PLAINTIFF'S
EXHIBIT
DUP-2923

OPERATIONS BUILDING

DUP 0760336

21 OCT 71

SPECIFICATION NO. C003

FOR

SITE WORK, BUILDING MATERIALS, PLUMBING,
MECHANICAL AND ELECTRICAL

FOR

CONSOLIDATED MANUFACTURE OF FREON - FLUOROCARBON
AND CHLOROCARBON
OPER. BLDG.

FOR

ORGANIC CHEMICAL DEPARTMENT

AT

CORPUS CHRISTI WORKS
CORPUS CHRISTI, TEXAS

BY

E. I. DUPONT DE NEMOURS AND COMPANY (INC.)
WILMINGTON, DELAWARE

PROJECT NO. 7925 SEPTEMBER 30, 1971
ADDENDUM NO. 1 - NOVEMBER 29, 1971

APPROVED BY:

DESIGN DIVISION DATE

DUP 0760337

ADDENDUM

ADDENDUM NO.	DIV, SHEET & ITEM NO.	DESCRIPTION	APPROVAL & DATE
1 11/29/71	DIV. 3 5 3.5.2	Add "Recommendations" after "Manufacturer's" on Line 2.	
	10 4.2.3	Change "Kind or Work" to "Kind of Work". Last line change "of" to "or".	
	11 4.2.6	Last paragraph, Line 11, Change "shown" to "shows".	
	12 4.6.1	Line 5, change "structurs" to "structure".	
	17 6.2.2	Second line, change "elapse" to "elapsed".	
	20 7.4,7.5	Third line, change "deposite" to "deposit". Remove parenthesis in second line.	
	29 11.3.2	Second line, change "fill" to "filled".	
	DIV. 4 8 3.7.1	Add "Masons shall verify the shape, size and strength of templates, and" at the beginning of the first paragraph.	
	DIV. 5 6 4.	Third paragraph, second line, change "loactions" to "locations".	
	DIV. 6 8 5.2	First paragraph, line 5, change "Therfor" to "therefor".	

Dec. 1, 1971

ADDENDUM

ADDENDUM NO.	DIV, SHEET & ITEM NO.	DESCRIPTION	APPROVAL & DATE
	DIV. 6 9 5.3	Line 5, eliminate "shall be" after "Boards".	
	DIV.8 2 1.2	Rewrote paragraph.	
	5 1.9.3	Line 8, add "are used" at end of line.	
	DIV. 9 11 3.2.1.1	Added "Travertine".	
	11 3.2.2.1	Line 7, change "baking" to "baked".	
	13 3.2.2.6	Added semi-concealed T-bar system.	
	25 7.3.2	Change "7.3.1.1" to "7.3.2.1".	
	DIV.14 4 1.7	Second paragraph, line 1, change "outlests" to "outlets".	
	5 1.8	Second paragraph, line 3, change "be-fore" to "before".	
	6 1.12	Line 2, eliminate "of sufficient duration".	
	11 3.1.1	Line 6, change "coa-tar" to "coaltar".	
	12 3.4.6	Change "gradw" to "grade".	

Specification No. 6031-Add. #1
Sheet #2

ADDENDUM

ADDENDUM NO.	DIV., SHEET & ITEM NO.	DESCRIPTION	APPROVAL & DATE
	DIV. 14		
	13 3.6.2	Delete "under Item 2.9.7 below".	
	17 3.11.3	Add "Horizontal cast iron soil pipe and silicon iron pipe shall be supported back of" before first sentence.	
	18 3.13.2	Line 3, change "mealleable" to "malleable"; Line 7, change "gaskets" to "gasket.	
	19 4.2	Last line, delete "in the".	
	20 4.4	Last word should be "dwgs."	
	21 4.6	Third paragraph, delete first line.	
	23 4.8	Line 1, change "and" to "at"; Line 5, change "value" to "valve".	

A.C. Wiggins Dec. 1, 1971

DIVISION 8

1.2 Types, openings, thickness, and size of doors and frames, and glazing shall be as indicated on the drawings and schedules.

DIVISION 9

3.2.1.1 ----------

Where noted on the drawings, tile shall be mineral fiber ceilings, with factory applied, washable, white vinyl latex paint finish and self leveling tongue and groove joint. "Travertine", fissured design, as manufactured by Armstrong Cork Company. Tile shall be square edge 12" x 12" x 3/4".

3.2.2.6 Semi-concealed T-bar System.

Semi-concealed T-bar system shall be galvanized or electro-galvanized steel system as manufactured by Eastern Products Corporation, Baltimore, Maryland or an approved substitute. Cross members shall be held with concealed "T" splines. For details, see drawings. All exposed parts of the system shall be finished with baked enamel, flat white, matching the ceiling tile.

SPECIFICATION NO. 6165

FOR

SITE WORK, BUILDING MATERIALS, PLUMBING,
MECHANICAL AND ELECTRICAL

FOR

CONSOLIDATED MANUFACTURE OF FREON - FLUOROCARBON
AND CHLOROCARBON
(ADMINISTRATION BUILDING)

FOR

ORGANIC CHEMICAL DEPARTMENT

AT

CORPUS CHRISTI WORKS
CORPUS CHRISTI, TEXAS

BY

E.I. DUPONT DE NEMOURS AND COMPANY(INC.)
WILMINGTON, DELAWARE

PROJECT NO. 9240 — JUNE 23, 1972

J.M. Chapoton — June 26, 1972
A&C — DATE

N.W. Clark — June 26, 1972
ELECTRICAL — DATE

Albert N. Hudak — June 26, 1972
H&V — DATE

DIVISION 1
GENERAL REQUIREMENTS

GENERAL INDEX

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Masonry	"	4
Metals	"	5
Carpentry	"	6
Moisture Protection	"	7
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1. GENERAL

1.1. SCOPE

THIS SPECIFICATION SETS FORTH THE QUALITY AND TYPE OF MATERIALS, WORKMANSHIP, AND METHODS OF CONSTRUCTION REQUIRED FOR SITE WORK, BUILDING MATERIALS, PLUMBING, ELECTRICAL AND MECHANICAL.

1.2. INTENT OF THE SPECIFICATIONS

INTENT OF THESE SPECIFICATIONS IS TO DESCRIBE THE MATERIALS AND METHODS OF CONSTRUCTION REQUIRED FOR THE PERFORMANCE OF THE WORK. IN GENERAL IT IS INTENDED THAT THE DRAWINGS SHALL DELINEATE THE DETAILED EXTENT OF THE WORK.

1.3. DEFINITION OF TERMS

1.3.1.

REFERENCE TO 'DU PONT' MEANS ANY AUTHORIZED REPRESENTATIVE OF E.I.DU PONT DE NEMOURS AND COMPANY (INC.).

1.3.2.

REFERENCE TO 'DESIGN DIVISION' MEANS THE DESIGN DIVISION OF THE ENGINEERING DEPARTMENT OF E.I. DU PONT DE NEMOURS AND COMPANY (INC.).

1.3.3.

CONTRACT IS THE WRITTEN AGREEMENT COVERING THE PERFORMANCE OF THE WORK AS SET FORTH HEREIN. IN THE PERFORMANCE OF SUCH WORK, THE 'GENERAL CONDITIONS - LUMP SUM OR UNIT PRICE CONTRACTS INVOLVING FIELD LABOR' APPLIES TO AND IS MADE A PART OF THIS SPECIFICATION.

1.4. MANUFACTURERS' PRODUCTS AND SPECIFIC PRACTICES

MANUFACTURERS' PRODUCTS AND SPECIFIC PRACTICES ARE NAMED FOR THE PURPOSE OF DESCRIBING THE TYPE AND QUALITY OF MATERIAL AND PRACTICES REQUIRED. THE NAMING SHALL NOT BE CONSTRUED AS PREVENTING THE USE OF OTHER (LOCAL) MATERIALS AND PRACTICES PROVIDED THEY RESULT IN EQUIVALENT QUALITY FOR THE WORK INVOLVED AND UNLESS SPECIFIC LIMITATIONS ARE CALLED FOR IN THIS SPECIFICATION. WHEN MATERIALS AND PRACTICES DEVIATE FROM THOSE SPECIFIED, PRIOR APPROVAL IN WRITING BY THE AUTHORITY ISSUING THIS SPECIFICATION IS REQUIRED BEFORE INCORPORATION INTO THE WORK.

1.5. REFERENCES

1.5.1.

REFERENCE TO STANDARDS ARE THE ENGINEERING STANDARDS OF THE ENGINEERING DEPARTMENT OF E.I.DU PONT DE NEMOURS AND COMPANY (INC.).

1.5.2.

REFERENCES TO STANDARD SPECIFICATIONS OF BUREAUS, ASSOCIATIONS AND INSTITUTES ARE MADE DIRECTLY TO THE LATEST DESIGNATED SPECIFICATION CODE NUMBERS, USING ABBREVIATED IDENTIFICATIONS FOR THE PARTICULAR ISSUING ORGANIZATION INVOLVED, AS LISTED BELOW:

ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
AISI	AMERICAN IRON AND STEEL INSTITUTE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AWS	AMERICAN WELDING SOCIETY
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC.

1.6. GOVERNING CODES

WORK PERFORMED UNDER THIS SPECIFICATION SHALL BE IN COMPLIANCE WITH APPLICABLE CODES, LAWS AND ORDINANCES OF THE MUNICIPAL AND STATE DEPARTMENTS CONCERNED. MATERIALS AND WORKMANSHIP REQUIRED BY SUCH REGULATIONS SHALL BE PROVIDED BY THE CONTRACTOR WHETHER OR NOT SPECIFICALLY NOTED HEREIN OR SHOWN ON THE DRAWINGS.

1.7. AREA MAINTENANCE

MAINTENANCE OF CLEAN CONDITIONS WHILE WORK IS IN PROGRESS AND CLEAN UP WHEN WORK IS COMPLETED, SHALL BE IN STRICT ACCORDANCE WITH THE 'GENERAL CONDITIONS' OF THIS CONTRACT.

1.8. AREA DRAINAGE

DRAINAGE OF THE CONSTRUCTION AREA, BOTH TEMPORARY AND PERMANENT, SHALL BE MAINTAINED IN GOOD ORDER DURING THE PERIOD OF CONSTRUCTION.

1.9. EXISTING FACILITIES

ALL EXISTING FACILITIES BOTH ABOVE AND BELOW GROUND SHALL BE PROTECTED AND MAINTAINED FREE OF DAMAGE AND REMAIN OPERATING DURING THE PERIOD OF CONSTRUCTION.

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DIVISION 2
SITE WORK

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 2.

1. EARTHWORK

1.1. EXCAVATION - GENERAL

THIS PORTION OF THE SPECIFICATION GOVERNS THE EXCAVATING, MOVING, AND DISPOSAL OF ALL MATERIALS NECESSARY FOR GRADING OF THE SITE TO THE LINES, GRADES, AND CROSS SECTIONS SHOWN ON THE DRAWINGS.

1.1.1. CLASSIFICATION

EXCAVATION SHALL INCLUDE ALL MATERIALS ENCOUNTERED, REGARDLESS OF THEIR NATURE, AND IS CLASSIFIED AS COMMON EXCAVATION.

1.1.2. LIMITS OF EXCAVATION

LIMITS AND DEPTHS OF EXCAVATION SHALL BE IN ACCORDANCE WITH LINES AND GRADES SHOWN ON THE DRAWINGS, OR AS ESTABLISHED BY DUPONT.

1.1.3. DISPOSAL OF MATERIALS

DISPOSAL OF MATERIALS RESULTING FROM EXCAVATION OPERATIONS AND NOT REQUIRED FOR FILL OR OTHER USES, REJECTED MATERIALS, RUBBISH, ETC SHALL BE DISPOSED OF OFFSITE.

1.1.4. DISTURBANCE OF STABILIZED SOIL

THE ENTIRE AREA HAS BEEN LIME STABLIZED. IF CONTRACTOR DISTURBS ANY AREA OTHER THAN THOSE AREAS SPECIFICALLY DEFINED FOR EXCAVATION FOR FOUNDATIONS, THEY SHALL BE RESTABLIZED IN ACCORDANCE WITH SECTION 260, TEXAS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AT NO COST TO DUPONT.

DIVISION 3
CONCRETE

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 3.

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1. CONCRETE - CERTIFIED

1.1.

THE CONCRETE FURNISHED UNDER THIS SPECIFICATION SHALL CONFORM TO ASTM C-94 ALTERNATE NO. 3 FOR READY-MIXED CERTIFIED CONCRETE USING CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS WITH NO. 57 AGGREGATE IN ACCORDANCE WITH ASTM C 33 TABLE II, AND WITH A SLUMP OF 3 INCHES TO 5 INCHES.

1.1.1. REINFORCEMENT

1.1.1.1.

REINFORCING BARS SHALL BE DEFORMED, INTERMEDAITE GRADE CONFORMING TO ASTM A615 GRADE 40.

1.1.1.2.

TYING WIRE SHALL CONFORM TO ASTM A112 EXCEPT GALVANIZING MAY BE OMITTED.

1.1.2. WATER

WATER SHALL BE CLEAN AND FREE OF OILS, ACIDS, ALKALI, AND ORGANIC MATERIALS. IN GENERAL, WATER CURRENTLY BEING USED FOR HUMAN CONSUMPTION WILL BE SATISFACTORY FOR USE.

1.1.3. JOINT MATERIALS

1.1.3.1.

FELT SHALL BE 30 LB UNPERFORATED ASPAHLT SATURATED RAG OR ASBESTOS ROOFING FELT, CONFORMING TO ASTM D226 OR D250 RESPECTIVELY.

1.1.3.2.

PREFORMED EXPANSION-JOINT FILLER SHALL CONFORM TO THE REQUIREMENTS OF ASTM D994 FOR BITUMINOUS TYPE AND ASTM D1751 FOR BITUMINOUS FIBER TYPE. ONLY BITUMINOUS TYPE FILLER SHALL BE USED IN

WATERTIGHT JOINTS.

1.1.3.3. HOT-POURED ELASTIC-TYPE FILLER SHALL BE OF THE RUBBERIZ

AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM D1190, AND PRECAUTIONS SET FORTH IN APPENDIX. THE MANUFACTURER'S INSTRUCTIONS, WITH RESPECT TO MELTING EQUIPMENT AND HEATING, SHALL BE FOLLOWED STRICTLY.

1.2. FORMS

FORMS SHALL BE CONSTRUCTED OF WOOD, PLASTIC-COATED OR MILL-OILED PLYWOOD, STEEL, OR OTHER MATERIALS APPROVED BY THE AUTHORITY ISSUING THIS SPECIFICATION WHICH WILL PRODUCE THE FINISHED SURFACE DESIRED. ANCHOR BOLTS, INSERTS AND OTHER BUILT-IN ACCESSORIES SHALL BE OF THE TYPES SHOWN ON THE DRAWINGS OR AS REQUIRED.

1.3. DUSTPROOFING LIQUID

DUSTPROOFING LIQUID SHALL BE A MAGNESIUM ZINC FLUOSILICATE (M28) WITH NOT LESS THAN 20% ZINC FLUOSILICATE SOLUTION. ''LAPIDOLITH'', SONNEBORN SONS, INC., NEW YORK; ''SINISEAL'', MASTER BUILDERS; OR APPROVED SUBSTITUTE. MANUFACTURER'S INSTRUCTIONS SHALL BE STRICTLY FOLLOWED.

1.4. CONCRETE FINISHING

1.4.1. EQUIPMENT

BULL FLOATS AND DARBIES SHALL BE WOOD AND NOT METAL.

1.4.2.

ALL SLABS SHALL BE STRAIGHTEDGED, OR A VIBRATING SCREED MAY BE USED TO BRING THE SURFACE TO THE LEVELS INDICATED ON THE DRAWINGS AND SLOPED TO DRAINAGE POINTS WHERE REQUIRED. SCREED STRIPS AND SUPPORTS SHALL BE REMOVED, AND THE RESULTING HOLES AND DEPRESSIONS SHALL BE FILLED WITH FRESH CONCRETE. IMMEDIATELY BEHIND THE STRIKE OFF OPERATION, THE CONCRETE SHALL BE FURTHER CONSOLIDATED

AND LEVELED WITH A WOODEN BULL FLOAT OR, IN SMALL AREAS, WITH A WOODEN DARBY. THE SURFACE SHALL BE BROUGHT TO A TRUE GRADE. DO NOT SEAL OR OVERWORK THE CONCRETE SURFACE AS THIS MAY BRING EXCESS WATER AND MORTAR TO THE SURFACE.

1.4.3. TYPE OF FINISH

TYPE 1. A DENSE, HARD SMOOTH-TROWELLED FINISH. APPLY ONE OR MORE MECHANICAL STEEL TROWELLINGS AND ONE HAND TROWELLING FOR BURNISHING. MOISTURE CURE ONLY. DUSTPROOFING LIQUID IS REQUIRED.

TYPE 2. PLAIN, SMOOTH FINISH. AND FOR FLOOR TOPPING APPLY ONE OR MORE MECHANICAL STEEL TROWELLINGS, AS NECESSARY, TO PRODUCE A SMOOTH FINISH FREE OF ALL IRREGULARITIES; MOISTURE CURE OR TYPE I CURING COMPOUNDS. DUSTPROOFING LIQUID SHALL NOT BE USED.

TYPE 3 COMPARATIVELY ROUGH FINISH FOR INSIDE AND OUTSIDE SLAB, SIDEWALKS, PAVEMENTS, RAMPS, STAIRS, ETC. AFTER FLOATING, APPLY ONE MANUAL OR MECHANICAL TROWELLING, FOLLOWED BY A FINISHING OPERATION, USING A CARPET-SURFACED FLOAT, OR IT MAY BE BROOMED WITH A HAIRBRUSH TO PRODUCE A SANDY SURFACE SIMILAR TO A ''SIDEWALK'' FINISH. FINISHING SHOULD BE DONE AFTER THE CONCRETE IS HARD ENOUGH TO RETAIN THE SCORING. BROOMING SHOULD BE DONE TRANSVERSELY TO THE DIRECTION OF MAIN TRAFFIC. MOISTURE CURE OR TYPE I, 2, OR 3 CURING COMPOUNDS MAY BE USED.

TYPE 8. AFTER SCREEDING, APPLY ONE STEEL TROWELLING OR WOOD FLOATING, MOISTURE CURE ONLY. DUSTPROOFING LIQUID SHALL NOT BE USED.

TYPE 9. SCORE FINISH.
AFTER FLOATING, AND WHEN THE SLAB HAS ATTAINED INITIAL SET, THE SURFACE SHALL BE ROUGHENED WITH A LIGHT RAKE, BEING CAREFUL NOT TO DISLODGE COARSE AGGREGATE OR EXPOSE REINFORCING STEEL. MOISTURE CURE ONLY. DUSTPROOFING LIQUID SHALL NOT BE USED.

1.5. WEATHER CONDITIONS

1.5.1. PROTECTION

UNLESS ADEQUATE PROTECTION IS PROVIDED, CONCRETE SHALL NOT BE PLACED DURING RAIN, SLEET OR SNOW. RAIN SHALL NOT BE ALLOWED TO INCREASE THE MIXING WATER NOR TO DAMAGE THE SURFACE FINISH.

1.5.2. PLACING TEMPERATURE

COLD WEATHER. PLACING CONCRETE IN COLD WEATHER SHALL CONFORM TO ''RECOMMENDED PRACTICE FOR COLD WEATHER CONCRETING'', ACI STANDARD 306.

HOT WEATHER. PLACING CONCRETE IN HOT WEATHER SHALL CONFORM TO ''RECOMMENDED PRACTICE FOR HOT WEATHER CONCRETING'', ACI STANDARD 605.

2. PRECAST STRUCTURAL CONCRETE

2.1. PROJECT REQUIREMENTS

THIS SECTION OF THESE SPECIFICATIONS IS DIVIDED INTO TWO PARTS, ''PROJECT REQUIREMENTS'' AND ''TRADE REQUIREMENTS''.

ALL PROVISIONS OF THE ''PROJECT REQUIREMENTS'' ARE APPLICABLE TO THIS PROJECT AND WILL BE REQUIRED BY THE WORK.

PORTIONS OF THE ''TRADE REQUIREMENTS'' WHICH ARE APPLICABLE TO THIS PROJECT WILL ALSO BE REQUIRED AS IF THEY WERE FULLY INCORPORATED INTO THE ''PROJECT REQUIREMENTS''.

2.2. SCOPE

PROVIDE ALL PRECAST STRUCTURAL CONCRETE FLOOR AND ROOF FRAMING UNITS AS SHOWN.

PROVIDE ALL ACCESSORY ITEMS AND COMPONENTS REQUIRED FOR COMPLETE INSTALLATION.

2.3. MATERIALS

2.3.1.

ALL PRECAST CONCRETE UNITS COMPLY WITH REQUIREMENTS OF ANSI A140.1- 1968 (AC 512-67) ''PRACTICE FOR MANUFACTURED REINFORCED CONCRETE FLOOR AND ROOF UNITS''.

2.3.2. PRECAST PRESTRESSED DOUBLE TEE PANELS

TYPES, SIZES, AND LOADINGS AS SHOWN. PANELS CAST OF LIGHTWEIGHT AGGREGATE CONCRETE OF 115#/CUBIC FOOT DENSITY, AND OF GRAVEL AGGREGATE CONCRETE OF 150#/CUBIC FOOT DENSITY AS SHOWN, SO PROPORTIONED AND MIXED AS TO DEVELOP A COMPRESSIVE STRENGTH OF 3000 PSI INITIALLY, AND 5000 PSI AT 28 DAYS.

UPPER SURFACES OF FLOOR PANELS ROUGH BROOMED WITH FIBER BROOM TO

INSURE ADEQUATE BONDING OF CONCRETE FLOOR TOPPING.

UPPER SURFACE OF ROOF PANELS SMOOTH TROWELED OR WOOD FLOAT FINISH FOR DIRECT APPLICATION OF RIGID ROOF INSULATION.

NEOPRENE BEARING PADS: 1/4'' THICK OF APPROPRIATE LENGTH AND WIDTH NEOPRENE ELASTOMERIC BEARING PADS. CONFORM TO REQUIREMENTS OF ARTICLE 1.6.47, T-2 OF STANDARD SPECIFICATIONS OF AASHO.

2.4. SHOP DRAWINGS

BASIC SHOP AND SETTING DRAWINGS FOR THIS PROJECT WILL BE FURNISHED BY BROWN & ROOT.

FURTHER SHOP AND SETTING DRAWINGS SHALL BE REQUIRED ONLY WHERE CHANGES ARE NECESSITATED BY MANUFACTURER'S PLANT FACILITIES OR STANDARD OPERATIONAL PROCEDURES.

2.5. ERECTION

PROVIDE AND INSTALL BEARING PADS AT ALL BEARING POINTS OF ALL UNITS. PLACE BEARING PADS ACCURATELY TO INSURE FULL BEARING ON ENTIRE BEARING SURFACE. RE-POSITION ANY BEARING PADS DISPLACED DURING ERECTION OF UNITS.

