, CHATTERED OR IF VOIDS OCCUR. THIS SHALL TAKE ONE WEEK PRIOR TO GRAND OPENING, OR AT OWNER'S REQUEST.

LIQUID DENSIFIER / SEALER AND POLISHING PROCESS

- MOCK-UP TEST SLAB: THE FOLLOWING PROCESS IS PROVIDED AS A GUIDE. MANY FACTORS, INCLUDING, BUT NOT LIMITED TO INTERIOR FLOOR SLAB FINISH, HARDNESS AND FLATNESS WILL DETERMINE THE INITIAL RESIN BOND DIAMOND TOOLING, INCLUDING ADDITIONAL GRINDING AND/OR POLISHING OPERATIONS REQUIRED TO MEET THE REQUIREMENTS SPECIFIED HEREIN. TRAINED APPLICATION SHALL PROVIDE A MOCK-UP TEST SLAB, INCLUDING APPLICATION OF LIQUID DENSIFIER/SEALER TO A DESIGNATED AREA OF THE INTERIOR FLOOR SLAB (BACK OF BUILDING), USING THE SAME EQUIPMENT, RESIN BOND DIAMOND TOOLING, AND METHODS AS WILL BE USED TO POLISH THE INTERIOR FLOOR SLAB. INTERIOR SALES FLOOR POLISHING AND APPLICATION OF LIQUID DENSIFIER/SEALER SHALL NOT COMMENCE UNTIL OWNER HAS ACCEPTED THE MOCK-UP TEST SLAB.
  - VERBIE PRESENCE OF CURING AND SEALING COMPOUND BY APPLYING WATER TEST TO THE SURFACE OF SLAB.
    - IF WATER BEADS, CURING AND SEALING COMPOUNDS ARE PRESENT AND MUST BE REMOVED FROM THE SLAB. COMPLETELY REMOVE THE REMNANTS OF THE DISSIPATING OR REMOVABLE CURING COMPOUND FROM THE FLOOR SURFACE. THE FOLLOWING FLOOR STRIPPER OR REMOVAL SOLUTION SHALL BE APPLIED TO THE FLOOR AT THE PROPER RATIO TO THOROUGHLY STRIP, CLEAN AND REMOVE ALL CURING COMPOUND RESIDUE: "EUCO CLEAN & STRIP" BY EUCLID CHEMICAL
    - IF WATER SOAKS INTO THE SURFACE INDICATING CURING AND SEALING COMPOUNDS ARE NOT PRESENT, MOVE TO STEP 3.
  - GRINDING/POLISHING EQUIPMENT SHALL BE EQUIPPED WITH 200 GRIT RESIN BOND DIAMOND TOOLING TO VERIFY IF SURFACE WILL OPEN TO ACCEPT LIQUID DENSIFIER/SEALER. IF SLAB OPENS TO ACCEPT LIQUID DENSIFIER/SEALER, PROCEED WITH PROJECT. IF SLAB DOES NOT OPEN, DROP TO LOWER GRIT RESIN BOND DIAMOND TOOLING, AND REPEAT (100 GRIT, 80 GRIT, 50 GRIT). FOLLOW PROCESS AND DROP RESIN BOND DIAMOND TOOLING AS NEEDED UNTIL SLAB ACCEPTS DENSIFIER.
  - ALL GRIND, HONE AND POLISH STEPS SHALL INCLUDE A 2 PASS PROCESS OVERLAPPING PREVIOUS PASS BY A MINIMUM OF 6".
- INITIAL GRIND AND HONE PROCESS:
  - START INITIAL GRIND WITH APPROPRIATE RESIN BOND DIAMOND TOOLING AS DETERMINED FROM MOCK-UP TEST SLAB.
  - OPERATE MACHINES AT 400 SQUARE FEET AN HOUR (MAX PACE), WITH HIGH TO MAXIMUM DRUM AND HEAD SPEED (TYPICALLY 300 RPM ON DRUM AND 1250 RPM ON PLANETARIES).
  - ONCE COMPLETED, CLEAN OPENED FLOOR THOROUGHLY, AND THEN APPLY EUCO DIAMOND HARD TO REJECTION. ALLOW THE SURFACE TO DRY.
  - RESIN BOND DIAMOND TOOLING SHALL BE INCREASED AT SAME OUTPUT RATES AND HEAD SPEEDS UP TO 400 GRIT HONING.
- FINAL POLISHING PROCESS:
  - CLEAN FLOOR AND MACHINE OF ACCUMULATED LAITANCE.
  - MOUNT 800 GRIT RESIN BOND DIAMOND TOOLING AND RUN MACHINES AT 300 SQUARE FEET AN HOUR PACE WITH DRUM AND HEAD SPEEDS AT HIGH TO MAXIMUM.
  - APPLY EUCO DIAMOND HARD LIGHTLY AT 700 SQUARE FEET PER GALLON JYR PRIOR TO BURNISHING.
  - CLEAN FLOOR AND BURNISH WITH 1500 GRIT DIAMOND PAD AT 500 SQUARE FEET PER HOUR WITH A 27" BURNISHER AT 2500 RPM.
- POLISH RESULTS: PERFORM POLISHING PROCESS TO REACH A SPECIFIED OVERALL GLOSS VALUE (SGOV) OF ≥35 AS MEASURED WITH A HORIBA IG-320, AND A SPECIFIED MINIMUM GLOSS READING (SGMV) OF ≥30. THE APPROVED APPLICATION SHALL TAKE FOUR GLOSS MEASUREMENT READINGS AT 90° FROM EACH OTHER, AND THEN AVERAGED FOR ONE READING AT EACH LOCATION. A MINIMUM OF 25 READINGS SHALL BE TAKEN THROUGHOUT THE INTERIOR SALES FLOOR. THE OVERALL MEASUREMENT SHALL BE REPORTED TO GENERAL CONTRACTOR WITHIN 24 HOURS OF THE POLISHING PROCESS. GLOSS SHALL BE CONSIDERED A QUANTITATIVE VALUE THAT EXPRESSES THE DEGREE OF REFLECTION WHEN LIGHT HITS THE CONCRETE FLOOR SURFACE. GLOSS MEASUREMENTS WILL BE TAKEN INDEPENDENT OF AMBIENT LIGHTING AND WILL BE TAKEN WITHIN A SEALED MEASUREMENT WINDOW LOCATED BENEATH THE TEST UNIT.

URETHANE EXPANSION JOINT SEALANT APPLICATION

- URETHANE JOINT SEALANT APPLICATION:
  - APPLY JOINT SEALANTS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
  - BACK-UP MATERIAL:
    - INSTALL APPROPRIATE SIZE BACKER ROD, LARGER THAN THE JOINT WHERE NECESSARY PER MANUFACTURER'S RECOMMENDATIONS AND IN A MANNER TO PROVIDE CONCAVE SEALANT PROFILE.
    - WHERE JOINT DEPTH DOES NOT PERMIT INSTALLATION OF BACKER ROD, INSTALL ADHESIVE-BACKED POLYETHYLENE BOND-BREAKER TAPE ALONG THE ENTIRE BACK OF JOINT TO PREVENT 3-SIDED ADHESION OF JOINT SEALANT.
  - SEALANT: VERIFY THAT THE TEMPERATURE AND MOISTURE CONDITIONS ARE WITHIN MANUFACTURER'S