2.6. TRADE REQUIREMENTS

THIS PORTION OF THIS SPECIFICATION SECTION CONSISTS OF REQUIREMENTS APPLYING TO PRE-CAST CONCRETE WORK IN GENERAL.

ALL PORTIONS OF THE TRADE REQUIREMENTS WHICH ARE APPLICABLE TO THIS PROJECT WILL BE REQUIRED AS IF THEY WERE FULLY INCORPORATED INTO THE PROJECT REQUIREMENTS, UNLESS SPECIFICALLY STATED TO THE CONTRARY IN THE PROJECT REQUIREMENTS.

2.7. GENERAL REQUIREMENTS

ALL PRE-CAST CONCRETE SPECIFIED HEREIN PRODUCT OF MANUFACTURER REGULARLY ENGAGED IN PRODUCTION OF PRE-CAST CONCRETE, AND WITH

EXPERIENCE AND FACILITIES SUFFICIENT TO PRODUCE, DELIVER, AND ERECT PRE-CAST CONCRETE HEREIN.

FABRICATION METHODS AND FACILITIES IN ACCORDANCE WITH STD-103 OF PRE-STRESSED CONCRETE INSTITUTE ''STANDARDS FOR PRE-STRESSED CONCRETE PLANTS''.

MANUFACTURERS FACILITIES SHALL BE OPEN FOR INSPECTION BY BROWN & ROOT REPRESENTATIVES.

WHEN REQUIRED, FURNISH TO BROWN & ROOT FOR APPROVAL THE FOLLOWING DATA CONCERNING FABRICATION AND PRE-STRESSING OPERATIONS:

(1) DETAILS OF METHODS, MATERIALS, AND EQUIPMENT PROPOSED TO BE USED IN THE FABRICATION OF THE UNITS.

(2) ENGINEERING DATA AND COMPUTATIONS ON THE UNITS PROPOSED TO BE FURNISHED.
METHODS AND SEQUENCE OF STRESSING OPERATIONS, SPECIFICATIONS AND DETAILS OF PRE-STRESSING REINFORCEMENT AND ANCHORAGES.

(3) SAMPLES OF SECTIONS OF UNITS REPRESENTING TYPICAL STANDARDS OF QUALITY AND FINISH OF UNITS TO BE SUPPLIED.

(4) OTHER DATA AND INFORMATION AFFECTING QUALITY OF FINISHED PRODUCT.

NO DEVIATIONS FROM APPROVED DATA SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF BROWN & ROOT. BROWN & ROOT'S APPROVAL OF ABOVE DATA AND FACILITIES DOES IN NO MANNER RELIEVE MANUFACTURER OF EXCLUSIVE RESPONSIBILITY FOR SUCCESSFUL FABRICATION, DELIVERY, AND ERECTION OF PRE-STRESSED CONCRETE UNITS SPECIFIED HEREIN.

2.8. MATERIALS

2.8.1. PORTLAND CEMENT

PORTLAND CEMENT SHALL CONFORM TO REQUIREMENTS OF ANSI A2.2-1970 (ASTM C150-67). PROTECT ALL CEMENT FROM WEATHER DAMAGE. ANY HARDENED, DAMP, OR DETERIORATED CEMENT UNACCEPTABLE.

SUBMIT MANUFACTURER'S CERTIFIED ANALYSIS OF CEMENT TO BE USED IN TRIPLICATE TO BROWN & ROOT FOR APPROVAL.

2.8.2. WATER

CLEAN AND POTABLE. FREE FROM ALL DELETERIOUS AMOUNTS OF ACIDS, ALKALIS, ORGANIC MATTER, OTHER FOREIGN MATTER.

2.8.3. FINE AGGREGATE

COMPLY WITH ANSI A37.124-1966 (ASTM C33-64). GRADED COARSE TO FINE WITHIN FOLLOWING PERCENTAGES BY WEIGHT:

PASSING SIEVE NO. 4	95 TO 100%
PASSING SIEVE NO. 16	50 TO 80%
PASSING SIEVE NO. 50	10 TO 30%
PASSING SIEVE NO. 100	0 TO 5%

MAXIMUM PERMISSIBLE CLAY CONTENT 3%. NOT MORE THAN 35% SHALL PASS A STANDARD SIEVE AND BE RETAINED ON NEXT SMALLER SIEVE.

2.8.4. COURSE AGGREGATE

NATURAL GRAVEL COMPOSED OF CLEAN, HARD, DURABLE, UNCOATED PEBBLES AND COBBLES OF STRONG MATERIAL. COMPLY WITH REQUIREMENTS OF ANSI A37.124-1966 (ASTM C33-64). GRADE COARSE TO FINE WITHIN THE FOLLOWING PERCENTAGES BY WEIGHT:

PASSING 1'' SIEVE	90-100%
PASSING 1/2'' SIEVE	25-60%
PASSING #4 SIEVE	1 TO 10%

A VARIATION IN ANY AMOUNT PASSING ANY SIEVE SIZE OF MORE THAN 10% OF TOTAL NOT PERMITTED. MAXIMUM PERMITTED CLAY CONTENT 1%. IN ADDITION, MAXIMUM PERMITTED SIZE OF 1/5TH OF NARROWEST DIMENSION BETWEEN FORMS AND 3/4 OF NARROWEST DIMENSION BETWEEN REINFORCEMENT SHALL GOVERN.

2.8.5. LIGHTWEIGHT AGGREGATE

EXPANDED CLAY OR SHALE LIGHTWEIGHT CONCRETE AGGREGATES. CONFORM TO ANSI A37.88-1970 (ASTM C330-69). GRADED FROM DUST TO 3/4'' MAXIMUM SIZE. FINE AND COARSE AGGREGATES SHIPPED AND STORED SEPARATELY.

2.8.6. ADMIXTURES

APPROVED AIR-ENTRAINMENT AGENT TO PRODUCE 6% AIR CONTENT AT 3'' SLUMP PERMISSABLE. CONFORM TO REQUIREMENTS OF ASTM

C260-69.

WATER REDUCING ADMIXTURES CONFORMING TO REQUIREMENTS OF ASTM C494 PERMISSIBLE.

2.8.7. REINFORCEMENT

CONFORM TO REQUIREMENTS OF ASTM A615, GRADE 40 DEFORMED BILLET STEEL BARS. SIZES AS SHOWN.

2.8.8. WELDED WIRE MESH REINFORCEMENT

CONFORM TO REQUIREMENTS OF ANSI G45.1-1970 (ASTM A185-69). SIZES AND SPACING AS SHOWN.

2.8.9. MISCELLANEOUS STEEL

ANCHORAGES, WELD PLATES, ETC. CONFORM TO REQUIREMENTS OF ASTM A36. GALVANIZING CONFORM TO REQUIREEMNTS OF ASTM A123.

2.8.10. PRE-STRESSING REINFORCEMENT CABLE

CONFORM TO REQUIREMENTS OF ASTM A416. WIRE CONFORM TO ASTM A-421 FOR UNCOATED, HIGH TENSILE, COLD DRAWN, STRESS RELIEVED WIRE, AND SHALL DEVELOP MINIMUM ULTIMATE STRENGTH OF 270,000 PSI AND A MINIMUM ELONGATION OF 4%.

2.9. FABRICATION

2.9.1. ACCESS TO PLANT FACILITIES

BROWN & ROOT REPRESENTATIVES SHALL HAVE FREE ACCESS TO ALL PORTIONS OF MANUFACTURER'S PLANTS INVOLVED IN PRODUCTION OF UNITS AT ALL TIMES DURING ANY PHASE OF FABRICATION.

2.9.2. FORMS AND MOLDS

UNITS CAST IN FORMS CONFORMING TO DIMENSIONS AND SECTIONS ON APPROVED SHOP DRAWINGS. FORMS CONSTRUCTED IN MANNER TO EFFECTIVELY MAINTAIN POSITION AND SHAPE THROUGHOUT STRESSING

AND CASTING OPERATIONS. CONTACT SURFACES OF FORMS TRUE TO LINE AND PLANE, FREE FROM DENTS, SAGS, IRREGULARITIES, CAPABLE OF PRODUCING SMOOTH FINISHED SURFACES FREE OF DEFECTS. NOTE ALL SURFACES WHICH ARE TO BE PAINTED. DO NOT USE ANY BOND BREAKING MATERIALS ON FORM SURFACES CONTACTING THESE AREAS WHICH WILL IMPAIR ADHESION OF PAINT. COAT FORMS AND MOLDS WITH THIN COATING OF NON-STAINING MINERAL OIL OR OTHER APPROVED BOND BREAKING MATERIAL.

2.9.3. PLACEMENT AND TENSIONING - PRE-STRESSING REINFORCEMENT

EXERCISE EXTREME CARE TO KEEP SURFACES OF REINFORCING STRANDS COMPLETELY FREE OF ALL FOREIGN SUBSTANCES WHICH WOULD IN ANY MANNER IMPAIR BONDING OF CONCRETE TO REINFORCING. DO NOT USE STRAND WITH KINKS, SHARP BENDS, KNICKS, OTHER DEFECTS OF ANY DESCRIPTION. PLACE ALL PRE-STRESSING REINFORCEMENT ACCURATELY IN CONFORMANCE WITH APPROVED SHOP DRAWINGS. ANCHOR BY MEANS TO INSURE AGAINST DISPLACEMENT DURING TENSIONING AND CASTING OPERATIONS. TENSION STRANDS UNIFORMLY AND IN SEQUENCE. VERIFY JACK PRESSURE BY ACCURATE MEASUREMENT OF STRAND ELONGATION. ACCURATELY CONTROL AND GAUGE TENSIONING AND ELONGATION. TENSION EITHER INDIVIDUALLY OR COLLECTIVELY AT MANUFACTURER'S OPTION.

2.9.4. PLACING REINFORCEMENT, CAST-IN ITEMS AND INSERTS

PLACE ALL REINFORCEMENT, INSERTS, ANCHORS, SLEEVES, HANGARS, WELDING CLIPS, LIFTING DEVICES, OTHER ITEMS REQUIRED TO BE CAST INTO UNITS ACCURATELY IN CONFORMANCE WITH APPROVED SHOP DRAWINGS. ANCHOR SECURELY TO INSURE AGAINST DISPLACEMENT DURING CASTING.

2.9.5. REINFORCEMENT

REGARDLESS OF DESIGN REQUIREMENTS, REINFORCE ALL UNITS IN MANNER TO EFFECTIVELY PROTECT UNITS FROM DAMAGE AND UNDUE STRAINS DURING HANDLING AND ERECTION OPERATIONS.

2.9.6. CAST OPENINGS

ACCURATELY LOCATE AND BLOCK OUT FOR CAST OPENINGS IN CONFORMANCE WITH APPROVED SHOP DRAWINGS.

2.9.7. CONCRETE DESIGN, PROPORTIONS, AND MIXING

CONCRETE SHALL PRODUCE COMPRESSIVE STRENGTHS SPECIFIED HEREIN.

DESIGN AND PROPORTIONS OF MIX AT MANUFACTURER'S OPTION.

2.9.8. CONCRETE CASTING AND COMPACTION

ALL CASTING AND COMPACTION OPERATIONS SHALL BE IN CONFORMANCE WITH RECOMMENDED STANDARD PRACTICES OF ACI AND PCMA. ALL FORMED SURFACES SHALL BE NEARLY PERFECT, UNIFORMLY SMOOTH CONCRETE SURFACES, COMPLETELY FREE OF HONEYCOMBING, AND WITH A MINIMUM OF SMALL SURFACE BUBBLES, SURFACE APPEARANCE SHALL BE UNIFORM THROUGHOUT.

2.9.9. IDENTIFICATION OF UNITS

PERMANENTLY MARK ALL UNITS TO CONFORM WITH APPROVED SHOP DRAWINGS. IN ALL UNITS WHERE REINFORCEMENT IS NOT SYMMETRICAL, POSITIVELY IDENTIFY MANNER OF PLACEMENT IN STRUCTURE.

2.9.10. LABORATORY TESTING

MAKE AT LEAST SIX (6) TEST CYLINDERS FOR EACH FIFTY CUBIC YARDS OR FRACTION THEREOF OF CONCRETE CAST IN ANY ONE DAY. MAKE AND CURE TEST CYLINDERS IN STRICT ACCORDANCE WITH ANSI A37.17. MARK CYLINDERS WITH DATE AND SHOP MARKS OF MEMBERS IN WHICH CONCRETE WAS CAST. TEST TWO CYLINDERS PER ASTM C-39 PRIOR TO RELEASE OF PRE-TENSIONING STRESS IN REINFORCEEMNT. TEST TWO CYLINDERS AT SEVEN DAYS (7 DAYS) AFTER CASTING. TESTING PERFORMED BY INDEPENDENT TESTING LABORATORY. MAIL FOUR (4) COPIES OF EACH TEST REPORT DIRECTLY TO:

BROWN & ROOT INC.
DRAWER MM
INGLESIDE, TEXAS 78362

2.9.11. RELEASE OF TENSIONING STRESS

DO NOT RELEASE PRETENSION STRESS IN STRANDS UNTIL CONCRETE IN UNITS HAS REACHED A COMPRESSIVE STRENGTH AS SHOWN ON DRAWINGS. DETERMINE CONCRETE STRENGTH BY TESTING CYLINDERS WHICH HAVE BEEN CURED UNDER SAME CONDITIONS AS UNITS. RELEASE TENSION FROM STRANDS IN SEQUENCE. BURN STRANDS OFF FLUSH WITH SURFACE OF UNITS. COAT EXPOSED SURFACES LIBERALLY WITH "MATCOTE" EPOXY OR EQUIVALENT RUST PREVENTIVE COATING. GROUT SURFACE FLUSH AND

FINISH TO MATCH ADJOINING SURFACES.

2.9.12. CURING

CURE ALL UNITS BY STEAM OR OTHER SUITABLE METHODS EQUIVALENT TO SEVEN (7) DAYS OF DAMP CURING OF TYPE I PORTLAND CEMENT. DO NOT MOVE, HANDLE, OR SUBJECT TO STRESS OF ANY NATURE, ANY UNITS UNTIL CURING HAS BEEN COMPLETED. MEMBERS MAY BE STEAM CURED BY KEEPING MOIST CONTINUOUSLY FOR 72 HOURS MINIMUM. ENCLOSE CASTING BED COMPLETELY IN MANNER SUITABLE TO MAINTAIN HEAT AND MOISTURE CONDITIONS. MOIST CURE MEMBERS FOR FOUR HOURS MINIMUM AFTER CASTING IN AMBIENT TEMPERATURE OVER 50 DEF F. DO NOT APPLY STEAM DIRECTLY TO CONCRETE SURFACES. INCREASE AIR TEMPERATURE AT 40 DEG F./HOUR MAXIMUM RATE UNTIL TEMPERATURE OF 140-160 DEG F. IS ATTAINED. MAINTAIN TEMPERATURE UNTIL CONCRETE REACHES REQUIRED STRENGTH. DECREASE TEMPERATURE AT RATE OF 40 DEG F PER HOUR MAXIMUM UNTIL TEMPERATURE REACHES A POINT OF 20 DEG F ABOVE AIR TEMPERATURE TO WHICH UNITS WILL BE EXPOSED. MAINTAIN UNITS AT TEMPERATURE ABOVE FREEZING FOR 6 DAYS MINIMUM AFTER CASTING.

2.10. HANDLING AND DELIVERY

HOIST UNITS ONLY BY MEANS OF LIFTING DEVICES CAST INTO UNITS. SUPPORT UNITS DURING ALL STAGES OF HANDLING AND DELIVERY IN MANNER TO PREVENT OVERSTRESSING, CHIPPING, CRACKING, OR OTHER DAMAGE TO THE UNITS. SCHEDULE OPERATIONS SO THAT WHEREVER POSSIBLE, UNITS WILL BE PLACED DIRECTLY FROM DELIVERY TRUCKS WITHOUT TEMPORARY STORAGE AT THE SITE. WHERE SITE STORAGE IS NECESSARY, PROVIDE LEVEL, SOUND SURFACE PREPARED IN MANNER TO PREVENT DAMAGE OR UNDUE STRAINS TO MEMBERS. PROVIDE 4 X 4 CRIBBING BETWEEN SUCCESSIVE LAYERS OF STACKED MEMBERS. HANDLE AND DELIVER ALL PRECAST CONCRETE UNITS IN SUCH MANNER AS TO PREVENT ANY DAMAGE TO THE MATERIALS AT ALL TIMES. ANY MATERIALS DAMAGED BY IMPROPER HANDLING WILL BE SUBJECT TO REJECTION BY DU PONT.

2.11. PROTECTION OF UNITS

TAKE ALL NECESSARY PRECAUTIONS THROUGHOUT FABRICATION, CURING, HANDLING, STORAGE AND ERECTION OPERATIONS, TO PROTECT UNITS FROM FOREIGN MATTER WHICH WILL IN ANY MANNER IMPAIR BONDING OF CONCRETE

TOPING TO SURFACES OF UNITS. PROTECT ADJACENT WORK, MATERIALS, FINISHES, SURFACES, ETC. FROM DAMAGE. ASSUME RESPONSIBILITY FOR ALL DAMAGE TO WORK BY OTHERS RESULTING FROM ERECTION OF UNITS. AVOID OVERLOADING ANY PORTION OF THE EXISTING WORK DURING ERECTION.

2.12. CO-OPERATION WITH OTHER TRADES

CO-OPERATE WITH OTHER TRADES BY PERMITTING TIMELY PLACEMENT OF WORK INSTALLED IN CONJUNCTION WITH FRAMING MEMBERS. PROVIDE INFORMATION TO OTHERS ON LOCATION OF REINFORCEMENT IN MEMBERS.

2.13. ERECTION

CAREFULLY PLACE ALL UNITS IN STRICT ACCORDANCE WITH DRAWINGS, AND SHOP DRAWINGS. PROVIDE FULL BEARING AS SHOWN. SET ALL UNITS ACCURATELY, AS NEAR LEVEL AS POSSIBLE, SPACED AS SHOWN.

WHERE NECESSARY, TEMPORARILY SUPPORT UNITS ON STEEL SHIMS OR BEARING BLOCKS. APPLY STIFF GROUT TO PROVIDE FULL BEARING SURFACES. PERFORM ALL CUTTING AND BORING WORK IN STRICT CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS, AND UNDER DIRECT SUPERVISION OF REPRESENTATIVE OF MANUFACTURER FOR ALL OPENINGS WITH ANY DIMENSION GREATER THAN 12''.

2.13.1. WELDING

WELD UNITS SECURELY AT ALL LOCATIONS AS SHOWN IN MANNER TO INSURE ADEQUATE ANCHORAGE OR SUPPORT. WELD ALL BRIDGEMENTS IN MANNER TO EFFECTIVELY DISTRIBUTE LOADS AND STRESSES BETWEEN ADJOINING MEMBERS.

ALL FIELD WELDING IN STRICT CONFORMANCE WITH ''CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION'' OF AMERICAN WELDING SOCIETY. ALL WELDING PERFORMED BY OPERATORS WHO HAVE PREVIOUSLY QUALIFIED BY TESTS PRESCRIBED IN ''STANDARD QUALIFICATION PROCEDURE'' OF AMERICAN WELDING SOCIETY FOR TYPE OF WORK REQUIRED.

USE EQUIPMENT OF DESIGN, CAPACITY, AND OPERATING CONDITION CAPABLE OF PRODUCING WELDS OF ACCEPTABLE QUALITY.

PROPERLY ALIGN AND BRING INTO POSITION MEMBERS TO BE WELDED. PROVIDE NECESSARY TEMPORARY CONNECTIONS REQUIRED TO MAINTAIN MEMBERS IN PROPER POSITION DURING WELDING OPERATIONS.

REMOVE ALL PAINT, RUST, SCALE, FOREIGN MATTER OF WHATEVER NATURE FROM AREA WITHIN 2 INCHES OF ANY WELDED CONNECTION.

FINISHED WELDS SHALL BE FULL WELDS WITH NEAT, WORKMANLIKE APPEARANCE.

2.13.2. ERECTION TOLERANCES

PANEL ERECTION SHALL BE PERFORMED WITHIN THE FOLLOWING TOLERANCES:

(1) PLUS OR MINUS 1/4'' FROM POSITION SHOWN.
(2) ENDS OF PROJECTING MEMBERS EXPOSED TO VIEW: PLUS OR MINUS 1/8''
(3) WIDTH OF JOINTS BETWEEN PANELS: PLUS OR MINUS 1/8''
(4) MAXIMUM TOLERANCE FROM LEVEL OR PLUMB POSITION: 1:500 MAXIMUM DIMENSION.

2.14. ACCEPTANCE OF WORK - REPAIR

2.14.1. FABRICATION TOLERANCES

MAXIMUM PERMITTED PLUS OR MINUS FABRICATION TOLERANCES:

(1) CROSS SECTIONAL DIMENSIONS: 3'' DIMENSION OR LESS - PLUS OR MINUS 1/16''

3'' TO 12'' DIMENSIONS - PLUS OR MINUS 1/8''

DIMENSIONS OVER 12'' - PLUS OR MINUS 1/4''

(2) LONGITUDINAL DIMENSIONS58 - 1/4'' TO + 1/2''
(3) TOLERANCE FROM DESIGN CAMBER: PLUS OR MINUS 1/16'' PER 10'0 OF SPAN WITH MAXIMUM PERMITTED OF PLUS OR MINUS 1/2''. MAXIMUM OF 1/4'' BETWEEN ADJACENT MEMBERS.
(4) PERMITTED DEVIATION FORM TRUE LINES: 1/8'' IN LENGTHS TO 10'0. 1/4'' IN LONGER LENGTHS.

2.14.2. REJECTION OF WORK

DU PONT RESERVES THE RIGHT TO REJECT ANY MEMBERS AT ANY STAGE OF COMPLETION IN ALL INSTANCES WHERE IT IS DEEMED THAT ACCEPTANCE OF SUCH MEMBERS WOULD BE DETRIMENTAL TO THE COMPLETED PROJECT.

REPAIR ALL EDGES AND CORNERS CHIPPED OR BROKEN, AND ALL SURFACES MARRED IN TRANSIT OR ERECTION OF MEMBERS WHICH ARE ACCEPTED BY DU PONT. PATCH WITH STIFF GROUT MIXTURE AND FINSIH TO MATCH SURROUNDING SURFACES.

3. ARCHITECTURAL PRECAST CONCRETE WALL PANELS

3.1. PROJECT REQUIREMENTS

THIS SECTION OF THESE SPECIFICATIONS IS DIVIDED INTO TWO PARTS, ''PROJECT REQUIREMENTS'' AND ''TRADE REQUIREMENTS''.

ALL PROVISIONS OF THE ''PROJECT REQUIREMENTS'' ARE APPLICABLE TO THIS PROJECT, AND WILL BE REQUIRED BY THE WORK.

PORTIONS OF THE ''TRADE REQUIREMENTS'' WHICH ARE APPLICABLE TO THIS PROJECT WILL ALSO BE REQUIRED AS IF THEY WERE FULLY INCORPORATED INTO THE ''PROJECT REQUIREMENTS''.

3.2. SCOPE

PROVIDE ALL ARCHITECTURAL PRECAST WALL PANELS AS SHOWN. PROVIDE ALL ACCESSORY ITEMS AND COMPONENTS REQUIRED FOR INSTALLATION. INSTALL BUTYL ROD GASKETING IN ALL JOINTS BETWEEN PANELS.

CAULKING WORK WILL BE PERFORMED BY OTHERS.

3.3. MATERIALS

3.3.1. PRECAST CONCRETE WALL PANELS

DECORATIVE FACED PRECAST STRUCTURAL WALL PANELS. SIZES, SHAPES, PROFILES, SECTIONS, REINFORCEMENT AND SURFACE TEXTURES AS SHOWN.

PROPORTION AND MIX CONCRETE SO AS TO PRODUCE A COMPRESSIVE

STRENGTH OF AT LEAST 4000 PSI AT 28 DAYS.

PROVIDE REINFORCEMENT, ANCHORAGES, ATTACHMENTS, AND MEANS FOR HOISTING AND HANDLING SUFFICIENT TO INSURE DELIVERY, HANDLING, AND ERECTION OF PANELS WITHOUT DAMAGE.

PROVIDE ALL OFFSETS, OPENINGS, INSERTS, OTHER TIEMS SHOWN TO BE CAST INTO PANELS.

3.3.2. EXPOSED FACING AGGREGATE

WASHED AND SCREENED GUADALUPE RIVER BASIN GRAVEL COMPOSED OF HARD, DURABLE PEBBLES AND COBBLES OF SOUND MATERIAL, GRADED UNIFORMLY FROM 1/2'' TO 3'' DIAMETER. BROKEN ROCK FACES ACCEPTABLE.

MATERIALS SHALL MATCH APPROVED SAMPLE FOR SIZE GRADATION, COLOR, AND GENERAL APPEARANCE.

3.3.3. CONCRETE RETARDER

WATER SOULBLE CHEMICAL CONCRETE RETARDER SPECIFICALLY FORMULATED AND MANUFACTURED FOR PRODUCTION OF EXPOSED AGGREGATE CONCRETE BY INVERTED CASTING METHOD. 1/4'' ETCH DEPTH. PRODUCT OF ONE OF THE FOLLOWING:

''SONOTEX''	SONNEBORN-DESOTO CORPORATION
''RUFFUP''	A.C. HORN DIV., GRACE AND COMPANY
''RUGASOL''	SIKA CHEMICAL CORPORATION

3.3.4. BUTYL ROD GASKETING

PREFORMED BUTYL ROD GASKETING OF DIAMETER AT LEAST 1 1/2 TIMES JOINT WIDTH. CONTINUOUS LENGTHS THROUGHOUT PANEL HEIGHT. MANUFACTURED FROM SPECIALLY COMPONDED BUTYL RUBBER EXTRUDED INTO ROD FORM AND HEAT EXPANDED INTO CLOSED CELL SPONGE COMPOSITION.

AS AN ALTERANTE TO BUTYL ROD, EXPANDED POLYETHYLENE MAY BE USED. HAVEG OR APPROVED EQUAL.

3.3.5. SILICONE MASONRY WATER REPELLANT

CLEAR SILICONE MASONRY WATER REPELLANT, SOLVENT TYPE, CONTAINING A MINIMUM OF 5% OF SILICONE SOLIDS (SODIUM METHYL SILICONATE) IN HYDROCARBON SOLVENT. SILICONE SOLIDS PRODUCT OF ONE OF FOLLOWING:

GENERAL ELECTRIC, DOW CHEMICAL COMPANY, UNION CARBIDE CORPORATION,

REPELLANT PRODUCT OF ONE OF FOLLOWING:

''SILICONE CLEAR COAT''	AMERICAN STA-DRI CO., BRENTWOOD, MO.
''DRIWALL''	GLIDDEN COMPANY
''DEHYDRATINE #22''	AC HORN DIV., W.R. GRACE CO.
''HYDROSEAL''	HYDROTEX INDUSTRIES, DALLAS, TEXAS
''WATERBAN #25''	LAMBERT CORP, HOUSTON, TEXAS
''HYDROCIDE #5''	SONNEBORN PRODUCTS, DESOTO CHEMICALS
''THOROCLEAR #777''	STANDARD DRY WALL PRODUCTS, NEW EAGLE, PA.
''CRYSTAL''	WURDACK CHEMICAL CO., ST. LOUIS
''CEL-TITE #521''	CEL CHEMICAL COATINGS, HOUSTON
''AQUANIL #5''	CHEM-MASTERS CORP., CHAGRIN FALLS, OHIO
''PRO-TEX''	PROTEX INDUSTRIES, INC., DENVER, COLOR.

3.4. FABRICATION

3.4.1. EXPOSED AGGREGATE SURFACES

FABRICATE PANELS BY CASTING BY INVERTED CASTING METHOD WITH AGGREGATE FACE IN CONTACT WITH RETARDER COATED FORMS. EXPOSED AGGREGATE FACE HOMOGENOUS MIX OF FACING AGGREGATE AND REGULAR GRAY CEMENT.

APPLY CHEMICAL RETARDER TO FORM SURFACES TO MANUFACTURERS DIRECTIONS. CAST FACING AGGREGATE AND MATRIX LAYER AS REQUIRED TO PRODUCE DESIRED EFFECT TO MATCH APPROVED SAMPLE. WHEN FACE LAYER HAS SET SUFFICIENTLY, CAREFULLY CAST BACKUP LAYER, TAKING ALL PRECAUTIONS NECESSARY TO PREVENT DISLODGEMENT OR BLEEDING THROUGH

FACING LAYER.

COMPLETED WALL PANELS SHALL FORM MONOLITHIC UNITS CAST IN CONTINUOUS OPERATION AND FREE FROM CONSTRUCTION JOINTS.

3.4.2. CRINKLED TEXTURE SURFACES

COVER SURFACE OF CASTING BED WITH SINGLE LAYER OF AGGREGATE UNIFORMLY GRADED FROM 1/2'' TO 1 1/2'' DIAMETER. COVER APPROXIMATELY 75-80% OF FORM SURFACE. DISTRIBUTE AGGREGATE AS EVENLY AS POSSIBLE IN ORDER TO PRODUCE UNIFORM TEXTURE.

COVER AGGREGATE LAYER WITH SHEET OF 6 MIL POLYETHYLENE SHEET SPREAD SMOOTHLY OVER SURFACE OF AGGREGATE. SECURELY ANCHOR EDGES OF FILM TO PREVENT DISLODGEMENT. TAKE ALL PRECAUTIONS NECESSARY TO PREVENT WRINKLES AND BUCKLES IN FILM SURFACE.

CAREFULLY CAST PANEL DIRECTLY UPON FILM SURFACE, TAKING ALL PRECAUTIONS NECESSARY TO PREVENT DISPLACEMENT OR PUNCTURING OF FILM SURFACE. COMPACT CONCRETE THROUGHLY BY MEANS OF MECHANICAL VIBRATORS TO MINIMIZE FORMATION OF AIR BUBBLES OF FILM SURFACE.

3.4.3. DRESSING AND CLEANING OF EXPOSED SURFACES

WHEN CONCRETE HAS ATTAINED STRENGTH OF 1500 PSI, PANEL FORMS MAY BE STRIPPED AND AGGREGATE FACES FINISHED BY REMOVING RETARDED MATRIX IN ACCORDANCE WITH MANUFACTURERS DIRECTIONS.

IF NECESSARY TO REMOVE RETARDED CEMENT MATERIALS ON RETARDED SURFACES, AND EXCESSIVE SHINY PATCHES ON CRINKLED TEXTURED SURFACES, PANEL FACES MAY BE LIGHTLY SANDBLASTED. RESTRICT SANDBLASTING OPERATION TO THAT NECESSARY FOR PRODUCTION OF UNIFORM SURFACE APPEARANCE.

3.5. ERECTION

ALL ERECTION SHALL BE DONE UNDER DIRECT SUPERVISION OF REPRESENTATIVE OF PRECAST MANUFACTURER.

3.6. FINISHES

AFTER PANELS HAVE BEEN ERECTED AND EXPOSED SURFACES HAVE BEEN CLEANED APPLY SILICONE WATER REPELLANT TO ALL EXPOSED SURFACES.

APPLY TO DRY SURFACES IN STRICT ACCORDANCE WITH MANUFACTURER'S PRINTED DIRECTIONS.

APPLY BY SPRAYING, OR BY DAUBING WITH BRUSH. DO NOT APPLY WITH ROLLERS. APPLY AT MINIMUM RATE OF 150-175 SQUARE FEET OF SURFACE PER GALLON.

FLOOD OR DRENCH SURFACES SUFFICIENTLY TO CAUSE REPELLANT TO RUN DOWN FACE OF SURFACE WITH FULL BEAD AT LEADING EDGE.

APPLY IN CONTINUOUS OPERATION TO ENTIRE SURFACE WITHOUT SKIPS OR ''HOLIDAYS''. LEAVE ENTIRE SURFACE SHINY WET. IF BRUSH APPLIED, DAUB OR SPLASH MATERIAL ON SURFACE. DO NOT BRUSH OUT.

3.7. TRADE REQUIREMENTS

THIS PORTION OF THIS SPECIFICATIONS SECTION CONSISTS OF REQUIREMENTS APPLYING TO ARCHITECTURAL PRECAST CONCRETE WORK IN GENERAL. ALL PORTIONS OF THE TRADE REQUIREMENTS WHICH ARE APPLICABLE TO THIS PROJECT WILL BE REQUIRED AS IF THEY WERE FULLY INCORPORATED INTO THE PROJECT REQUIREMENTS, UNLESS SPECIFICALLY STATED TO THE CONTARY IN THE PROJECT REQUIREMENTS.

3.8. GENERAL REQUIREMENTS

ALL ARCHITECTURAL PRECAST CONCRETE SPECIFIED HERIN PRODUCT OF MANUFACTURER REGULARLY ENGAGED IN PRODUCTION OF SUCH PRODUCTS, AND WITH EXPERIENCE AND FACILITIES SUFFICIENT TO PRODUCE, DELIVER, AND ERECT PRE-CAST ARCHTECTURAL CONCRETE UNITS OF THE HIGHEST QUALITY, AND IN ACCORDANCE WITH REQUIREMENTS SPECIFIED HERIN.

MANUFACTURERS FACILITIES SHALL BE OPEN FOR INSPECTION BY REPRESENTATIVES OF BROWN & ROOT.

3.9. MATERIALS

3.9.1. PORTLAND CEMENT

TYPE I OR TYPE III PORTLAND CEMENT. CONFORM TO REQUIREMENTS OF ANSI A1.1-1970 (ASTM C150-67). PROTECT ALL CEMENT FROM WEATHER DAMAGE. ANY HARDENED, DAMP, OR DETERIROATED CEMENT UNACCEPATBLE.

SUBMIT MANUFACTURER'S CERTIFIED ANALYSIS OF CEMENT TO BE USED IN TRIPLICATE TO BROWN & ROOT FOR APPROVAL.

3.9.2. WATER

CLEAN AND POTABLE. FREE FROM ALL DELETERIOUS AMOUNTS OF ACIDS, ALKALIS, ORGANIC MATTER, OTHER FOREIGN MATTER.

3.9.3. FINE AGGREGATE

NATURAL SAND OF CLEAN, HARD, DURABLE, UNCOATED GRAINS. COMPLY WITH ANSI A37.124-1966 (ASTM C33-64). GRADED COARSE TO FINE WITHIN FOLOWING PERCENTAGES BY WEIGHT:

PASSING SIEVE NO. 4	95 TO 100%
PASSING SIEVE NO. 16	50 TO 80%
PASSING SIEVE NO. 50	10 TO 30%
PASSING SIEVE NO. 100	0 TO 5%

MAXIMUM PERMISSABLE CLAY CONTENT 3%. NOT MORE THAN 35% SHALL PASS A STANDARD SIEVE AND BE RETAINED ON NEXT SMALLER SIEVE.

3.9.4. COARSE AGGREGATE

NATURAL GRAVEL COMPOSED OF CLEAN, HARD, DURABLE, UNCOATED PEBBLES AND COBBLES OF STRONG MATERIAL. COMPLY WITH REQUIREMENTS OF ANSI A37.124-1966 (ASTM C33-64). GRADE COARSE TO FINE WITHIN THE FOLLOWING PERCENTAGES BY WEIGHT:

PASSING 1'' SIEVE	90-100%
PASSING 1/2'' SIEVE	25-60%
PASSING #4 SIEVE	1 - 10%

A VARIATION IN ANY AMOUNT PASSING ANY SIEVE SIZE OF MORE THAN 10% OF TOTAL NOT PERMITTED. MAXIMUM PERMITTED CLAY CONTENT, 1%. IN ADDITION, MAXIMUM PERMITTED SIZE OF 1/5TH OF NARROWEST DIMENSION BETWEEN FORMS AND 3/4 OF NARROWEST DIMENSION BETWEEN REINFORCEMENT SHALL GOVERN.

3.9.5. LIGHTWEIGHT AGGREGATE

EXPANDED CLAY OR SHALE LIGHTWEIGHT CONCRETE AGGREGATE TO CONFORM TO ANSI A37.88-1970 (ASTM C330-69). GRADED FROM DUST TO 3/4'' MANIMUM SIZE. FINE AND COARSE AGGREGATES SHIPPED AND STORED SEPARATELY.

3.9.6. ADMIXTURES

APPROVED AIR-ENTRAINMENT AGENT TO PRODUCE 6% AIR CONTENT AT 3'' SLUMP PERMISSABLE. CONFORM TO REQUIREMENTS OF ASTM C260-69.

WATER REDUCING ADMIXTURE CONFORMING TO REQUIREMENTS OF ASTM C494 PERMISSABLE.

3.9.7. REINFORCEMENT

CONFORM TO REQUIREMENTS OF ASTM A615, GRADE 60 DEFORMED BILLET STEEL BARS. SIZES AS SHOWN.

3.9.8. WELDED WIRE MESH REINFORCEMENT

CONFORM TO REQUIREMENTS OF ANSI G45.1- 1970 (ASTM A185-69). SIZES AND SPACING AS SHOWN.

3.9.9. MISCELLANEOUS STEEL

ANCHORAGES, WELD PLATES, ETC., CONFORM TO REQUIREMENTS OF ASTM A36. GALVANIZING CONFORM TO REQUIREMENTS OF ASTM A123.

3.10. SAMPLES

PREPARE AND SUBMIT SHOP AND ERECTION DRAWINGS FOR ALL PRE-CAST ARCHTECTURAL CONCRETE WORK SPECIFIED HERIN.

DRAWINGS SHALL INCLUDE, BUT SHALL NOT NECESSARILY BE LIMITED TO FOLLOWING INFORMATION: COMPLETE DIMENSIONAL DATA ON ALL UNITS BASED UPON CONTRACT DOCUMENTS AND/OR FIELD MEASUREMENTS. CROSS SECTIONS OF UNITS SHOWING NUMBER, SIZES, SPACING AND LOCATIONS OF ALL REINFORCING. SHOP MARK FOR ALL UNITS. NUMBER, SIZES, SPACING, AND LOCATION OF ALL WELDING CLIPS, BEARING PLATES, OTHER PROVISIONS FOR ANCHORING, FASTENING, ALIGNING UNITS. NUMBER, DESCRIPTION, SIZES, SPACING AND LOCATIONS OF ALL INSERTS, ANCHORS, SLEEVES, BRACKETS, HANGARS, OTHER ITEMS REQUIRED TO BE CAST INTO

UNITS. NUMBER, DESCRIPTION AND LOCATION OF LIFTING DEVICES CAST INTO UNITS. INDICATION OF EXTENT OF DECORATIVE SURFACES, OTHER ARCHITECTURAL FEATURES.

NOTE: APPROVAL OF SHOP DRAWINGS BY BROWN & ROOT IMPLIES APPROVAL OF ARRANGEMENT OF UNITS, BEARING AREAS, AND CONFORMANCE WITH ARCHITECTURAL REQUIREMENTS ONLY. WHILE AN EFFORT WILL BE MADE TO DETECT ANY DISCREPANCIES IN DIMENSIONING, RESPONSIBILITY FOR DIMENSIONING AND FIELD MEASUREMENTS RESTS WITH THE FABRICATOR.

SUBMIT DUPLICATE SAMPLES OF ARCHITECTURAL PRECAST CONCRETE WORK. SAMPLES SHALL BE REPRESENTATIVE OF LIKE WORK TO BE FURNISHED INSOFAR AS COLOR, AGGREGATE PATTERN, TEXTURE, WORKMANSHIP, AND GENERAL APPEARANCE ARE CONCERNED. WHERE ACTUAL WORK INVOLVES FINISHED SURFACES MEETING AT CORNERS, SAMPLES SHALL ALSO CONTAIN AT LEAST ONE FINISHED EDGE TO INDICATE APPEARANCE OF FINISHED PRODUCT.

3.11. FABRICATION

3.11.1. ACCESS TO PLANT FACILITIES

BROWN & ROOT REPRESENTATIVES SHALL HAVE FREE ACCESS TO ALL PORTIONS OF MANUFACTURER'S PLANT INVOLVED IN PRODUCTION OF UNITS AT ALL TIMES DURING ANY PAHSE OF FABRICATION.

3.11.2. FORMS AND MOLDS

UNITS CAST IN FORMS CONFORMING TO DIMENSIONS AND SECTIONS ON APPROVED SHOP DRAWINGS. FORMS CONSTRUCTED IN MANNER TO EFFECTIVELY MAINTAIN POSITION AND SHAPE THROUGHOUT STRESSING AND CASTING OPERATIONS. CONTACT SURFACES OF FORMS TRUE TO LINE AND PLANE, FREE FROM DENTS, SAGS, IRREGULARITIES, CAPABLE OF PRODUCING SMOOTH FINISHED SURFACES FREE OF DEFECTS.

3.11.3. PLACING REINFORCEMENT, CAST-IN ITEMS AND INSERTS

PLACE ALL REINFORCEMENT, INSERTS, ANCHORS, SLEEVES, HANGARS, WELDING CLIPS, LIFTING DEVICES, OTHER ITEMS REQUIRED TO BE CAST INTO UNITS ACCURATELY IN CONFORMANCE WITH APPROVED SHOP DRAWINGS. ANCHOR SECURELY TO INSURE AGAINST DISPLACEMENT DURING CASTING.

3.11.4. REINFORCEMENT

REGARDLESS OF DESIGN REQUIREMENTS, REINFORCE ALL UNITS IN MANNER TO EFFECTIVELY PROTECT UNITS FROM DAMAGE AND UNDUE STRAINS DURING HANDLING AND ERECTION OPERATIONS.

3.11.5. CAST OPENINGS

ACCURATELY LOCATE AND BLOCK OUT FOR CAST OPENINGS IN CONFORMANCE WITH APPROVED SHOP DRAWINGS.

3.11.6. CONCRETE DESIGN, PROPORTIONS, AND MIXING

CONCRETE SHALL PRODUCE COMPRESSIVE STRENGTHS SPECIFIED HERIN. DESIGN AND PROPORTIONS OF MIX AT MANUFACTURER'S OPTION. SUBMIT PROPOSED MIX DESIGN TO BROWN & ROOT FOR APPROVAL.

3.11.7. CONCRETE CASTING AND COMPACTION

ALL CASTING AND COMPACTION OPERATIONS SHALL BE IN CONFORMANCE WITH REQUIREMENTS OF ACCEPTED TRADE PRACTICES AS RECOMMENDED BY ACI AND PCMA. ALL FORMED SURFACES SHALL BE NEARLY PERFECT, UNIFORMLY SMOOTH CONCRETE SURFACES, COMPLETELY FREE OF HONEYCOMBING, AND WITH A MINIMUM OF SMALL SURFACE BUBBLES, SURFACE APPEARANCE SHALL BE UNIFORM THROUGHOUT.

3.11.8. LABORATORY TESTING

MAKE AT LEAST SIX (6) TEST CYLINDERS FOR EACH FIFTY CUBIC YARDS OR FRACTION THEREOF OF CONCRETE CAST IN ANY ONE DAY. MAKE AND CURE TEST CYLINDERS IN STRICT ACCORDANCE WITH ANSI A37.17. MARK CYLINDERS WITH DATE AND SHOP MARKS OF MEMBERS IN WHICH CONCRETE WAS CAST. TEST TWO CYLINDERS PER ASTM C-39 PRIOR TO RELEASE OF PRE-TENSION STRESS IN REINFORCEMENT, TEST TWO CYLINDERS AT SEVEN DAYS(7) AFTER CASTING. TESTING PERFORMED BY INDEPENDENT TESTING LABORATORY. MAIL FOUR (4) COPIES OF EACH TEST REPORT DIRECTLY TO: BROWN & ROOT, INC., DRAWER MM, INGLESIDE, TEXAS 78362.

3.11.9. IDENTIFICATION OF UNITS

PERMANENTLY MARK ALL UNITS TO CONFORM WITH APPROVED SHOP DRAWINGS. IN ALL UNITS WHERE REINFORCEMENTS IS NOT SYMMETRICAL, POSITIVELY IDENTIFY MANNER OF PLACEMENT IN STRUCTURE.

3.11.10. CURING

CURE ALL UNITS BY STEAM OR OTHER SUITABLE METHODS EQUIVALENT TO SEVEN (7) DAYS OF DAMP CURING OF TYPE I PORTLAND CEMENT.

NOTE: FOLLOW MANUFACTURERS DIRECTIONS REGARDING USE OF STEAM CURING WHERE CHEMICAL RETARDERS ARE USED.

3.12. HANDLING AND DELIVERY

HANDLE UNITS ONLY AFTER CONCRETE HAS DEVELOPED SUFFICIENT STRENGTH TO ALLOW HANDLING WITHOUT DAMAGING EFFECT.

SUPPORT UNITS DURING ALL STAGES OF HANDLING AND DELIVERY IN MANNER TO PREVENT OVERSTRESSING, CHIPPING, CRACKING, OR OTHER DAMAGE TO THE UNITS. ANY MATERIALS DAMAGED BY IMPROPER HANDLING WILL BE SUBJECT TO REJECTION BY DUPONT. WHERE SITE STORAGE IS NECESSARY, PROVIDE SOLID, LEVEL, SOUND SURFACE FREE OF GROUND, PREPARED IN MANNER TO PROVIDE CONTINUOUS BEARING FOR UNITS. HANDLE, STACK, AND STORE UNITS VERTICALLY WITH PROPER SUPPORT AT ALL TIMES. TAKE SPECIAL PRECAUTIONS TO DISLODGEMENTS OF EXPOSED AGGREGATE.

3.13. PROTECTION OF PANELS AND WORK

TAKE ALL PRECAUTIONS NECESSARY THROUGHOUT FABRICATION, CURING, HANDLING STORAGE AND ERECTION OPERATIONS TO PROTECT PANELS FROM FOREIGN MATTER WHICH WOULD IN ANY MANNER DAMAGE, STAIN, OR OTHERWISE DISFIGURE EXPOSED SURFACES, OR IMPAIR PENETRATION OF SILICONE WATER REPELLANT.

PROTECT ADJACENT WORK, MATERIALS, FINISHES, SURFACES, ETC. FROM DAMAGE DURING HANDLING AND ERECTION OPERATIONS. AVOID OVERLOADING ANY PORTION OF EXISTING WORK DURING ERECTION.

3.14. CO-OPERATION WITH OTHER TRADES

CO-OPERATE WITH OTHER TRADES BY PERMITTING TIMELY PLACEMENT OF

WORK INSTALLED IN CONJUNCTION WITH WALL PANELS. PROVIDE INFORMATION TO OTHERS ON LOCATION OF REINFORCEMENT IN PANELS WHERE REQUIRED.

3.15. ERECTION

PROPOSED SEQUENCE OF ERECTION OF PANELS SUBJECT TO APPROVAL BY BROWN & ROOT PRIOR TO COMMENCEMENT OF ERECTION OPERATIONS.

PLACE, ERECT, SUPPORT, GUY, BRACE, AND SUPPORT ALL PANELS AS ERECTION PROGRESSES IN MANNER TO INSURE MAINTAINING OF PANELS IN PROPER POSITION UNTIL PERMANTELY ANCHORED.

ERECT ALL PANELS TRUE TO LINE AND POSITION, LEVEL AND PLUMB.

PROVIDE FULL AND ADEQUATE BEARING AT ALL LOACTIONS INDICATED.

MAINTAIN UNIFORM JOINT WIDTH BETWEEN PANELS THROUGHOUT PROJECT INSOFAR AS POSSIBLE. MAKE MINOR ADJUSTMENTS OF PANEL PLACEMENT AS REQUIRED TO MAINTAIN UNIFORMITY OF JOINTS AND OVERALL APPEARANCE BEFORE MAKING PERMANENT ANCHORAGES.

3.15.1. WELDING

CHECK ALL UNITS FOR PROPER PLACEMENT AND ALIGNMENT BEFORE COMMENCING FINAL WELDING.

ANCHOR ALL PANELS WITH FULL WELDS PERFORMED AT ALL LOCATIONS INDICATED IN MANNER TO EFFECTIVELY ANCHOR AND CONNECT PANELS, AND TO TRANSMIT STRESSES BETWEEN PANELS.

ALL FIELD WELDING IN STRICT CONFORMANCE WITH ''CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION'' OF AMERCIAN WELDING SOCIETY. ALL WELDING PERFORMED BY OPERATORS WHO HAVE PREVIOUSLY QUALIFIED BY TESTS PRESCRIBED IN ''STANDARD QUALIFICATION PROCEDURE'' OF AMERICAN WELDING SOCIETY FOR TYPE OF WORK REQUIRED.

USE EQUIPMENT OF DESIGN, CAPACITY, AND OPERATING CONDITION CAPABLE OF PRODUCING WELDS OF ACCPETABLE QUALITY.

PROPERLY ALIGN AND POSITION PANELS TO BE WELDED. PROVIDE NECESSARY TEMPORARY CONNECTIONS REQUIRED TO MAINTAIN MEMBERS IN PROPER POSITION DURING WELDING OPERATIONS.

PROTECT ALL EXPOSED SURFACES FROM DAMAGE DURING WELDING OPERATIONS.

REMOVE ALL PAINT, RUST, SCALE, FOREIGN MATTER OF WHATEVER NATURE FROM AREAS WITHIN 2 INCHES OF ALL WELDED CONNECTIONS.

FINISHED WELDS SHALL BE FULL WELDS WITH NEAT, WORKMANLIKE APPEARANCE.

3.16. ACCEPTABLE TOLERANCES

3.16.1. FABRICATION OF TOLERANCES

MAXIMUM PERMITEED PLUS OR MINUS FABRICATION TOLERANCES:

HEIGHT AND WIDTH:	LESS THAN 10'0:	+ 1/8''	- 1/8''
	10'0 TO 20'0:	+ 1/8''	- 3/16''
	OVER 20'0:	+ 1/8''	- 1/4''

PANEL THICKNESS: + 1/8'', - 1/8''
INSERT LOCATIONS: + 1/4'', - 1/4''
BOWAGE AND WARPAGE: 1/360TH OF GREATER DIMENSION OF PANEL.
MINIMUM THICKNESS OF EXPOSED AGGREGATE: 1/2''

3.16.2. ERECTION TOLERANCES

MAXIMUM PERMITTED ERECTION TOLERANCES:
DEVIATION FROM PLACEMENT OR FROM TRUE LINE AT ANY LOCATION
+ OR - 1/4''
WIDTH OF JOINTS BETWEEN PANELS: + OR - 1/8''
EDGES OF ADJOINING PANELS (FROM TRUE PLANE): + OR - 1/8''
MAXIMUM TOLERANCE FROM LEVEL OR PLUMB POSITION: 1:500.

3.17. CLEANING:

UPON COMPLETION OF ERECTION, CLEAN ALL EXPOSED SURFACES THROUGHLY AND COMPLETELY WITH COMMERCIAL DETERGENT AND WATER APPLIED WITH STIFF FIBER BRUSHES. COMPLETELY REMOVE ALL FOREIGN MATTER,

STAINING, OTHER APPEARANCE DEFECTS. FLUSH SURFACES THROUGHLY WITH CLEAN WATER.

3.18. PATCHING - ACCEPTANCE

MINOR BROKEN EDGES OR CORNERS MAY BE PATCHED AFTER ERECTION BY FABRICATOR IN MANNER SUBJECT TO APPROVAL BY DUPONT.

IN GENERAL, PATCHING OF EXPOSED SURFACES UNACCEPTABLE. MINOR DEFECTS ON UNEXPOSED SURFACES MAY BY PATCHED IN MANNER SUBJECT TO APPROVAL BY DUPONT. REMOVE PATCHED PANELS UNACCEPTABLE BY BROWN & ROOT FROM JOBSITE AND REPLACE WITH MATCHING PANELS AT NO ADDITIONAL COST.

4. TESTING AND SAMPLING BY DUPONT

4.1.

TESTS SHALL BE PERFORMED ON THE THIRD BATCH OR TRUCKLOAD FOR EACH CLASS OF CONCRETE, AND FOR EACH DIFFERENT GRADATION OF COARSE AGGREGATE BEING USED IN EACH DAY'S POUR. ADDITIONAL TESTS SHALL BE PERFORMED AS TABULATED BELOW. WHEN THE DAILY POUR IS LESS THAN 3 TRUCKLOADS OR BATCHES, THE TESTS SHALL BE PERFORMED ON THE FIRST OR SECOND TRUCKLOAD OR BATCH. THE ABOVE TESTS SHALL BE PERFORMED ON EVERY TRUCKLOAD OR BATCH OF CONCRETE WHICH HAS HAD ADDITIONAL WATER ADDED AT THE JOB SITE.

4.2. TEST CYLINDERS

FOUR CYLINDERS PER TEST SHALL BE PREPARED AND PROPERLY CURED FOR 24 HOURS PER ASTM C31.

INDENTIFICATION OF CYLINDERS.

EACH GROUP OF FOUR CYLINDERS SHALL BE ASSIGNED AN IDENTIFICATION NUMBER AS WELL AS EACH CYLINDER BEING ASSIGNED A NUMBER WITHIN THE GROUP. THE FOLLOWING PERTINENT DATA REGARDING THE CONDITIONS UNDER WHICH THE CYLINDERS WERE CAST SHALL BE RECORDED, AND A COPY SHALL ACCOMPANY EACH SHIPMENT OF CYLINDERS TO THE LABORATORY.

A. CYLINDER GROUP NUMBER AND NUMBER OF EACH CYLINDER

B. DATA AND TIME OF SAMPLING

C. CONCRETE AND AIR TEMPERATURE (AMBIENT)

D. CLASS OF CONCRETE AND TYPE OF ADMIXTURE, IF ANY

E. SLUMP AND AIR TEST RESULTS

F. LOCATION OF CONCRETE IN STRUCTURE FROM WHICH SAMPLES WERE MADE

G. AGE AT WHICH CYLINDERS SHALL BE TESTED

COMPRESSIVE STRENGTH TEST SHALL BE PERFORMED BY AN APPROVED TESTING LABORATORY IN ACCORDANCE WITH ASTM C39. FOR REGULAR CONCRETE, ONE CYLINDER SHALL BE TESTED AT 7 DAYS (FOR CONTROL PURPOSES) AND THE BALANCE AT 28 DAYS. FOR HIGH EARLY-STRENGTH CONCRETE, ONE CYLINDER SHALL BE TESTED AT 3 DAYS (FOR CONTROL PURPOSES) AND THE BALANCE AT 7 DAYS. IF THE TEST FOR CONTROL DOES NOT GIVE SATISFACTORY RESULTS, ANOTHER CYLINDER SHALL BE BROKEN TO CHECK WHETHER THE FIRST TEST WAS CORRECT OR IN ERROR. THE TEST RESULT WILL BE THE AVERAGE STRENGTH OF THE TWO OR THREE CYLINDERS BROKEN AT 7 DAYS FOR HIGH EARLY-STRENGTH CONCRETE OR 28 DAYS FOR REGULAR CONCRETE. IF ONE CYLINDER IN A TEST SHOWS EVIDENCE OF IMPROPER SAMPLING, CASTING, OR HANDLING, IT SHALL BE DISCARDED AND THE REMAINING CYLINDERS USED.

4.3.

FREQUENCY OF SAMPLING

*THESE REQUIREMENTS ARE IN ADDITION TO THE ONES REQUIRED ABOVE.

KIND OR WORK	NUMBER OF TESTS REQUIRED*
FOOTINGS AND RETAINING WALLS	ONE FOR EACH 50 CU YD OR PART THEREOF
COLUMNS, GIRDERS, BEAMS, AND SUSPENDED SLABS	ONE FOR EACH POURING SECTION (EXCEEDING 25 CU YD)
FLOORS ON EARTH	ONE FOR EACH 50 CU YD OF EACH CLASS OF CONCRETE, OR PART THEREOF, FOR FLOORS HAVING CLASS 1,4,5, AND 6 FINISH, AND FOR THOSE WHICH WILL RECEIVE 1'' TOPPINGS
LARGE EQUIPMENT	ONE FOR EACH FOUNDATIONS (EXCEEDING 50 CU YD)
CONCRETE SUBJECT TO INTERMITTENT OR CONSTANT IMMERSION	ONE FOR EACH 50 CU YD, OR PART THEREOF.

PAVEMENTS	ONE FOR EACH 200 CU YD, OR PART THEREOF, EACH DAY
ALL OTHER CONCRETE	ONE FOR EACH 100 CU YD, OR PART THEREOF, OR AT LEAST ONE SAMPLE PER DAY FOR EACH CLASS OF CONCRETE (EXCEEDING 50 CU YD)

4.4. RECORDS AND REPORTS

4.4.1. RECORDS.

DU PONT FIELD FORCES SHALL KEEP A RUNNING RECORD OF ALL SAMPLING AND TESTING. SUCH RECORDS SHALL INCLUDE ALL THE INFORMATION SET FORTH, IDENTIFICATION OF CYLINDERS, AND THE FOLLOWING:

A. KIND OF TEST FOR ACCEPTANCE OR QUALITY CONTROL (SLUMP, AIR, COMPRESSIVE STRENGTH, ETC)
B. NUMBER OF DELIVERY TICKET COVERING THE SAMPLED BATCH OF CONCRETE
C. DATA ON SAMPLING AND TESTING OF HARDENED CONCRETE, IF ANY
D. FILE OF LABORATORY TEST RESULTS

4.4.2. REPORTS.

A COPY OF THE FOLLOWING REPORTS SHALL BE FORWARDED BY DU PONT FIELD FORCES TO THE PRINCIPAL ARCHITECTURAL AND CIVIL ENGINEER OF THE DESIGN DEVISION OR OTHER ISSUING AUTHORITY.

FOR ''CERTIFIED'' CONCRETE PURCHASED. ASTM C94 ALTERNATE 3

A. ALL COMPRESSIVE-STRENGTH TESTS

FOR ''SPECIAL APPLICATIONS CONCRETE PURCHASED PER ASTM C94 ALTERNATE #1

A. CEMENT ANALYSIS
B. TESTS ON FINE AND COARSE AGGREGATES
C. TESTS ON WATER (WHEN REQUIRED)
D. ALL COMPRESSIVE-STRENGTH TESTS

4.4.3. RECORDS

RECORDS SHALL BE KEPT OF EACH DAY'S CONCRETE PLACEMENT INDICATING TIME OF START AND FINISH, VOLUME OF CONCRETE PLACED, LOCATION IN THE STRUCTURE, COMPOSITION OF THE MIX, AND WEATHER CONDITIONS (INCLUDING TEMPERATURE). ORIGINALS AND ONE COPY OF SUCH RECORDS SHALL BE FURNISHED DU PONT AFTER EACH DAY'S WORK.

DIVISION 4
MASONRY

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 4.

TABLE OF CONTENTS

1. SCOPE

THIS PORTION OF THE SPECIFICATION SETS FORTH THE QUALITY AND TYPE OF MATERIALS, AND THE WORKMANSHIP REQUIRED FOR CONCRETE BLOCK WALLS, AND THE ACCESSORY MATERIALS RELATED THERETO.

2. MATERIALS

2.1. CONCRETE MASONRY UNITS

2.1.1. PHYSICAL DIMENSIONS.

NOMINAL FACE SIZE OF BLOCKS SHALL BE 8 INCHES BY 16 INCHES. NOMINAL THICKNESS SHALL BE AS INDICATED ON THE DRAWINGS AND SHALL CONFORM TO ASTM C 90, GRADE S-II FOR INTERIOR NONLOAD - BEARING WALLS. HEIGHT OF BLOCKS SHALL BE SUCH THAT 3/8-INCH THICK JOINTS (1/4 INCH MINIMUM) WILL RESULT IN 8-INCH MODULES. STANDARD CORNER AND JAMB UNITS SHALL BE FURNISHED IN BOTH HALF AND FULL LENGTHS AS REQUIRED. FACE SHELL THICKNESS OF HOLLOW UNITS SHALL AVERAGE 1-1/4 INCHES FOR THOSE 6 INCHES THICK, AND OVER 1 INCH FOR 4-INCH THICK UNITS, WITH MINIMUM OF 1-1/8 INCHES AND 7/8 INCH RESPECTIVELY. WEB THICKNESS SHALL BE 1 INCH MINIMUM.

2.1.2. AGGREGATES

AGGREGATES FOR BLOCKS SHALL BE LIGHTWEIGHT AGGREGATES CONFORMING TO ASTM C 331. CINDER AGGREGATE UNITS SHALL NOT BE USED.

PROVIDING NO PRICE PENALTY IS ACCRUABLE, BLOCKS MANUFACTURED FROM EXPANDED SLAG ARE PREFERRED BY DU PONT.

2.1.3. MANUFACTURE

2.1.3.1. CURING

IMMEDIATELY AFTER CASTING, UNITS SHALL BE WATER- OR STEAM-CURED IN SUCH A MANNER AND FOR SUCH A DURATION AS TO RESULT IN THE ATTAINMENT IN 28 DAYS OF THE COMPRESSIVE STRENGTH CALLED FOR IN THE APPLICABLE ASTM SPECIFICATIONS AS REFERRED TO ABOVE. STEAM CURING IS THE METHOD PREFERRED BY DU PONT.

2.1.3.2. CORNER BLOCK

BLOCK USED FOR OUTSIDE CORNERS OF INTERIOR PARTITIONS SHALL BE BULLNOSED

2.1.3.3. LABEL

UNDERWRITER'S LABEL IS NOT REQUIRED.

2.1.4. SITE STORAGE

IT IS ESSENTIAL THAT CONCRETE MASONRY UNITS BE KEPT DRY UNTIL PLACED IN THE WALL. UNITS SHALL BE SO STORED THAT THE MOISTURE CONTENT, WHEN UNITS ARE PLACED, DOES NOT EXCEED THE MAXIMUM PERMITTED UNDER THE REFERENCED ASTM SPECIFICATIONS. NO UNITS SHALL BE USED LESS THAN 28 DAYS AFTER CASTING (INCLUDING CURING PERIOD), UNLESS THE UNITS WERE AUTOCLAVED, IN WHICH CASE MINIMUM AGE MAY BE REDUCED TO 14 DAYS.

2.1.5. SAMPLES

WHEN REQUESTED, SAMPLES, CONSISTING OF A MINIMUM OF 2 UNITS, SHALL BE SUBMITTED TO BROWN & ROOT FOR APPROVAL. SUCH SAMPLES SHALL BE REPRESENTATIVE OF THE MAXIMUM RANGE OF SURFACE TEXTURE AND PHYSICAL PROPERTIES AND SHALL BE CONSIDERED THE BASIS FOR COMPARISON IN ACCEPTANCE OF SHIPMENT. WHERE CONCRETE MASONRY UNITS ARE TO BE EXPOSED IN INTERIOR WALLS THAT ARE TO BE PAINTED, THE SURFACE TEXTURE SHALL BE APPROVED BY DU PONT BEFORE SHIPMENT.

2.2. MORTARS

BRANDS OF CEMENT, LIME, COMMERCIAL MASONRY CEMENT AND WATERPROOFING ADMIXTURE SHALL BE APPROVED BY BROWN & ROOT.

2.2.1. MATERIALS

2.2.1.1. PORTLAND CEMENT

PORTLAND CEMENT SHALL BE NORMAL CEMENT AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM C 150, TYPE I OR II.

2.2.1.2. LIME

MASON'S LIME SHALL BE HYDRATED LIME CONFORMING TO ASTM C 207, TYPE S.

2.2.1.3. SAND

SAND SHALL BE MORTAR SAND AND SHALL CONFORM TO ASTM C 144.

2.2.1.4.

WATER SHALL BE CLEAN AND UNCONTAMINATED.

2.2.1.5. COMMERCIAL MASONRY CEMENTS

COMMERCIAL MASONRY CEMENTS SHALL CONFORM TO ASTM C 91. WHEN THE USE OF A COMMERCIAL MASONRY CEMENT IS CONTEMPLATED, ITS MANUFACTURER SHALL FURNISH TO BROWN & ROOT AN ANALYSIS SETTING FORTH THE PERCENTAGES BY WEIGHT OF PORTLAND CEMENT, HYDRATED LIME (IF ANY), NATURAL CEMENT OR SLAG CEMENT (IF ANY), TOGETHER WITH INERT FILLERS SUCH AS FLOURED SILICA, GROUND LIMESTONE, OR POZZUOLANIC MATERIALS CONTAINED IN A UNIT PACKAGE OF MASONRY CEMENT TOGETHER WITH THE TOTAL WEIGHT AND VOLUME OF THE PACKAGE. UPON RECEIPT OF THIS INFORMATION, THE DESIGN DIVISION WILL DETERMINE THE REQUIRED PROPORTIONS OF MASONRY CEMENT, HYDRATED LIME (IF ADDITIONAL LIME IS CONSIDERED NECESSARY) AND SAND.

2.2.2. ADMIXTURES

CALCIUM CHLORIDE ADMIXTURES MAY BE USED IN MORTARS FOR CONCRETE BLOCK TO ACCELERATE SET, BUT ITS USE SHALL NOT AFFECT THE NECESSITY FOR HEATING UNDER COLD WEATHER CONDITIONS, IN ACCORDANCE WITH SECTION TITLED ''COLD WEATHER CONSTRUCTION'' BELOW. QUANTITIES USED SHALL BE IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PRINTED DIRECTIONS.

2.2.3. STORAGE

STORAGE OF MORTAR MATERIALS SHALL BE SUCH AS TO PREVENT DETERIORATION AND CONTAMINATION WITH FOREIGN MATTER.

2.2.4. PROPORTIONING AND MIXING.

MORTAR MATERIALS SHALL BE MEASURED BY VOLUME AND PROPORTIONED AS INDICATED IN TABLE WHICH FOLLOWS:

CONCRETE BLOCK MORTAR PROPORTIONS

PORTLAND CEMENT	LIME	SAND
1	2	8

2.2.4.1. REWORKING OF MORTARS

REWORKING OF MORTARS IS DESIRABLE AND SHALL BE PRACTICED WHENEVER POSSIBLE. THE MORTAR SHALL BE PREPARED ONE TO TWO HOURS BEFORE USE, THEN REWORKED IMMEDIATELY BEFORE USING. ADDITION OF WATER IS NOT PREMITTED. DURING HOT WEATHER THE WAITING PERIOD SHOULD BE REDUCED.

2.2.4.2. MECHANICAL MIXING

MECHANICAL MIXING OF MORTAR FOR A MINIMUM OF THREE MINUTES IS MANDATORY, EXCEPT WHERE A SMALL QUANTITY OF MORTAR IS REQUIRED FOR PATCHING, ETC. EQUIPMENT USED FOR MIXING SHALL BE KEPT FREE OF SET MORTAR AND UNCONTAMINATED.

3. WORKMANSHIP

3.1. GENERAL - CONCRETE BLOCK WORK.

ALL MASONRY UNITS SHALL BE LAID PLUMB AND TO A LINE WITH LINE TWIGS NOT MORE THAN 20 FEET APART. HOLES LEFT BY REMOVAL OF TWIGS SHALL BE IMMEDIATELY FILLED WITH MORTAR. CARE SHALL BE TAKEN TO PREVENT SPLASHING OF MORTAR ON FINISHED FACES.

3.1.1. COURSING

COURSING SHALL BE AS INDICATED ON THE DRAWINGS. VERTICAL JOINTS SHALL BE REQUIRED, APPROXIMATELY 3/8'', (1/2''MAXIMUM) FOR CONCRETE BLOCK. MASONRY UNITS SHALL BE SPACED SO AS TO PRESENT A UNIFORM APPEARANCE, WITH VERTICAL JOINTS IN LINE, SET SO THAT EACH BLOCK IS OFFSET 1/2 THE BLOCK(LENGTH)BELOW. CONCRETE BLOCK SHALL BE LAID UP SO THAT ONE COURSE PLUS JOINT EQUALS 8'' VERTICALLY.

3.2. MORTAR COVERAGE.

3.2.1. CONCRETE BLOCK

CONCRETE BLOCK - HOLLOW UNITS SHALL HAVE FULL MORTAR COVERAGE AT ALL INSIDE AND OUTSIDE FACE SHELLS FOR BOTH VERTICAL AND HORIZONTAL FACES.

3.3. CLOSURE UNITS.

BEFORE LAYING A MASONRY UNIT TO CLOSE THE SPACE BETWEEN TWO OTHER UNITS ALREADY LAID, FRESH MORTAR FROM THE MUD BOARD SHALL BE PLACED ON THE END SURFACES OF THE ADJACENT UNITS AND ON TOP OF THE UNIT BELOW. THE CLOSURE UNITS SHALL THEN BE ROCKED INTO PLACE.

3.4. SHIFTING OR REALIGNING

SHIFTING OR REALIGNING OF MASONRY UNITS, ONCE LAID, WILL NOT BE PERMITTED, EXCEPT BY REMOVING THE UNIT AND RELAYING IN A BED OF FRESH MORTAR.

3.5. TOOLING.

ALL MORTAR JOINTS OF WALLS SHALL BE TOOLED, AFTER MORTAR HAS ACHIEVED ITS INITIAL SET, TO A CONCAVE CONTOUR USING A TOOL SLIGHTLY LARGER THAN THE JOINT THICKNESS AND WITH SUCH FORCE AS TO PRODUCE A HARD, COMPACT, SMOOTH SURFACE. THE TIME AT WHICH MORTAR JOINTS ARE TOOLED IS IMPORTANT. THE MORTAR SHALL NOT BE SO HARD THAT IT CANNOT BE COMPRESSED, BUT IT SHALL NOT BE SO WET AS TO LEAVE ''DRAG MARKS'' ON THE SURFACE OF THE JOINT AS THE TOOL IS USED. EXCESS FAT PROJECTING FROM FACE OF WALL AT THE JOINT SHALL BE REMOVED, LEAVING A SMOOTH SURFACE.

3.6. WETTING OF MASONRY UNITS.

CONCRETE BLOCK AND BRICK SHALL NOT BE WETTED.

3.7. OTHER REQUIREMENTS.

3.7.1.

MASONS SHALL VERIFY THE SHAPE, SIZE AND STRENGTH OF TEMPLATES, AND THE ACCURACY OF THE CENTERING OF OPENINGS, BRACKETING, ETC. THEY SHALL BUILD IN OPENINGS, CHASES, STRIPS, LUGS, INSERTS, ANCHORS, BOLTS, GRILLES, REGLETS, HARDWARE, ETC., FURNISHED BY OTHER TRADES, AND AS DIRECTED BY THEM OR INDICATED ON THE DRAWINGS; BED AND POINT UP AROUND FRAMES FOR ALL OPENINGS; AND BACKUP ALL CEMENT, STEEL, IRON OR OTHER WORK. WHERE FRESH MASONRY JOINS MASONRY ALREADY SET, THE SURFACE OF THE SET MASONRY SHALL BE CLEANED WITH A WIRE BRUSH SO AS TO OBTAIN THE BEST POSSIBLE BOND WITH THE NEW WORK. ALL LOOSE UNITS AND MORTAR SHALL BE REMOVED.

WHERE OPENINGS ARE TO BE CUT IN WORK ALREADY IN PLACE, WORK SHALL

BE ARRANGED SO THAT BROKEN EDGES OF UNITS ARE CONCEALED, OR BROKEN UNITS SHALL BE REMOVED AND NEW UNITS INSTALLED AS REQUIRED TO PRODUCE A NEAT, FINISHED APPEARANCE, MATCHING AND BLENDING INTO THAT IN PLACE AS CLOSELY AS POSSIBLE. EXPOSED BROKEN EDGES OF BLOCK OR BRICK ARE NOT ACCEPTABLE.

3.8. CLEANING.

EXPOSED SURFACES OF MASONRY PREFERABLY SHALL BE KEPT CLEAN AS THE WORK PROGRESSES BY WIPING WITH A DAMP CLOTH. WHERE ADDITIONAL CLEANING IS REQUIRED, THE MASONRY SHALL BE CLEANED USING A STIFF BRUSH AND WATER.

ACID CLEANING IS NOT PERMITTED FOR CONCRETE BLOCK. CARE SHALL BE TAKEN TO PREVENT ACID WATER FROM CONTACTING CONCRETE BLOCK.

AS CLEANING PROGRESSES, MASONRY SURFACES SHALL BE EXAMINED FOR CRACKS, HOLES OR OTHER DEFECTS. SUCH DEFECTS SHALL BE CAREFULLY POINTED IMMEDIATELY AFTER CLEANING IS FINISHED.

AT ALL TIMES THE WORK SHALL BE PROTECTED FROM DRIPPINGS FROM OTHER WORK, AND FROM ALL DAMAGING OR DISCOLORING ELEMENTS.

DIVISION 5
METALS

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 5.

MATLS & METHODS FOR
CONSTRUCTING, FABRICATING, & INSTALLING
MISC. STEEL & IRON.

SPECIFICATION NO 6165
METALS DIVISION 5

TABLE OF CONTENTS

1. GENERAL

1.1. SCOPE

THIS SPECIFICATION DESCRIBES THE MATERIALS & METHODS OF CONSTRUCTION AND INSTALLATION FOR MISCELLANEOUS STEEL AND IRON, STEEL GRATING & STAIR TREADS, AND THRESHOLDS.

2. MATERIALS

2.1. MISCELLANEOUS STEEL

ALL MISCELLANEOUS STEEL, INCLUDING ANGLES, ETC. SHALL CONFORM TO THE REQUIREMENTS OF ASTM A36, EXCEPT AS NOTED ON DRAWINGS.

2.2. FABRICATION

ITEMS WHICH ARE NOT ''STOCK'' OR COMMERCIAL ITEMS, SHALL BE FABRICATED STRICTLY IN ACCORDANCE WITH THE APPROVED SHOP DRAWINGS. ALL FINISHED PRODUCTS SHALL BE FREE OF DEFECTS IMPAIRING STRENGTH, DURABILITY, AND APPEARANCE.

2.3. ERECTION

MISCELLANEOUS STEEL AND IRON ITEMS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE DRAWINGS OR MANUFACTURER'S DIRECTIONS.

2.4. GALVANIZING

ALL MISCELLANEOUS STEEL SHALL BE GALVANIZED.

WHERE FIELD CUTS OR WELDS ARE MADE ON GALVANIZED MEMBERS, THE WELDS SHALL BE CLEANED, WASHED WITH WATER, AND THEN COATED WITH ONE OF THE FOLLOWING TO MINIMUM DRY-FILM THICKNESS OF 4.0 MIL:

DU PONT NO. 67-744 ''DULUX'' METAL PRIMER
E. I. DU PONT DE NEMOURS & CO., INC.
WILMINGTON, DELAWARE

ZRC
SEALLUBE COMPANY
14 VALLEY STREET
WAKEFIELD, MASSACHUSETTS

GALVICON

GALVICON CORPORATION
20 MEADOW STREET
BROOKLYN, NEW YORK

THE SURROUNDING GALVANIZED AREA AFFECTED BY THE HEAT ALSO SHALL BE SIMILARLY COATED.

3. STEEL GRATINGS AND STAIR TREADS

ALL GRATINGS SHALL BE FABRICATED FROM BARS MEETING THE REQUIREMENTS OF ASTM A36. SIZE OF GRATING AS CALLED FOR ON DRAWINGS. ALL CUT OPENINGS IN GRATING TO BE BANDED. SMALL OPENINGS TO BE BANDED WITH SHORT SECTIONS OF PIPE.

ALL STAIR TREADS SHALL BE FABRICATED FROM 1-INCH OR 1-1/4 INCH BEARING BARS (AS CALLED FOR ON THE DRAWINGS) EXCEPT WHEN TREADS ARE OVER 4 FEET WIDE, THEN 1-1/4 INCH BY 3/16 INCH BEARING BARS SHALL BE USED, AND SHALL HAVE DIAMOND PLATE OR TWISTED-BAR ABRASIVE NOSINGS END PLATES SHALL BE APPROXIMATELY 2-1/2 INCHES WIDE AND NOT LESS THAN 3/16 INCH THICK, AND SHALL BE SUITABLY DRILLED TO FASTEN TO CHANNEL STAIR STRINGERS. IN ALL OTHER RESPECTS, STAIR TREADS SHALL MEET THE REQUIREMENTS SET FORTH ABOVE FOR FLOOR GRATING. DIAMOND PLATE OR TWISTED-BAR NOSINGS ALSO SHALL BE PROVIDED AT THE EXPOSED EDGE OF FLOOR GRATINGS ADJACENT TO THE TOP RISER OF STAIRS AT LANDINGS AND FLOOR LEVELS. ALL GRATINGS AND STAIR TREADS SHALL BE GALVANIZED BY THE HOT-DIP METHOD AND MEET THE REQUIREMENTS OF ASTM A123.

4. HAND RAIL

HAND RAIL SHALL BE ''OVAL-LINE'' HAND RAIL AS MANUFACTURED BY BLUMCRAFT OF PITTSBURGH, PITTSBURGH, PA. RAILS SHALL BE #4310, POSTS SHALL BE #4320, AND ANCHOR BRACKETS SHALL BE #AU.

WHERE NOTED ON THE DRAWINGS, HANDRAIL SHALL BE WELDED ANGLE IRON IN ACCORDANCE WITH ASTM A36. ANGLE SHALL BE GALVANIZED.

5. RAIL AND GATE

RAIL AND GATE SHALL BE AS MANUFACTURED BY BLUMCRAFT OF PITTSBURG, PITTSBURG, PA. MODEL NUMBERS SHALL BE AS NOTED ON DRAWING W-442768.

6. THRESHOLDS

ABRASIVE ALUMINUM THRESHOLDS CALLED FOR ON THE DRAWINGS SHALL BE ''ALUMALUN'' AS MANUFACTURED BY AMERICAN ABRASIVES METALS COMPANY, IRVINGTON, NEW JERSEY OR AN APPROVED SUBSITUTE. TYPE SHALL BE AS SHOWN ON ENGINEERING STANDARD 881B.

THE THRESHOLDS SHALL BE SECURED TO THE CONCRETE BY MEANS OF FLUSH BOLTS INTO EXPANSION SHIELD OR BY PROPRIETRY FASTENERS FURNISHED BY THE MANUFACTURER.

DIVISION 6
CARPENTRY

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 6.

TYPE & QUALITY OF
MATL. TO BE USED
FOR CARPENTRY.

SPECIFICATION NO 6165
CARPENTRY, DIVISION 6

TABLE OF CONTENTS

1. SCOPE

THIS PORTION OF THE SPECIFICATION SETS FORTH THE QUALITY AND TYPES OF MATERIAL REQUIRED FOR THE COMPLETE INSTALLATION OF ALL CARPENTRY.

2. DESCRIPTION

THIS PORTION OF THE SPECIFICATION COVERS ALL LUMBER USED FOR THE FOLLOWING PURPOSES. WALL PLATES, BRIDGING, NAILING STRIPS, GROUNDS, MISCELLANEOUS BLOCKING MATERIAL, UNEXPOSED FILLERS, COVERED FASCIAS, EDGING STRIPS FOR INSULATED ROOFS, CANTS, WOOD CURBS FOR VENTILATORS, SLEEPERS, ETC.

2.1. GRADING RULES, GRADES AND SPECIES

2.1.1. GRADING RULES.

LUMBER SHALL BE GRADED ACCORDING TO THE STANDARD GRADING RULES OF THE SOUTHERN PINE ASSOCIATION FOR LONG-LEAF AND SHORT-LEAF YELLOW PINE; OF THE WEST COAST LUMBERMAN'S ASSOCIATION FOR DOUGLAS FIR AND SITKA SPRUCE; OF THE WESTERN PINE MANUFACTURER'S ASSOCIATION FOR PONDEROSA PINE, IDAHO WHITE PINE, CALIFORNIA WHITE PINE, AND CALIFORNIA WHITE FIR; OF THE NORTHEASTERN LUMBER MANUFACTURER'S ASSOCIATION FOR NORTHERN WHITE PINE AND NORWAY PINE.

2.1.2. GRADES.

UNLESS OTHERWISE CALLED FOR ON THE DRAWINGS, GRADES SHALL BE AS FOLLOWS.

LUMBER FOR THE MEMBERS LISTED SHALL BE YELLOW PINE, FIR, SPRUCE, WHITE PONDEROSA OR NORWAY PINE, AND SHALL BE NO. 2 DIMENSION (1200 F) FOR YELLOW PINE OR DOUGLAS FIR. WHEN SPRUCE OR OTHER PINE IS USED, THE GRADES THEREOF SHALL BE AS REQUIRED TO PROVIDE A MATERIAL OF EQUAL APPEARANCE OR STRENGTH.

2.2. MOISTURE CONTENT

2.2.1. TREATED LUMBER.

ALL LUMBER, REGARDLESS OF KIND, SIZE, OR GRADE, TO BE CZC TREATED, SHALL BE AIR-DRIED OR KILN-DRIED BEFORE TREATMENT, SO THAT THE MOISTURE CONTENT IS NOT MORE THAN 19 PERCENT. AFTER TREATMENT IT SHALL BE AIR-DRIED OR KILN-DRIED AT TEMPERATURES NOT EXCEEDING 150 DEGREES F, SO THAT THE MOISTURE CONTENT IS NOT MORE THAN 19 PERCENT AT TIME OF SHIPMENT.

2.3. TREATMENT

ALL LUMBER USED SHALL BE CHROMATED ZINC CHLORIDE TREATED.

2.3.1. PRESERVATIVES.

CHROMATED ZINC CHLORIDE SHALL CONFORM TO AWPA SPECIFICATION P5.

2.3.2. PERTINENT REQUIREMENTS

TREATING PROCESSES, MATERIAL CONDITIONING, PLANT EQUIPMENT, AND OTHER PERTINENT REQUIREMENTS SHALL CONFORM TO THE 'STANDARD SPECIFICATION FOR PRESERVATIVE TREATMENT BY PRESSURE PROCESSES,' AMERICAN WOOD PRESERVERS ASSOCIATION'S DESIGNATION C1 AND C2 FOR THE SPECIFIC KIND OF LUMBER AND TYPE OF PRESERVATIVE TO BE USED. RETENTION SHALL BE AS REQUIRED FOR 'GENERAL USE' UNLESS OTHERWISE CALLED FOR ON THE DRAWINGS.

2.4. OTHER REQUIREMENTS

DIMENSIONS INDICATED ON THE DRAWINGS ARE NOMINAL DIMENSIONS (EXCEPT WHERE DETAILS SHOW ACTUAL SIZES), AND SHALL BE SUBJECT TO THE STANDARD REDUCTIONS REQUIRED FOR SURFACING, OR TOLERANCES PERMITTED BY THE GRADING RULES. UNLESS OTHERWISE SPECIFIED OR INDICATED, MATERIAL SHALL BE S4S.

2.5. STORAGE

ALL MATERIAL SPECIFIED HEREIN SHALL BE STORED, AFTER DELIVERY TO THE SITE, SO THAT IT WILL BE FULLY PROTECTED FROM DAMAGE AND WEATHER, AND PILED TO PREVENT WARPAGE. ALL LUMBER EXCEPT CREOSOTED LUMBER SHALL BE FULLY PROTECTED TO MAINTAIN THE ORIGINAL REQUIRED MOISTURE CONTENT AS SPECIFIED IN SECTION TITLED 'MOISTURE CONTENT'.

3. SCOPE

THIS PORTION OF THE SPECIFICATION DESCRIBES THE QUALITY AND CONSTRUCTION OF WOOD SWINGING DOORS. THE SIZE, THICKNESS, AND TYPE OF DOORS SHALL BE AS INDICATED ON THE DRAWINGS. INSOFAR AS POSSIBLE, ALL WOOD DOORS SHALL BE OF 'STOCK' DESIGN.

3.1. FLUSH SOLID CORE DOORS

3.1.1. CORES

CORES FOR EXTERIOR DOORS SHALL CONSIST OF LOW-DESNITY WOOD BLOCKS NOT OVER 2-1/2 INCHES WIDE ON THE FACE, MADE UP INTO STILE, RAIL, AND PANEL UNITS, WITH THE GRAIN OF THE BLOCKS RUNNING PARALLEL. THE STILE AND RAIL UNITS SHALL BE ASSEMBLED WITH DOWELS, WITH THE PANEL UNITS TIGHTLY TONGUE-AND-GROOVED BETWEEN. GRAIN IN STILES AND RAILS OF THE ASSEMBLED CORE SHALL RUN PARALLEL WITH THEIR LONGITUDINAL DIMENSION AND IN PANEL UNITS, VERTICALLY. CORES FOR INTERIOR DOORS SHALL BE AS ABOVE OR MAY BE PARTICLE OR CHIP BOARD CONFORMING TO CS 236 TYPE I, DENSITY C, CLASS 1. SIDE EDGE STRIPS SHALL BE UNSELECTED BIRCH AT LEAST 3/4 INCH THICK; TOP AND BOTTOM EDGE STRIPS SHALL BE ANY SPECIE OF HARDWOOD 1-1/4 INCH THICK AND BE TONGUE-AND-GROOVED TO THE CORE.

3.1.2. CROSSBANDING

CROSSBANDING SHALL BE MAPLE, GUM, BIRCH, ASH, ELM, BASSWOOD, YELLOW POPLAR, OR OTHER SUITABLE HARDWOOD, NOT LESS THAN 1/10 INCH THICK. CROSSBANDING MAY BE SPLICED BUT PAPER OR CLOTH TAPE SHALL NOT BE USED OVER THE JOINTS UNLESS FACE VENEER IS AT LEAST 1/16 INCH THICK. CROSSBANDING SHALL BE APPLIED WITH GRAIN RUNNING HORIZONTALLY AND AT RIGHT ANGLES TO FACE VENEER.

3.1.3. FACE VENEERS.

UNLESS OTHERWISE CALLED FOR IN THE PROJECT SPECIFICATIONS, FACE VENEERS SHALL BE SELECTED BIRCH OF 'NO. 2 GRADE FOR STAINING' AS DESCRIBED IN HARDWOOD PLYWOOD COMMERCIAL STANDARD CS35. THICKNESS OF FACE VENEERS SHALL BE SUCH THAT, IN COMBINATION WITH CROSSBANDING, THE RESULTING OVER-ALL THICKNESS WILL BE NOT LESS THAN 1/8 INCH BEFORE SANDING.

3.1.4. ADHESIVE

ADHESIVE FOR CROSSBANDED DOORS SHALL BE MOISTURE-RESISTANT RESIN GLUES, HOT PLATE, PRESS BONDED.

3.1.5. WORKMANSHIP.

SURFACES SHALL BE PERFECTLY SMOOTH, FREE OF BLEMISHES WHICH WILL BE DETRIMENTAL TO THE TYPE OF FINISH DESIRED.

4. WORKMANSHIP

4.1. ROUGH CARPENTRY

FRAMING MEMBERS SHALL BE ACCURATELY CUT TO THE WORK REQUIREMENTS, AND BE WELL FASTENED. BOLTED FASTENINGS SHALL HAVE WASHERS OF ADEQUATE SIZE UNDER BOTH THE HEADS AND NUTS. NAILS SHALL BE OF THE CORRECT SIZE AND QUANTITY FOR PROPER FASTENING. OVERSIZED NAILS THAT WILL RESULT IN SPLITTING SHALL NOT BE USED. SHEATHING BOARDS SHALL BE DRIVEN UP TIGHT. ALL WORK SHALL BE ADEQUATELY BRACED FOR PROPER ALIGNMENT AND TO PROVIDE ADEQUATE SAFETY FOR THE WORKMEN. IN DOING THE CUTTING, AS REQUIRED BY OTHER TRADES, WEAKENING OF STRUCTURAL MEMBERS WILL NOT BE PERMITTED.

PERMANENT GROUNDS AND NAILING STRIPS SHALL BE PROVIDED IN CONCRETE AND MASONRY, WHERE REQUIRED, TO AFFORD PROPER NAILING FOR ALL FINISHING MATERIAL. WOOD GROUNDS IN CONCRETE SHALL BE DRESSED TO REQUIRED SIZES AND BEVELED SO AS NOT TO LOOSEN THROUGH SHRINKAGE. THEY SHALL BE SECURELY FASTENED TO FORMS AND BE RIGID, STRAIGHT, LEVEL, AND PLUMB AS REQUIRED.

4.2. FINISH HARDWARE

HARDWARE SHALL BE VERIFIED AS TO TYPE AND QUANTITY, AND ALL SHORTAGES IMMEDIATELY REPORTED TO THE PROPER AUTHORITY. ALL KEYS SHALL BE PROPERLY IDENTIFIED AND MARKED AND BE PLACED IN THE CUSTODY OF DU PONT, WHO WILL ISSUE A RECEIPT THEREFOR.

HARDWARE SHALL BE NEATLY INSTALLED AND SHALL OPERATE PERFECTLY BEFORE FINAL ACCEPTANCE BY DU PONT.

4.3. MISCELLANEOUS

4.3.1. PROTECTION.

ALL FINISHED WORK SHALL BE ADEQUATELY PROTECTED AGAINST DAMAGE, SOILING, ETC FROM ANY SOURCE. IF PLASTERED OR MASONRY SURFACES ARE NOT COMPLETELY DRY, AND THE HUMIDITY WITHIN THE BUILDING IS DOWN TO A POINT WHERE NO SERIOUS SWELLING OR DAMAGE THEREFROM CAN

OCCUR, FINISHING MATERIALS SHALL NOT BE BROUGHT INTO THE BUILDING OR BE INSTALLED UNTIL PERMITTED BY DU PONT.

4.3.2. COORDINATION.

CARPENTERS SHALL COORDINATE THEIR WORK WITH THAT OF THE OTHER TRADES SO THAT PROGRESS CONTINUES WITHOUT INTERRUPTION.

DIVISION 7
MOISTURE PROTECTION

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 7.

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1. GENERAL

1.1. SCOPE.

THIS SPECIFICATION SETS FORTH THE QUALITY AND TYPE OF MATERIALS OF CONSTRUCTION AND WORKMANSHIP INVOLVED IN THE INSTALLATION OF NEW BUILT-UP ROOFING, FLASHING, INSULATION AND RELATED SHEET METAL WORK, ALL AS SPECIFIED HEREIN AND SHOWN ON DRAWINGS, AND THE DETAILS AND STANDARDS REFERENCED THEREON. ALL MATERIALS DESCRIBED HEREIN SHALL BE FURNISHED AND INSTALLED BY THE ROOFING CONTRACTOR, UNLESS SPECIFICALLY NOTED OTHERWISE.

1.2. ROOFING GUARANTEE

ALL BUILT-UP ROOFING AND FLASHING INSTALLED BY OTHER THAN DU PONT FORCES SHALL CARRY A WRITTEN TWO-YEAR GUARANTEE, EXECUTED BY THE CONTRACTOR, WHICH WILL PROTECT DU PONT AGAINST PREMATURE DETERIORATION OR FAILURE CAUSED BY DEFECTIVE MATERIALS, OR BY WORKMANSHIP PERFORMED IN A MANNER CONTRARY TO THE REQUIREMENTS OF THIS SPECIFICATION. ALL DEFECTIVE WORK SHALL BE REPAIRED OR REPLACED IN A MANNER SATISFACTORY TO AND WITHOUT COST TO DU PONT. THE GUARANTEE PERIOD SHALL START ON THE DATE OF DU PONT ACCEPTANCE OF THE WORK.

1.2.1. INSULATED ROOFS

WHEN A ROOF IS INSULATED AND INSULATION BECOMES WET DURING THE GUARANTEE PERIOD BECAUSE OF DEFECTIVE ROOFING, THE INSULATION SHALL BE REPLACED AS WELL AS THE ROOFING, WITHOUT EXPENSE TO DU PONT.

1.3. INSPECTION OF DECKS

THE CONTRACTOR SHALL INSPECT ALL DECKS AND ASCERTAIN THAT THEY ARE IN THE CONDITION REQUIRED BY THIS SPECIFICATION. START OF WORK BY THE CONTRACTOR SHALL IMPLY APPROVAL OF THE DECK SURFACES, AND NO CLAIM IN THIS RESPECT WILL BE CONSIDERED VALID, IN CASE OF FAILURE OF THE ROOFING COMPONENTS WITHIN THE GUARANTEE PERIOD.

1.4. FIRE AND SMOKE PROTECTION

KETTLES SHALL BE LOCATED SO AS TO PREVENT DAMAGE TO BUILDINGS OR OTHER PROPERTY. THEY SHALL NOT BE POSITIONED ON ROOF DECKS. MOPS SHALL BE SPUN OR WHIRLED AT THE END OF WORK PERIODS TO SEPARATE THE STRANDS, AND SHALL BE STORED IN THAT CONDITION TO PREVENT SPONTANEOUS COMBUSTION. FIRE EXTINGUISHERS SHALL BE PROVIDED NEAR KETTLES FOR IMMEDIATE USE.

1.5. ROOF TRAFFIC

AFTER WORK ON ROOF IS STARTED, NO UNAUTHORIZED TRAFFIC WILL BE PERMITTED ON THE ROOF OTHER THAN THAT NECESSARY FOR THE ROOFING APPLICATION AND INSPECTION. SURFACING AGGREGATE, FELTS, OR OTHER MATERIALS SHALL NOT BE PILED ON THE ROOF TO THE EXTENT THAT DESIGN LIVE LOADS ARE EXCEEDED. ROOFING MATERIALS SHALL NOT BE TRANSPORTED OVER UNFINISHED OR FINISHED ROOFING UNLESS ADEQUATE PROTECTION OF THE WORK IN PLACE IS PROVIDED.

1.6. PROTECTION AGAINST SOILAGE

SURFACE OF WALLS, WALKS, PAVEMENTS, ETC SHALL BE COVERED AS NECESSARY TO PREVENT SOILING OR OTHER DAMAGE RESULTING FROM THE APPLICATION OF ROOFING OR TRANSPORTING OF MATERIALS.

IF SURFACES ARE STAINED, THEY SHALL BE CLEANED BY CONTRACTOR AT NO COST TO DU PONT IN A MANNER ACCEPTABLE TO DU PONT.

1.7. WORK SEQUENCE

ONCE WORK IS STARTED ON A ROOF OR A SECTION THEREOF, IT SHALL CONTINUE WITHOUT UNDUE DELAY UNTIL THAT SECTION IS COMPLETED BEFORE STARTING ANOTHER. THE INSTALLATION OF BUILT-UP AND OTHER FLASHINGS SHALL FOLLOW APPLICATION OF THE ROOFING WITHOUT DELAY. APPLICATION OF SURFACE PROTECTION SHALL NOT BE DELAYED OVER 48 HOURS AFTER COMPLETION OF FLASHING INSTALLATION, UNLESS THE ROOFING IS WET.

1.8. CLEAN UP

WHEN THE WORK IS COMPLETED, THE CONTRACTOR SHALL, AT HIS OWN EXPENSE AND AS DIRECTED BY DU PONT, REMOVE FROM THE SITE ALL TEMPORARY FACILITIES, EXCESS MATERIALS, RUBBISH, AND WASTE MATERIALS RESULTING FROM HIS OPERATION AND LEAVE THE AREA IN A CLEAN CONDITION.

1.9. DESCRIPTION

THE ROOFING SHALL BE OF THE TYPE INDICATED BY THE SYMBOLS SHOWN ON THE ROOF PLANS AND AS DEFINED BELOW.

1.9.1. ROOF TYPE SG-1TI-4

SG - SLAG OR GRAVEL SURFACE
1 - SLOPE LESS THAN 1/2 IN. PER FOOT
T - SHORT-SPAN PRECAST CONCRETE SLAB DECK
PRECAST CONCRETE OR PRESTRESSED SLAB DECK
I - VEGETABLE FIBERBOARD INSULATION
4 - FOUR-PLY ROOFING (20 YEAR QUALITY)

2. MATERIALS

2.1. SELECTION OF MATERIALS

ROOFING SHALL CONSIST OF ONE PLY ASPHALT SATURATED BASE SHEET SET IN ASPHALT FOLLOWED BY THREE PLIES OF TAR SATURATED FINISHING FELTS SET IN COAL TAR PITCH.

2.2. QUALITY OF MATERIALS

2.2.1. FELTS

FELTS SHALL BE EITHER RAG OR ASBESTOS FELTS WEIGHING 15 LB PER 100 SQ FT.

TAR SATURATED RAG FELTS SHALL CONFORM TO ASTM D227. TAR SATURATED ASBESTOS FELTS SHALL CONFORM TO D 250, EXCEPT THAT THE SATURANT SHALL BE COAL-TAR PITCH FROM WHICH THE HIGHLY VOLATILE CONSTITUENTS HAVE BEEN REMOVED.

ALL ASBESTOS FELTS SHALL BE PERFORATED.
ALL RAG FELTS SHALL BE UNPERFORATED.

ASPHALT-COATED BASE SHEET SHALL BE HEAVY RAG OR ASBESTOS ROOFING FELT, THOROUGHLY SATURATED AND COATED ON BOTH SIDES WITH ASPHALT, SHALL BE UNPERFORATED AND WEIGH 35-40 POUNDS PER 100 SQUARE FEET. THE FELT SHALL CONFORM TO ASTM D2626 TYPE II.

2.2.2. BITUMENS

PITCH SHALL CONFORM TO THE REQUIREMENTS FOR TYPE A, ASTM D 450.

ASPHALT FOR APPLICATION OF INSULATION AND BASE FELT SHALL BE STEEP ASPHALT AND SHALL CONFORM TO ASTM D312 TYPE III.

2.2.3. SURFACE PROTECTION

SURFACE PROTECTION SHALL BE CRUSHED SLAG, GRAVEL, OR MARBLE CHIPS EXCEPT WHEN ONE OF THESE MATERIALS IS SPECIFICALLY CALLED FOR ON

THE DRAWINGS. COLOR OF SURFACE PROTECTION SHALL BE WHITE.

WHITE CHIPS SHALL BE CRUSHED, WHITE CRYSTALLINE MARBLE. CHIPS SHALL BE IRREGULAR IN SHAPE, BUT MATERIALS HAVING ELONGATED POINTS WILL NOT BE ACCEPTABLE. GRADATION SHALL BE THE SAME AS CALLED FOR ABOVE FOR CRUSHED STONE.

2.2.4. INSULATION

INSULATION SHALL BE VEGETABLE FIBERBOARD CONFORMING TO ASTM C208, FOR CLASS C. THE BOARD SHALL HAVE EITHER SQUARE OR FABRICATED EDGES. UNITS SHALL BE EITHER ASPHALT-COATED OR IMPREGNATED WITH ASPHALT. THICKNESS SHALL BE AS SHOWN ON THE DRAWINGS.

2.2.5. CANT STRIPS

CANT STRIPS SHALL BE FABRICATED FROM WOOD, VEGETABLE FIBER, OR CELLULAR GLASS INSULATION, OR ANY OTHER SUITABLE MATERIAL. SIZE OF CANT STRIPS SHALL BE AS NOTED ON DRAWINGS AND DETAILS.

2.2.6. COLD ADHESIVES

COLD ADHESIVES FOR APPLYING FELTS TO PRECAST CONCRETE DECKS SHALL BE ONE OF THE FOLLOWING. IT IS PREFERABLE TO DU PONT TO USE THE EMULSION AT ALL TIMES, EXCEPT DURING FREEZING WEATHER.

EMULSION ADHESIVE SHALL BE A PITCH CLAY EMULSION, SIMILAR AND EQUAL TO PLACCO EK-103 MANUFACTURED BY BORDEN CHEMICAL CO. THIS ADHESIVE MAY BE USED WITH BOTH TAR- AND ASPHALT-SATURATED FELTS.

CUT-BACK ADHESIVES SHALL BE ONE OF THE FOLLOWING-

MATERIAL	MANUFACTURER
BA 5431	BORDEN CHEMICAL CO MIDDLESEX, NJ
INDUSTRIAL ADHESIVE B1340	ARMSTRONG CORK CO. LANCASTER, PA.
ADHESIVE 232R	MIRACLE ADHESIVES CORP NEW PHILADELPHIA, OHIO

THE ABOVE ADHESIVES MAY BE USED WITH EITHER TAR- OR ASPHALT-SATURATED FELTS.

PRIMER FOR EMULSION ADHESIVE SHALL CONSIST OF ONE PART EMULSION MIXED WITH ONE PART WATER.

PRIMER FOR CUT-BACK ADHESIVE SHALL BE ASPHALT PRIMER SPECIFIED BELOW.

2.2.7. FLASHINGS (BUILT-UP)

2.2.7.1. ASPHALT-SATURATED FABRIC SHALL CONFORM TO ASTM D 173.

2.2.7.2. ASBESTOS-REINFORCED BASE FLASHING SHALL

BE JOHNS-MANVILLE'S ASBESTOS BASE FLASHING (REINFORCED) WHICH CONSISTS OF AN OUTER LAYER OF ASPHALT-IMPREGNATED AND COATED ASBESTOS FELT, AND A LAYER OF ASPHLAT-SATURATED WATERPROOFING FABRIC, CEMENTED TOGETHER IN MANUFACTURE AND WEIGHING NOT LESS THAN 65 LB PER 100 SQ FT. NO SUBSTITUTE WHICH IS NOT SIMILARLY COMPOSED WILL BE ACCEPTABLE.

2.2.7.3. FIBROUS ASPHALT ROOF CEMENT SHALL

CONFORM TO FEDERAL SPECIFICATION SS-C-153 FOR TYPE I.

2.2.7.4. FLASHING NAILS SHALL BE HIGH-CARBON

STEEL, HEAT TREATED MASONRY NAILS. LENGTH SHALL NOT BE LESS THAN 1 INCH AND THEY SHALL BE USED IN CONJUNCTION WITH TIN CAPS NOT LESS THAN 1-13/16 INCH DIAMETER. INTEGRAL ONE-PIECE CAP NAILS ARE NOT ACCEPTABLE.

2.2.7.5. ASPHALT PRIMER SHALL CONFORM TO ASTM D 41.

2.2.8. FLASHINGS (METAL)

2.2.8.1. STAINLESS STEEL FLASHINGS SHALL BE EITHER 0.012 INCH

OR 0.015 INCH THICK CONFORMING TO TYPE 302 OR 304, ASTM A167, AND SHALL BE DEAD SOFT TEMPER FULLY ANNEALED WITH AISI NO.10 (DULL SHEET FINISH).

2.2.9. GRAVEL STOPS AND FASCIAS

2.2.9.1. EXTRUDED ALUMINUM GRAVEL STOPS AND

FASCIAS SHALL BE OF THE TYPE SHOWN ON THE DRAWINGS.

2.2.10. COATINGS FOR CONCRETE MACHINE FOUNDATIONS AND PADS.

2.2.10.1. EMULSION

THE ASPHALT CLAY EMULSION SHALL BE SIMILAR AND EQUAL TO ADDEX NO. 480 HEAVY-DUTY EMULSION MANUFACTURED BY KOPPERS CO. INC. PITTSBURG, PA; TREMSHIELD EMULSION MANUFACTURED BY TREMCO MANUFACTURING CO, CLEVELAND, OHIO; OR PLACCO EK-101 MANUFACTURED BY BORDEN CHEMICAL CO, MIDDLESEX, NJ.

2.2.10.2. MESH

GLASS MESH SHALL BE AN ASPHALT-COATED RANDOM-WEAVE (FELTED) GLASS-FIBER MESH WEIGHING NOT LESS THAN 4 1/2 LB PER 100 SQ FT, SIMILAR AND EQUAL TO ADDEX HEAVY-DUTY MESH MANUFACTURED BY KOPPERS CO; TREMSHIELD MESH MANUFACTURED BY TREMCO MANUFACTURING CO; AND GLASFLEX MANUFACTURED BY BORDON CHEMICAL CO.

2.3. STORAGE OF MATERIALS

FELTS AND SIMILAR MATERIALS SHALL BE DELIVERED TO THE SITE IN AN UNDAMAGED AND DRY CONDITION. MATERIAL RECEIVED WHICH IS OBVIOUSLY NOT DRY OR OTHERWISE DAMAGED SHALL BE REJECTED. STORAGE AT THE SITE MUST BE UNDER COVER SO THAT, WHEN INSTALLED, THE MATERIALS ARE IN THE SAME CONDITION AS WHEN RECEIVED. ROLLS OF PAPER, ROOFING, FLASHING, OR FELTS SHALL BE STACKED VERTICALLY ON THEIR ENDS AND NOT IN CONTACT WITH THE GROUND. BITUMINOUS EMULSIONS SHALL BE STORED AT TEMPERATURES ABOVE FREEZING.

3. APPLICATION

3.1. CONDITION OF DECKS

THE ROOF DECK, WHEN TURNED OVER TO THE ROOFING CONTRACTOR, SHALL BE CLEAN AND FREE OF REFUSE. ALL EAVE AND FASCIA WOOD MEMBERS SHALL BE IN PLACE.

THE CONTRACTOR SHALL PERFORM ALL OTHER WORK OF PREPARATION OF THE DECK. WHEN ROOFING IS APPLIED, DECKS SHALL BE DRY AND FREE OF FROST, SNOW, OR ICE.

3.2. TEMPORARY ROOF

PRIME - IF CUT-BACK ADHESIVE IS USED, PRIME PRECAST DECK UNITS AND VERTICAL SURFACES WITH ASPHALT PRIMER. DO NOT PRIME PRECAST WALL UNITS. TEMPORARY ROOF SHALL CONSIST OF 2 PLIES OF SATURATED FELT LAID INTO COLD ADHESIVE, UNIFORMLY SPREAD WITH A SERRATED SQUEEGEE WHICH WILL PERMIT DEPOSIT OF 2 1/2 TO 3 GALLON PER 100 SQ FT. ADHESIVE SHALL BE APPLIED BETWEEN PLIES AS WELL AS TO THE DECK. FELTS SHALL BE LAID PROGRESSIVELY BY LAPPING EACH STRIP 1/2 ITS WIDTH PLUS 1 INCH. THOROUGHLY BROOM FELTS INTO THE ADHESIVE TO ELIMINATE WRINKLES, BLISTERS AND FISHMOUTHS. CARE SHALL BE TAKEN IN APPLYING ADHESIVE AT JOINTS TO ASSURE AGAINST DRIP INTO AREA BELOW, WHILE THE ADHESIVE IS STILL FLUID.

THE COVERING SHALL EXTEND OVER THE ENTIRE ROOF FROM EDGE TO EDGE, EDGE TO WALL, OR WALL TO WALL AS THE CASE MAY BE.

TEMPORARY ROOFING SHALL EXTEND UP VERTICAL SURFACES A MINIMUM OF 4'' AND SHALL BE FLASHED INTO ROOF DRAINS AND ROOF VENTS AS DETAILED. THE TEMPORARY ROOF SHALL BRIDGE THE VOID BETWEEN DECK TEES AND BETWEEN TEES AND PRECAST WALL PANELS.

THE TEMPORARY ROOF SHALL BRIDGE THE VOID BETWEEN DECK TEES AND TEES AND PRECAST WALL PANELS.

THE TEMPORARY COVERING SHALL BE HELD BACK AT LEAST 2'' FROM EXTERIOR FACE OF THE WALL PANELS.

IMMEDIATELY FOLLOWING INSTALLATION OF THE FELTS, THEY SHALL BE OVER COATED WITH ADHESIVE AT A RATE OF 2-1/2 - 3 GALLONS PER 100 SQ. FT. (MINIMUM).

IN ALL CASES, SUFFICIENT ADDITIONAL ADHESIVE SHALL BE USED WHERE REQUIRED TO COMPLETELY SEAL THE FELTS AGAINST INTRUSION OF MOISTURE.

3.3. PITCH DAMS

BEFORE LAYING INSULATION, A STRIP OF 15 LB FELT 12 INCHES WIDE SHALL BE APPLIED IN ALL CORNERS AGAINST VERTICAL SURFACES. THE STRIP SHALL BE APPLIED IN A 1/16-IN. THICK APPLICATION OF FIBROUS ROOFING CEMENT, OR SIMILAR COLD ADHESIVE, AND SHALL EXTEND OUT ON THE DECK 6 IN. FROM THE CORNER. SIMILARLY, ALL FELT PITCH DAMS AT ROOF EDGES AND AT ROOF OPENINGS SHALL BE APPLIED.

IT IS THE INTENT THAT PITCH DAMS BE INSTALLED AT ALL LOCATIONS WHERE THERE IS A POSSIBILITY OF BITUMEN DRIPPAGE INTO THE AREA BELOW OR DOWN EXTERIOR WALL.

3.4. HEATING OF BITUMEN

KETTLE AND APPLICATION TEMPERATURES ARE SHOWN IN THE FOLLOWING TABLE, AND THEY MUST BE RIGIDLY ADHERED TO:

	KETTLE TEMP. MAX.	KETTLE TEMP. MIN.	MOP TEMP. RECOMMENDED	MOP TEMP. MINIMUM
BITUMEN				
COAL TAR PITCH	400 F	350 F	375 F	300 F
HOT STEEP ASPHLAT (TYPE III)	450 F	375 F	425 F	350 F

IF HEAT IS DESIRED DURING A HOLDING PERIOD WHEN MATERIAL IS NOT BEING DRAWN OFF, THE KETTLE TEMPERATURE SHALL BE REDUCED AND NOT BE PERMITTED TO EXCEED 350 DEG F. RECEPTACLES CONTAINING BITUMEN ON THE ROOF SHALL BE KEPT AS FULL AS POSSIBLE AT ALL TIMES TO ACHIEVE MAXIMUM TEMPERATURE UNIFORMITY. BITUMEN TEMPERATURES SHALL

BE CHECKED REGULARLY TO ENSURE COMPLIANCE WITH THE ABOVE REQUIREMENTS.

3.5. CANT STRIPS

CANT STRIPS SHALL BE APPLIED IN HOT BITUMEN.
WOOD CANTS SHALL BE CUT TO LENGTHS NOT EXCEEDING 48 INCHES AND MAY BE NAILED AS AN ALTERNATE TO APPLICATION IN HOT BITUMEN.

3.6. INSULATION

3.6.1. SURFACE PREPARATION

THE SURFACE TO WHICH INSULATION IS TO BE APPLIED SHALL BE FREE OF DUST, DIRT, AND FOREIGN MATERIAL. THE TEMPORARY ROOFING SHALL BE SLIT ALONG THE LINE OF THE JOINTS IN PRECAST ROOF DECK. TEMPORARY ROOFING WHICH IS WORN, BLISTERED, DAMAGED OR TORN SHALL BE REMOVED ONLY AS REQUIRED TO PROVIDE A REASONABLY SMOOTH SURFACE FOR APPLICATION OF INSULATION.

3.7. PRIMING

THE TEMPORARY ROOFING AND/OR CONCRETE DECK SHALL BE PRIMED USING EMULSION OR ASPAHLT PRIMER DEPENDING ON ADHESIVE, EMULSION, OR CUT-BACK, USED TO APPLY INSULATION.

INSULATION SHALL BE LAID INTO COLD ADHESIVE APPLIED TO THE DECK WITH A SERRATED SQUEGEE WHICH WILL PERMIT DEPOSIT OF 2 1/2 TO 3 GALLONS OF ADHESIVE PER 100 SQ FT. INSULATION SHALL BE LAID WITH TIGHT JOINTS, BUT UNITS SHALL NOT BE FORCED INTO PLACE. IT IS ESSENTIAL THAT ALL UNITS REST UNIFORMLY ON THE DECK. CROSS JOINTS SHALL BE STAGGERED. WHEN MORE THAN 1 LAYER OF INSULATION IS REQUIRED, THE JOINTS OF THE SECOND AND SUCCEEDING LAYERS SHALL BE STAGGERED FROM THOSE BELOW, AND SHALL BE APPLIED IN HOT BITUMEN.

INSULATION SHALL BE APPLIED OVER THE ENTIRE DECK AREA AND CANT STRIPS SHALL BE SET ON TOP OF THE INSULATION.

NO MORE INSULATION SHALL BE APPLIED DURING ANY WORK PERIOD THAN CAN BE COVERED BY ALL 4 PLIES OF THE OVERLYING ROOFING DURING THE

SAME PERIOD. AT THE END OF THE WORK PERIOD, THE EDGE OF THE INSULATION SHALL BE THOROUGHLY EDGE SEALED.

AT THE END OF THE WORK PERIOD TEMPORARY WATER CUT-OFFS MUST BE INSTALLED TO PROTECT THE ROOF INSULATION. UPON RESUMPTION OF WORK, THEY MUST BE REMOVED. SUCH SEALS SHALL CONSIST OF 15 POUND FELT STRIPS APPLIED AND TOP COATED WITH HOT BITUMEN OR ROOFING CEMENT.

CUT-OFFS (EDGE SEALS) SHALL BE PROVIDED AROUND ALL ROOF DRAINS APPROX. 18 INCHES FROM DRAIN.

CUT-OFFS SHALL BE INSTALLED ON 20 FT CENTERS, BOTH DIRECTIONS IN A BASICALLY SQUARE PATTERN OVER THE ENTIRE ROOF AREA TO ISOLATE FUTURE ROOF LEAKS. WHEN MORE THAN ONE LAYER OF INSULATION IS TO BE APPLIED, THE CUT-OFFS SHALL BE POSITIONED ABOVE THOSE IN THE LAYERS BELOW.

3.8. ROOFING - ROOF TYPE SG-1T1-4

ROOFING SHALL CONSIST OF A ONE PLY BASE SHEET APPLIED SINGLY FOLLOWED BY 3 PLIES OF 15 LB FELTS APPLIED PROGRESSIVELY.

BASE SHEET, A SINGLE PLY OF ASPHALT COATED BASE SHEET SHALL BE INSTALLED DIRECTLY TO THE INSULATION OVER THE ENTIRE ROOF SURFACE. THE BASE SHEET SHALL BE LAID IN HOT STEEP ASPHALT APPLIED AT THE RATE OF 25 LBS PER 100 SQUARE FEET. EDGE AND END LAPS SHALL BE A MINIMUM OF 4'' SEALED WITH STEEP ASPHALT. THE BASE SHEET SHALL EXTEND UP AND OVER THE TOP OF CANT STRIPS AT RAISED GRAVEL STOPS AS SHOWN ON DETAILS AND SHALL ALSO EXTEND TO TOP OF CANT STRIPS AT INTERSECTION WITH VERTICAL WALLS AND BE THOROUGHLY BROOMED DOWN SO THAT NO WRINKLES OR FISHMOUTHS OCCUR.

ALL THREE PLIES OF ROOFING SHALL BE APPLIED PROGRESSIVELY BY LAPPING EACH STRIP 2/3 ITS WIDTH, PLUS 1 IN. EACH PLY SHALL BE UNROLLED INTO AN OVER-ALL MOPPING OF HOT PITCH APPLIED AT THE RATE OF 30 LB PER 100 SQ FT PER MOPPING. APPLICATION OF THE BITUMEN SHALL NOT EXTEND MORE THAN 3 FT IN FRONT OF THE ROLL OF FELT AND, AS EACH STRIP IS LAID, IT SHALL BE THOROUGHLY AND VIGOROUSLY BROOMED TO ELIMINATE BLISTERS, AIR POCKETS, WRINKLES, AND FISHMOUTHS, AND TO ASSURE FULL ADHESION. THE EDGES OF ALL FELT STRIPS SHALL BE THOROUGHLY ADHERED TO THE UNDERLYING PLY.

ROOFING SHALL EXTEND TO THE TOPS OF CANTS AT INTERSECTION OF WALLS, PARAPETS, CURBS, PLATFORMS, ETC AND SHALL BE NEATLY CUT AT THAT POINT. IT SHALL EXTEND UNDER THE FLANGE OF METAL GRAVEL STOPS, ETC, AND UNDER THE CLAMPING RINGS OF ROOF DRAINS AND VENTS,

ALL AS SHOWN ON THE DRAWINGS.

3.9. BUILT-UP FLASHINGS

BUILT-UP FLASHINGS SHALL BE CONSTRUCTED IN ACCORDANCE WITH DRAWING DETAILS AND REFERENCE ENGINEERING STANDARDS. THE ASSEMBLY SHALL CONSIST OF TWO PLIES OF ASPHALT SATURATED FABRIC CAPPED WITH REINFORCED BASE FLASHING. EACH PLY SHALL BE SET INTO A UNIFORM COATING OF ASPHALT ROOF CEMENT APPROX. 1/8 IN. THICK. ALL MASONRY WALL SURFACES TO BE COVERED WITH FLASHINGS SHALL BE PRIMED AND ALLOWED TO DRY BEFORE FLASHING WORK IS STARTED. THE CAP FLASHINGS SHALL BE CUT INTO STRIPS OF SUCH LENGTH AS TO MINIMIZE THE NUMBER OF END JOINTS. ALL FLASHING PLIES SHALL BE THOROUGHLY TUCKED INTO CORNERS AND JOINTS, AND SHALL BE LAPPED AT LEAST 4 IN. AND THOROUGHLY SEALED. THE FINAL COATING OF FIBROUS ASPHALT CEMENT SHALL BE 1/8-IN. THICK AND BE UNIFORMLY APPLIED.

3.10. COATING CONCRETE MACHINE FOUNDATIONS, FAN PADS, ETC.

PRIME THE ENTIRE SURFACE WITH A PRIMER CONSISTING OF EQUAL PARTS OF WATER AND ASPHALT EMULSION, STIRRED THOROUGHLY. ALLOW PRIMER TO DRY.

APPLY A COAT OF EMULSION AT A RATE OF NOT MORE THAN 50 SQ FT PER GALLON. WHILE IT IS STILL WET, LAY IN THE GLASS MESH AND BRUSH THOROUGHLY TO BRING THE EMULSION UP THROUGH THE MESH. CUT AND FIT CORNERS TO ASSURE COMPLETE ADHESION. WHEN THE FIRST COAT IS DRY, THE SECOND COAT SHALL BE APPLIED AND WHEN IT, TOO, IS DRY, THE THIRD AND FINAL COAT SHALL BE APPLIED. WHEN COMPLETED, THE GLASS MESH SHALL NOT BE VISIBLE THROUGH THE COATING.

IN GENERAL, ALL FOUNDATIONS AND PADS SHALL BE COATED BEFORE EQUIPMENT IS SET.

3.11. MISCELLANEOUS METAL WORK

METAL FLASHINGS, PITCH POCKETS, ETC SHALL BE FABRICATED AND INSTALLED AS SHOWN ON THE DRAWINGS.

GRAVEL STOPS AND FASCIAS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH DETAILED DRAWINGS. CARE SHALL BE TAKEN TO ASSURE THAT PITCH POCKETS ARE IN PLACE AND GRAVEL STOPS INSTALLED IN SUCH A MANNER TO ASSURE AGAINST BITUMEN DRIPPAGE EITHER INSIDE BUILDING OR DOWN EXTERIOR WALL.

3.12. SURFACE PROTECTION

SLAG SHALL BE APPLIED AT THE MINIMUM RATE OF 300 LB PER 100 SQ FT. GRAVEL, CRUSHED STONE OR WHITE CHIPS SHALL BE INSTALLED AT MINIMUM RATE OF 400 LB PER 100 SQ. FEET.

THE SURFACE OF THE ROOFING SHALL BE THOROUGHLY DRY AND FREE OF FROST, SNOW OR ICE WHEN APPLICATION OF SURFACE GRAVEL IS MADE.

A POURING OF HOT BITUMEN IN THE QUANTITY OF 80 LB PER 100 SQ FT SHALL PROVIDE THE COATING INTO WHICH THE AGGREGATE SHALL BE UNIFORMLY SPREAD WHILE IT IS STILL HOT. BITUMEN USED SHALL ALWAYS BE SAME AS USED TO APPLY THE FINISHING FELTS.

IT IS IMPORTANT THAT THE SURFACE PROTECTION, STONE OR GRAVEL, BE INSTALLED AS SOON AS POSSIBLE AFTER FELTS ARE IN PLACE. NO MORE ROOFING SHALL BE APPLIED DURING ANY WORK PERIOD THAN CAN BE CLOSED IN WITH PROTECTION DURING THAT WORK PERIOD.

WHEN JOB CONDITIONS PREVENT COMPLETION OF SURFACE PROTECTION, THE SURFACE SHALL BE GLAZED IN WITH A LIGHT COATING OF HOT BITUMEN TO PROVIDE WEATHER PROTECTION UNTIL THE SLAG OR GRAVEL IS APPLIED.

4. ASPHALT PLANK

4.1. MATERIALS

ASPHALT PLANK FOR WALKWAYS SHALL CONFORM TO THE REQUIREMENTS FOR MINERAL-SURFACED ASPHALT PLANK, ASTM: D517. SIZE SHALL BE 1'' THICK, 12'' WIDE, AND 24'' OR 36'' LONG. ASPHALT PLANK SIMILAR TO ABOVE SUCH AS MANUFACTURED BY JOHNS-MANVILLE IS ACCEPTABLE.

MINERAL SURFACED ASPHALT SATURATED BOARD 1'' X 36'' X 36'' ''CAREYTRED'' MANUFACTURED BY PHILIP CAREY CORP IS ALSO AN ACCEPTABLE SUBSTITUTE.

APPLICATION BITUMEN FOR ASPHALT PLANK SHALL BE THE FINAL MOPPING OF ROOFING BITUMEN USED IN THE ROOFING WORK.

4.2. WORKMANSHIP

ASPHALT PLANK SHALL BE INSTALLED WHERE CALLED FOR ON THE DRAWINGS, INTO THE FINAL MOPPING OF HOT BITUMEN APPLIED TO THE ROOFING FELTS. PLANK WALKWAYS SHALL BE NOMINALLY 24'' WIDE AND OF SINGLE THICKNESS, UNLESS OTHERWISE CALLED FOR ON THE DRAWINGS. PLANKS SHALL BE FIRMLY PRESSED INTO THE BITUMEN WHILE STILL HOT. IF MORE THAN ONE LAYER IS REQUIRED, THE SECOND LAYER SHALL BE APPLIED IN A MOPPING OF HOT ROOFING BITUMEN, USING CARE NOT TO FILL THE SPACE BETWEEN ADJACENT PLANKS.

PLANKS SHALL BE LAID WITH 1'' JOINTS TRANSVERSELY AND OR LONGITUDINALLY, EXCEPT AS NOTED OTHERWISE. JOINTS SHALL BE IN LINE. PLANK SHALL BE INSTALLED IN SUCH A MANNER AS NOT TO CREATE A DAM WHICH WOULD PREVENT WATER FROM GETTING TO ROOF DRAINS. WHEN SLAG OR GRAVEL SURFACING IS APPLIED, IT SHALL BE SPREAD OVER PLANKS AND BRUSHED OVER JOINTS FILLING THEM. EXCESS GRAVEL PROTRUDING ABOVE FIRST LAYER OF PLANK SHALL BE SWEPT AWAY.

5. CALKING

5.1.

CALKING COMPOUND DESIGNATED ON DRAWINGS AS TYPE 2 SHALL BE A POLYSULPHIDE (''THIOKOL'') BASE CALKING COMPOUND. THE POLYSULPHIDE CALK SHALL BE SIMILAR AND EQUAL TO TREMCO MFG. CO'S. ''LASTO-MERIC'', CLEVELAND, OHIO; D.E. LONG CORPORATION'S ''SYNTHETIC RUBBER CALKING COMPOUND'', NEW YORK; L. SONNEBORN SONS ''SONOLASTIC SEALING COMPOUND'', NEW YORK CITY; OR PECORA, INC., ''SYNTHACALK'', PHILADELPHIA, PENNSYLVANIA. PRIMER FOR CALKING SHALL BE FURNSIHED BY THE MANUFACTURER OF THE CALKING MATERIAL.

CAUTION: INASMUCH AS SOME BRANDS OF POLYSULPHIDE CALKING COMPOUNDS TEND TO STAIN SOME TYPE OF MASONRY, CARE SHALL BE TAKEN IN SELECTION OF MATERIAL, USE OF PRIMER, AND CONFORMATION TO MANUFACTURER'S DIRECTIONS IN CALKING.

COLOR OF ALL CALKING SHALL BE GRAY.

5.2. EXPANSION JOINT FILLER AND BACKUP MATERIAL

FOR CALKED JOINTS SHALL BE BUTYL RUBBER ROD OR POLYSTYRENE SPONGE ROD SUCH AS ''ETHAFOAM'' OF SIZE SHOWN ON DETAILS.

5.3. BOND BREAKERS, WHERE REQUIRED, SHALL BE

POLYETHYLENE TAPE OR OTHER MATERIAL AS RECOMMENDED BY MANUFACTURER OF SEALANT.

5.4. WORKMANSHIP

ALL SURFACES IN CONTACT WITH CALKING COMPOUND MUST BE THOROUGHLY DRY PRIOR TO AND DURING THE CALKING PROCESS. IF SURFACES BECOME WET DURING THE WORK PERIOD, CALKING SHALL BE DISCONTINUED AND NOT RESUMED UNTIL THE SURFACES ARE DRY. SURFACES SHALL ALSO BE FREE

OF DIRT, GREASE, DETRIMENTAL MORTAR DEPOSITS, ETC. CALKING GROOVES AROUND OPENINGS IN EXTERIOR WALLS SHALL NOT EXCEED 1/2'' WIDE, AND PREFERABLY BE 3/8 INCH. DEPTH SHALL NOT EXCEED 1/2'' FOR ANY CALKING. DEEPER GROOVES SHALL BE FILLED WITH JOINT FILLER SO THAT THE DEPTH OF JOINT DOES NOT EXCEED 1/2''. EXPANSION JOINTS SHALL BE FILLED WITH JOINT FILLER TO WITHIN 1/2 INCH OF FACE OF THE UNIT AND THEN CALKED. BOND BREAKER TAPE SHALL BE INSTALLED BETWEEN BACKUP AND CALKING.

CALKING PROCEDURES SHALL BE STRICTLY IN ACCORDANCE WITH THE PRINTED DIRECTIONS FURNISHED BY THE MANUFACTURER OF THE PRODUCT USED. APPLICATION SHALL BE WITH A SUITABLE CALKING GUN.

CALKED JOINTS SHALL BE COMPLETELY FILLED AND SHALL BE FINISHED TO A SMOOTHLY CONVEX SURFACE, EXCEPT THAT THE EXPANSION JOINTS SHALL BE FINISHED TO A SMOOTHLY CONCAVE SURFACE.

DIVISION 8
METAL DOORS

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 8.

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1. STEEL DOORS & FRAMES GENERAL REQUIREMENTS ALL TYPES

1.1. SCOPE

THIS PORTION OF THE SPECIFICATION COVERS THE GENERAL REQUIREMENTS FOR ALL TYPES OF HINGED, DOORS AND FRAMES, AND INCLUDES ALL REINFORCEMENTS, PLASTER GUARDS, STOPS, GASKETING SILENCERS, TRIM, BASE AND JAMB ANCHORS, CEILING AND FLOOR STRUTS, SIDELIGHTS AND TRANSOMS, SPREADER BARS, GLAZING BEADS, LOUVERS, ASTRAGALS, DRIPS, AND ALL APPURTENANT ITEMS REQUIRED FOR THE COMPLETE AND CORRECT INSTALLATION OF THE DOOR FRAMES AND DOORS AS REQUIRED.

1.2. DESCRIPTION

TYPES, OPENINGS, THICKNESS, AND SIZE OF DOORS AND FRAMES AND GLAZING SHALL BE AS INDICATED ON THE DRAWINGS AND SCHEDULES.

1.3. SHOP DRAWINGS

SHOP DRAWING, INDICATING FULLY ALL DETAILS OF DESIGN AND FABRICATION, INCLUDING LOCATION OF AND REINFORCEMENT FOR HARDWARE, WILL BE REQUIRED FOR ALL TYPES DOORS AND FRAMES. SUCH DRAWINGS SHALL BE SUBMITTED TO, AND BE APPROVED BY, THE AUTHORITY INITIATING THE USE OF THIS SPECIFICATION BEFORE FABRICATION OF DOORS AND FRAMES IS STARTED.

1.4. SHOP COATINGS

ALL DOORS AND FRAMES SHALL BE FULLY FACTORY PRIMED WITH THE MANUFACTURER'S STANDARD BAKED-ON COATING, UNLESS OTHERWISE CALLED FOR IN THE PROJECT SPECIFICATIONS.

1.5. HARDWARE

FINISH HARDWARE SHALL BE AS SPECIFIED HEREIN.

1.6. GLASS AND GLAZING

DOORS SHALL BE PROVIDED WITH LOOSE GLAZING BEADS MOUNTED ON THE INSIDE OF THE DOORI.

1.7. PACKAGING

DOORS AND FRAMES SHALL BE WELL PACKED FOR SHIPMENT TO ASSURE DELIVERY IN AN UNDAMAGED CONDITION. USE OF DAMAGED DOORS OR FRAMES WILL NOT BE PERMITTED. PROVIDE IDENTIFICATION TAGS OR LABELS, INDICATING THE DOOR OPENING NUMBER, AS SHOWN ON THE DRAWINGS, FOR WHICH THE DOOR OR FRAME (OR BOTH) IS INTENDED.

1.8. WORKMANSHIP

FRAMES SHALL BE SET, BEFORE STARTING CONSTRUCTION OF WALLS, IN THE LOCATIONS INDICATED ON THE DRAWINGS. THEY SHALL BE FIRMLY ANCHORED TO THE FLOOR BY THE METHODS PROVIDED, AND BE FIRMLY BRACED IN A PLUMB AND TRUE PLANE, SQUARE AT CORNERS, AND FREE FROM TWIST. ADEQUATE BRACING SHALL BE PROVIDED BETWEEN JAMBS TO PREVENT BOWING OR BENDING DURING CONSTRUCTION OF WALL. FOR CHANNEL FRAMES.

SWINGING DOORS SHALL BE HUNG SO THAT PROPER CLEARANCE, AS PROVIDED BY THE MANUFACTURER, IS SECURED ALL AROUND THE OPENING. NO SHIMMING SHALL BE DONE, EXCEPT UPON APPROVAL BY DU PONT, AND WHEN SHIMMING IS REQUIRED AND PERMITTED, ONLY STEEL SHIMS SHALL BE USED.

1.9. DESCRIPTION

THIS SPECIFICATION COVERS FLUSH METAL DOORS AND PRESSED STEEL FRAMES WHICH ARE OFFERED BY VENDORS AS STOCK-MANUFACTURED UNITS.

WHEN THE COMPLETE UNIT IS REQUIRED, THE UNIT IS DESCRIBED BY THE DESIGNATION 'TYPE U' AND WHEN THE FRAME IS TO BE OMITTED, BY THE DESIGNATION 'TYPE W.'

1.10. MATERIAL AND FABRICATION

1.10.1. DOORS

DOORS SHALL CONSIST OF STEEL SHEETS (20-GAGE-0.0359INCH MINIMUM) ASSEMBLED TO CHANNEL OR TUBULAR STEEL STILE AND RAIL MEMBERS. THE INTERIOR OF THE DOOR SHALL BE INSULATED WITH AN INORGANIC NONCOMBUSTIBLE MATERIAL. FACE SHEETS SHALL BE ADEQUATELY STIFFENED WITH INTERNAL CHANNELS OR BY A SOLID, INFLEXIBLE, NONCOMBUSTIBLE CORE. DOORS HAVING LIGHTS OR LOUVERS LARGER THAN 20 INCHES BY 20 INCHES SHALL HAVE STILES OF TUBULAR SHAPE ONLY. JOINTS BETWEEN STILE AND RAIL MEMBERS, AND BETWEEN FACE SHEETS AND SUCH MEMBERS, SHALL BE INTERLOCKED AND REINFORCED WITH WELDS TO PROVIDE A STIFF, UNWARPING DOOR. STILES SHALL BE RIGIDLY AND POSITIVELY FASTENED TO FACE SHEETS SO THAT FLEXING DUE TO HINGE ACTION WILL NOT WEAKEN THE DOOR. ALL EXPOSED WELDS SHALL BE GROUND SMOOTH. A SUFFICIENT ALLOWANCE IN WIDTH AND HEIGHT SHALL BE PROVIDED FOR PROPER HANGING AND OPERATION WITHOUT BINDING. TOPS OF DOORS USED IN EXTERIOR OPENINGS SHALL BE FLUSH, SO AS TO ELIMINATE A POCKET WHICH CAN COLLECT MOISTURE.

1.10.2. FRAMES

FRAMES SHALL BE PRESSED FROM STEEL SHEETS HAVING A THICKNESS OF AT LEAST 16 GAGE (0.0598 INCH). WIDTH AND PROFILE OF JAMBS SHALL BE AS CALLED FOR ON THE DRAWINGS. FRAMES SHALL BE PROVIDED WITH AT LEAST THREE STRAP OR PLATE ANCHORS PER SIDE, PROPERLY SPACED FOR THE TYPE OF WALL CONSTRUCTION INVOLVED. ANCHORS FOR FRAMES IN MASONRY WALLS SHALL BE ADJUSTABLE. BOXES FOR MORTAR AND PLASTER EXCLUSION AT HARDWARE MORTISES SHALL BE PROVIDED.

1.10.2.1. DOOR CLEARANCE.

THE HEIGHT OF FRAMES FOR INSIDE AND OUTSIDE DOOR OPENINGS SHALL BE SUCH THAT THE SPACE BETWEEN THE BOTTOM OF THE DOOR AND THE FINISHED CONCRETE FLOOR IS 5/8 INCH, EXCEPT THEY SHALL BE UNDERCUT AS REQUIRED FOR CARPET. ALL FRAMES SHALL BE DESIGNED TO SET ON TOP OF THE FINISHED CONCRETE FLOOR.

1.10.3. HARDWARE REINFORCEMENT

DOORS SHALL BE REINFORCED NEAR THE TOP OF THE HINGE SIDE FOR SURFACE-MOUNTED CLOSERS, BUT DRILLING AND TAPPING SHALL BE DONE IN THE FIELD. DOORS SHALL BE REINFORCED FOR ONE AND ONE-HALF PAIRS. DOORS LESS THAN 2 FEET-8 INCHES WIDE REINFORCED FOR ONE PAIR OF HINGES ARE ACCEPTABLE. HINGE REINFORCEMENT SHALL BE AT LEAST 1/8-INCH THICK. DOORS WHICH DO NOT HAVE CHANNEL SHAPED MEMBERS FOR PERIMETER EDGES SHALL HAVE HINGE REINFORCEMENT WELDED TO BOTH FACES OF THE DOOR AS WELL AS TO THE EDGE. IF CYLINDRICAL LOCKS ARE USED, ALL DOORS EXCEPT THOSE WHICH ARE TO RECEIVE NIGHT LATCHES OR PANIC BOLTS SHALL BE SUITABLY REINFORCED TO RECEIVE THE PARTICULAR TYPE SELECTED BY DU PONT. THOSE DOORS WHICH ARE TO RECEIVE NIGHT LATCHES, PANIC BOLTS, TOP AND BOTTOM BOLTS, AND OTHER HARDWARE NOT SPECIFICALLY MENTIONED, SHALL BE SUITABLY REINFORCED TO RECEIVE THOSE ITEMS. HOLES FOR MOUNTING TOP AND BOTTOM BOLTS, PUSH AND PULL PLATES, AND KICK PLATES SHALL BE DRILLED AND TAPPED IN THE FIELD.

1.10.4. LOUVERS.

MINIMUM SIZE OF LOUVERS SHALL BE SUCH AS TO PROVIDE THE FREE AREA CALLED FOR ON THE DRAWINGS, BUT MANUFACTURER'S STANDARD LOUVER OF THE NEXT LARGER SIZE MAY BE USED. NO LOUVERS ARE PERMITTED IN LABELED DOORS. LOUVERS SHALL BE DESIGNED AND STIFFENED SO AS TO RESIST ORDINARY BLOWS AND WEAR.

1.10.5. ALUMINUM DOORS & FRAMES

ALUMINUM DOORS & FRAMES SHALL BE MANUFACTURED BY KAWNEER CO. OF THE MODEL AND FINISH CALLED FOR ON THE DRAWINGS.

THE DOORS & FRAMES SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

1.10.6. WOOD DOORS

WOOD DOORS SHALL BE AS SPECIFIED IN DIVISION 6, CARPENTRY.

1.11. BUILDERS HARDWARE

1.11.1. GENERAL

THIS SPECIFICATION IS INTENDED TO COVER ALL BUILDERS HARDWARE REQUIRED FOR A COMPLETE DOOR INSTALLATION IN THE BUILDING, IN

ACCORDANCE WITH THE DRAWINGS.

1.11.2. MATERIALS

MATERIALS FOR HARDWARE ITEMS SHALL CONFORM TO THE REQUIREMENTS OF THE APPLICABLE PORTIONS OF FEDERAL SPECIFICATION FF-H-106, FF-H-111 AND FF-H-121.

1.11.3. TEMPLATES

THE CONTRACTOR SHALL FURNISH FREE OF CHARGE, TO ALL INTERESTED PARTIES, THE NECESSARY SCHEDULES AND TEMPLATE DRAWINGS, TO PERMIT THE PREPARATION OF METAL DOORS AND FRAMES FOR HARDWARE.

THE CONTRACTOR SHALL FURNISH DU PONT A COPY OF HARDWARE SCHEDULE FOR APPROVAL.

1.11.4. CYLINDERS AND KEYS

ALL CYLINDERS SHALL BE 6-PIN TUMBLER, MASTER-KEYED TO THE PLANT SYSTEM AND SHALL BE OF THE SAME MAKE. FURNISH TWO CHANGE KEYS PER LOCK. EACH KEY SHALL BE STAMPED WITH THE IDENTIFYING DOOR NUMBER AND SERIAL NUMBER.

PROVIDE WALL TYPE KEY CABINET FOR CONTROL AND RECORD OF ALL KEYS.

1.11.5. DESCRIPTION

PROVIDE WITH EACH ITEM OF HARDWARE, ALL WOOD SCREWS, MACHINE SCREWS, BOLTS AND ACCESSORY PARTS AS REQUIRED FOR ATTACHING HARDWARE TO DOORS, FRAMES, OR ADJACENT SURFACES.

1.11.6. INSTALLATION

LOCATION OF HINGES, CLOSERS, LATCHES, ETC. SHALL BE IN ACCORDANCE WITH STANDARD PRACTICES. HARDWARE SHALL BE IN PERFECT WORKING CONDITION WHEN ACCEPTED BY DU PONT.

1.11.7.

HARDWARE MATERIALS SHALL BE AS LISTED HEREIN. THERE WILL BE NO SUBSTITUTES, EXCEPT AS DIRECTED BY DU PONT, TO MATCH EXISTING SYSTEM.

1.12.

DOORS SHALL BE EQUIPPED WITH BUILDERS HARDWARE AS CALLED FOR IN THE SPECIFIC HARDWARE LIST NOTED AS APPLICABLE TO THAT DOOR.

DOOR NO.	LIST NO.
1	1
2	2
3,4,14,14.5	3
5	1
6,6.5	4
7,8,9,10	2
11,12,13	4
15	5
16	1
17,18,18.5	2
19	1
20,21,22,23,24,25	2
26,27,28	6
29,46	12
31,32,33,35,36	2
34	4
37,38	4
39	8
40	9
41,42	7
43 (KEY SIDE CORRIDOR #47)	10

44,45 11

NOTE: COLOR OF ALUMINUM DOORS SHALL BE PERMANODIC #26, MEDIUM BRONZE.

LIST 1. 1-1/2 PR HINGES STANLEY F-179, 4-1/2 X 4-1/2 USP
1 LOCK SCHLAGE D51PD X PLY US10
1 STOP, GLYNN JOHNSON - GJ-WB55MXT, US28
FOR DOOR 19 - GJ-WB55MX

LIST 2. 1-1/2 PR HINGES STANLEY F-179, 4-1/2 X 4-1/2 USP
1 LOCK SCHLAGE D51PD X PLY US10
1 STOP GLYNN JOHNSON GJ-WB55MXT US10
FOR DOOR 2 - GJ-FB-13X

LIST 3. 1-1/2 PR HINGES STANLEY FBB 179 - 4-1/2 X 4-1/2 USP
1 PUSH PLATE CORBIN 221C-1/2, 15" X 3-1/2" US10
1 PULL WITH PLATE CORBIN 4458 14" X 3-1/2" US10
1 CLOSER LCN SMOOTHEE 4013, US10
1 STOP GLYNN JOHNSON GJ-FB-14X JS10

LIST 4. 1-1/2 PR HINGES STANLEY FBB 179 4-1/2 X 4-1/2 USP
1 LOCK SCHALGE D51PD X PLY US10
1 CLOSER LCN SMOOTHEE 4013 H90, US10
1 STOP GLYNN JOHNSON GJ-FB-13X US10
DOOR 11, 13, 34 - GJ-WB55MXT US10

LIST 5. 1-1/2 PR HINGES STANLEY F 179 4-1/2 X 4-1/2 USP
1 LOCK SCHLAGE D40S X PLY US10
1 STOP GLYNN JOHNSON GJ-WB55MX JS10

LIST 6. 1-1/2 PR HINGES STANLEY FBB 167 4-1/2 X 4-1/2 USP
1 LOCK SCHALGE D51PD US10
1 CLOSER LCN SMOOTHEE 4115-DA, JS10

LIST 7. 1-1/2 PR HINGES STANLEY FBB 191 4-1/2 X 4-1/2,
FINISH TO MATCH DOOR
PUSH PULL MANUFACTURER'S STANDARD -
PUSH PULL WIDTH OF GLASS - FINISH TO MATCH DOOR
1 CLOSER LCN SMOOTHEE 5034 - FINISH TO MATCH DOOR

LIST 8. 1-1/2 PR HINGES STANLEY FBB 179 4-1/2 X 4-1/2 USP
1 LOCK SCHLAGE D51PD X PLY US28
1 CLOSER LCN SMOOTHEE 4013 H140 SPRAYED ALUM. LACQUER

LIST 9. 3 PR HINGES STANLEY FBB 191 4-1/2 X 4-1/2,
FINISH TO MATCH DOOR
PUSH-PULL MANUFACTURER'S STANDARD -

PUSH FULL WIDTH OF GLASS - FINISH TO MATCH DOOR
2 CLOSERS LCN SMOOTHEE 5034, FINISH TO MATCH DOOR
2 STOPS GLYNN JOHNSON GJ-W855MXT US10

LIST 10. 1-1/2 PR HINGES STANLEY FBB 191 4-1/2 X 4-1/2,
FINISH TO MATCH DOOR
1 LOCK SCHLAGE B251PD, FINISH TO MATCH DOOR
PUSH-PULL MANUFACTURER'S STANDARD -
PUSH FULL WIDTH OF DOOR - FINISH TO MATCH DOOR
1 CLOSER LCN SMOOTHEE 5034 H90, FINISH TO MATCH DOOR

LIST 11. 1-1/2 PR HINGES STANELY FBB 191 4-1/2 X 4-1/2,
FINISH TO MATCH DOOR
PUSH-PULL MANUFACTURER'S STANDARD -
PUSH FULL WIDTH OF DOOR - FINISH TO MATCH DOOR
1 LOCK ADAMS RITE 4512 & 4565 THUM TURN
SCHLAGE CYLINDER
1 CLOSER LCN 5034 FINISH TO MATCH DOOR

LIST 12. 1-1/2 PR HINGES STANLEY FBB 191 4-1/2 X 4-1/2,
FINISH TO MATCH DOOR
PUSH-PULL MANUFACTURER'S STANDARD -
PUSH FULL WIDTH OF DOOR - FINISH TO MATCH DOOR
1 LOCK ADAMS WRITE 4512 & 4565 THUM TURN
SCHLAGE CYLINDER
1 CLOSER LCN SMOOTHEE 5034, FINISH TO MATCH DOOR

2. GLAZING

2.1. SCOPE

THIS SPECIFICATION SETS FORTH THE QUALITY AND TYPE OF MATERIALS AND WORKMANSHIP REQUIRED FOR THE GLASS AND GLAZING OF EXTERIOR AND INTERIOR DOORS, EXTERIOR AND INTERIOR SASH, AND INCLUDES ALL WORK AS SHOWN ON THE DRAWING, DOOR SCHEDULES AND DETAILS.

2.2. MATERIALS

2.2.1.

TYPE OF GLASS SHALL BE AS SHOWN ON THE DRAWINGS IN ACCORDANCE WITH THE FOLLOWING DEFINITIONS:

TYPE	KIND OF GLASS
H	1/4-INCH OBSCURE GLASS, SPANDREL GLASS
J	1/4" CLEAR LAMINATED SAFETY GLASS.
N	3/8" BRONZE TINTED, LAMINATED, POLISHED SAFETY PLATE GLASS.

2.2.2.

THE BRAND OF GLASS SHALL BE SUBJECT TO DU PONT'S APPROVAL. FACTORY LABELS INDICATING THE NAME OF THE MANUFACTURER AND GRADE SHALL REMAIN IN PLACE UNTIL FINAL CLEANING. WHEN IT IS NOT PRACTICABLE FOR VENDOR TO LABEL EACH LIGHT, HE SHALL PROVIDE CERTIFICATION OF CONFORMING TO THESE SPECIFICATIONS.

2.2.2.1.

TYPE H. SPANDREL GLASS - BRONZE COLOR TO BLEND WITH BRONZE TINTED WINDOW BELOW. SUBMIT SAMPLE FOR APPROVAL.

2.2.2.2.

TYPE 'J' - SHALL BE CLEAR, SAFETY GLASS, CONSISTING OF TWO LIGHTS OF SINGLE STRENGTH "A" QUALITY SHEET GLASS CONFORMING TO THE

REQUIREMENTS OF FEDERAL SPECIFICATION DD-G-451, TYPE II, LAMINATED TOGETHER WITH A LAYER OF PLASTIC SO AS TO RESULT IN AN OVERALL THICKNESS OF AT LEAST 1/4'' WITH A TOTAL WEIGHT OF 3.32 LBS. PER SQUARE FOOT. THE PLASTIC SHALL BE ''BUTACITE'' POLYVINYL BUTYRAL RESIN, OR EQUAL HAVING A MINIMUM THICKNESS OF 0.015 INCH.

2.2.2.3.

TYPE 'N' - SHALL BE TINTED SAFETY GLASS, CONSISTING OF TWO LIGHTS OF BRONZE TINTED, POLISHED PLATE GLASS (ONE SHEET 1/4'' THICK, THE OTHER 1/8'' THICK) CONFORMING TO THE REQUIREMENTS OF FEDERAL SPECIFICATION DD-G-451 TYPE I, CLASS 2, STYLE B, LAMINATED TOGETHER WITH A LAYER OF PLASTIC SO AS TO RESULT IN AN OVERALL THICKNESS OF AT LEAST 3/8 INCH. ''SOLARBRONZE'' AS MANUFACTURED BY P.P.G. INDUSTRIES OR AN APPROVED SUBSTITUTE. THE PLASTIC SHALL BE ''BUTACITE'', HAVING A MINIMUM THICKNESS OF 0.015 INCH.

2.2.3. SETTING BLOCKS AND SPACERS

SETTING BLOCKS SHALL BE NEOPRENE OF 70 TO 90 DUROMETER. SHIM BLOCKS SHALL BE NEOPRENE OF 40 TO 50 DUROMETER. SETTING BLOCKS SHALL BE APPROXIMATELY 1/4'' X 3'' SIZE. LEAD OR WOOD SETTING BLOCKS ARE ACCEPTABLE SUBSTITUTES AND SHALL BE USED ONLY WHEN SPECIFICALLY RECOMMENDED BY THE GLASS MANUFACTURER. SHIM BLOCKS SHALL BE 2'' TO 3'' LONG OF A THICKNESS TO PROVIDE A MINIMUM CLEARANCE OF 1/8'' BETWEEN STOPS AND GLASS.

2.2.4.

COMPRESSION TYPE GASKETS (CONTINUOUS SHIMS) SHALL BE OF NEOPRENE OR VINYL EXTRUDED TO THE SHAPE REQUIRED FOR THE SPECIFIC MAKE OF SASH USED AND SHALL BE FURNISHED WITH PREFORMED CORNERS. THE MANUFACTURER OF THE GASKET SHALL PROVIDE ADHESIVE SO THAT ALL JOINTS IN THE GASKET MAY BE SEALED. THE GASKETS SHALL CONFORM TO NAAMM TENTATIVE SPECIFICATION FOR RUBBER LIKE GASKET MATERIAL OR TO TENTATIVE SPECIFICATIONS FOR PLASTIC GASKET MATERIAL.

2.2.5. SEALANTS

2.2.5.1.

ONE PART SEALANT, SOLVENT RELEASE TYPE SHALL BE ACRYLIC BASED. ''MONO-LASTO-MERIC'' AS MANUFACTURED BY TREMCO MANUFACTURING COMPANY, CLEVELAND, OHIO. OR AN APPROVED SUBSTITUTE.

2.2.5.2.

TWO PART SEALANT, CHEMICAL CURING TYPE SHALL BE A POLYSULPHIDE BASE MATERIAL, "SYNTHACALK" (NONSAGGING) AS MANUFACTURED BY PECORA, INC., PHILADELPHIA, PENNSYLVANIA, OR AN APPROVED SUBSTITUTE.

2.2.6.

PUTTY SHALL BE ELASTIC GLAZING COMPOUND AND CONFORM TO FEDERAL SPECIFICATION TT-P-781 TYPE I, AND SHALL BE USED FOR ALL METAL DOORS AND SASH.

2.3. WORKMANSHIP

2.3.1. APPLICATION SCHEDULE

2.3.1.1.

EXTERIOR TRANSOMS AT DOORS 44 AND 45 SHALL BE GLAZED USING TYPE 'N' GLASS.

2.3.1.2.

DOORS 29, 40, 41, 42, 43, AND 46 AND SIDE LIGHTS AT 41 & 42 SHALL BE GLAZED WITH TYPE 'J' GLASS.

2.3.1.3.

EXTERIOR SASH WHERE NOTED ON THE DRAWINGS AS OBSCURE GLASS SHALL BE GLAZED WITH TYPE "H" GLASS.

2.3.2.

TINTED GLASS - INSPECT EACH EDGE OF EACH PANE TO ASSURE IT IS A "TINTED CLEAN-CUT EDGE" AS DEFINED IN THE MANUFACTURER'S LITERATURE. LIGHTS NOT CONFORMING TO THE REQUIREMENTS SHALL NOT BE USED.

2.3.3.

IN ADDITION TO THE PROCEDURES SET FORTH BELOW, ALL GLAZING, CONDITION AND PREPARATION OF SASH AND GLASS SHALL CONFORM TO THE RECOMMENDATIONS AS SET FORTH IN "FLAT GLASS JOBBERS ASSOCIATION GLAZING MANUAL" AND TO THE GLASS MANUFACTURER'S TECHNICAL

BULLETIN FOR HANDLING AND INSTALLATION OF TINTED GLASS (FOR EXAMPLE PPG INDUSTRIES TECHNICAL SERVICE REPORT NO. 104B.!)

2.3.4.

ALL GLAZING SHALL BE DONE BY EXPERIENCED WORKMEN.

2.3.5.

THE GLAZING CONTRACTOR SHALL REMOVE ALL DIRT, LOOSE PAINT, AND OTHER FOREIGN MATERIAL, AND SURFACES SHALL BE DRY BEFORE GLAZING IS STARTED. NO GLAZING SHALL BE DONE WHEN AMBIENT TEMPERATURES ARE LOWER THAN 40 F. IN ADDITION, THIS CONTRACTOR SHALL INSPECT ALL SASH TO ASSURE THAT THEY ARE SQUARE AND IN PROPER CONDITION TO RECEIVE GLAZING. ANY DEFECTS WHICH WILL AFFECT THE QUALITY OF THE GLAZING SHALL BE IMMEDIATELY CALLED TO DU PONT'S ATTENTION. PANE SHALL BE PLACED ON SETTING BLOCKS POSITIONED AT THE QUARTER POINTS.

2.3.6.

EXTERIOR SASH, SIDE LIGHTS AND TRANSOMS SHALL BE GLAZED USING THE "DRY GLAZING" METHOD. DEPTH OF GLAZING RABBET SHALL BE 1/2 INCH NOMINAL. EDGE CLEARANCE 3/32" AND FACE CLEARANCE 1/8" MINIMUM. MINIMUM BITE FOR DRY GLAZING SHALL BE 1/4 INCH. THE GLASS SHALL BE CENTERED IN THE OPENINGS SO THAT REQUIRED CLEARANCES AT THE PERIMETER ARE MAINTAINED. EACH THE GLASS SHALL BE BEDDED IN ACRYLIC SEALANT, TAKING CARE NOT TO OBSTRUCT WEEPS, AND THEN SECURED IN PLACE WITH PREFORMED NEOPRENE OR VINYL GASKETS, ROLLED INTO PLACE AND SET TO SERVE AS CONTINUOUS LATERAL SHIMS.

2.3.7.

INTERIOR DOORS MAY BE GALZED AS SPECIFIED ABOVE OR AS FOLLOWS:

THE GLASS SHALL BE SET ON SETTING BLOCK LOCATED AT THE QUARTER POINTS CENTERED IN THE OPENING SO THAT REQUIRED EDGE CLEARANCES ARE MAINTAINED. FACE CLEARANCES SHALL BE MAINTAINED USING SHIM BLOCKS SET AT QUARTER POINTS. WHERE LONG LIGHTS OF GLASS OCCUR ADDITIONAL FACE SHIMS SHALL BE INSTALLED AT THE CENTER POINT OF THE GALSS. THEY SHALL THEN BE GLAZED IN USING SEALANT BOTH BACK AND FACE AROUND THE ENTIRE PERIMETER OF THE LIGHT.

2.3.8.

EXTERIOR DOORS #26, 27 AND 28 SHALL BE GLAZED WITH TYPE 'J' GLASS USING METAL SASH PUTTY. THE DOORS SHALL BE BACK-PUTTIED AND THE GLASS FIRMLY PRESSED INTO THE PUTTY, IN SUCH A MANNER THAT THE GLASS IS FULLY BEDDED. THE SPACE BETWEEN THE GLASS AND REMOVABLE

GLAZING STOPS SHALL BE FILLED WITH PUTTY. THE GLAZING STOPS PRESSED INTO PLACE AND SECURED. REMOVE EXCESS PUTTY AS THE WORK PROGRESSES, IN A SHARP CLEAN LINE FLUSH WITH THE GLAZING STOP OR BEAD AS THE CASE MAY BE. TOOL PUTTY ON EXTERIOR DOORS AT A SLIGHT ANGLE TO SHED WATER AND PROVIDE CLEAN SIGHT LINES.

2.3.9. CLEANING

AFTER ALL COLLATERAL WORK IS COMPLETE AND PAINT IS THOROUGHLY DRY (WHERE PAINTING OCCURS), REMOVE LABELS, PAINT AND OTHER COATINGS AND FOREIGN MATERIAL FROM THE GLASS. WASH AND POLISH BOTH SIDES AS REQUIRED TO LEAVE SURFACE THOROUGHLY CLEAN.

2.3.10. BREAKAGE

REMOVE AND REPLACE ALL GLASS BROKEN DURING CONSTRUCTION AND UNTIL FINAL ACCEPTANCE BY DU PONT.

DIVISION 9
FINISHES

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 9.

SPECIFICATION NO 6165
DIVISION 9, FINISHES

TABLE OF CONTENTS

1. QUARRY TILE FLOORS

1.1. SCOPE

THIS PORTION OF THE SPECIFICATION DESCRIBES THE MATERIALS WORKMANSHIP, AND INSPECTION FOR THE QUARRY TILE FLOORS.

1.2. MATERIALS

1.2.1. TILE

TILE SHALL BE 6'' X 6'' X 1/2'' ABRASIVE TILE AS MANUFACTURED BY MURRAY QUARRY TILE COMPANY, LEWISPORT, KENTUCKY. COLOR SHALL BE SELECTED BY DU PONT. TILE SHALL BE ABRASIVE.

1.2.1.1. QUALITY

TILE SHALL BE 'STANDARD GRADE', DENSE, VITREOUS TILE MANUFACTURED FROM SHALE OR CLAY OR A MIXTURE OF BOTH, CONFORMING TO FEDERAL SPECIFICATION SS-T-308. EXPOSED EDGES SHALL BE STRAIGHT, SMOOTH, AND TRUE. FACES SHALL BE UNMARRED BY PITTING, SCALING, BLISTERS, OR OTHER IMPERFECTIONS AND THE BACK SHALL BE GROOVED OR SCORED. THICKNESS SHALL BE AT LEAST 1/2 INCH. THE EXPOSED TILE SURFACES SHALL CONTAIN AN ALUNDUM OR EMORY AGGREGATE IN SUFFICIENT QUANTITY TO PREVENT SLIPPING WHEN SURFACES ARE WET.

1.2.2. PORTLAND CEMENT

PORTLAND CEMENT SHALL BE TYPE I, II, OR III CEMENT CONFORMING TO ASTM C150. HYDRATED LIME SHALL BE TYPE ''S'' LIME CONFORMING TO ASTM C206 OR C207. BEFORE USING, LIME SHALL BE MIXED WITH WATER TO FORM A HIGH VISCOSITY PUTTY AND ALLOWED TO STAND FOR AT LEAST 3 HOURS.

1.2.3. SAND

SAND FOR SETTING BED MORTAR SHALL BE PLASTERING SAND CONFORMING TO THE REQUIREMENTS FOR NATURAL SAND IN ASTM C35.

1.2.4. WATER

WATER SHALL BE CLEAN AND FREE FROM ORGANIC IMPURITIES. WATER CURRENTLY USED FOR DRINKING PURPOSES WILL BE SATISFACTORY.

1.2.5. MORTAR FOR BEDDING QUARRY TILE FLOORS

SHALL BE EITHER DRY SET MORTAR OR DRY SET MORTAR CONCENTRATE CONFORMING TO ASA 118.1, AS MANUFACTURED BY:

L&M TILE PRODUCTS CO.	- DALLAS, TEXAS
PERMALASTIC CORP.	- DETROIT, MICHIGAN
TECHNICAL ADHESIVE, INC.	- EVANSTON, ILLINOIS
THE UPCO COMPANY	- CLEVELAND, OHIO

THE PRODUCT AND METHOD OF USE SHALL BE UNDER LICENSE OF THE TILE COUNCIL OF AMERICA.

THE MORTAR MATERIAL SHALL BE SHIPPED TO THE JOB SITE IN THE ORIGINAL UNOPENED CONTAINERS, AND SHALL BEAR THE SEAL OF THE TILE COUNCIL.

WHERE THE ABOVE SETTING MORTAR IS USED THE GROUTING MATERIAL SHALL BE DRY TILE GROUT AS MANUFACTURED BY THE ABOVE LISTED MANUFACTURERS, AND APPROVED BY THE TILE COUNCIL OF AMERICA.

1.3. WORKMANSHIP

1.3.1. SURFACE PREPARATION, LEVELING, MORTAR MIXING AND

APPLICATION, SETTING OF TILE, GROUTING, ETC., SHALL BE IN STRICT ACCORDANCE WITH THE PUBLISHED SPECIFICATIONS OF THE TILE COUNCIL OF AMERICA.

1.3.2. PREPARATION FOR LAYING TILE

THE CONCRETE SUBFLOOR SHALL BE THOROUGHLY CLEANED AND SATURATED WTIH CLEAN WATER. IF AREA TO RECEIVE QUARRY TILE IS UNEVEN, IT MAY BE SMOOTHED USING A LEVELING COAT OF 1 PART SAND (BY VOLUME), 1/2 TO 1 PART HYDRATED LIME, AND 4 TO 7 PARTS SAND. VARIATION IN FLOOR SHALL NOT BE MORE THAN PLUS OR MINUS 1/16'' AS DETERMINED BY A STRAIGHTEDGE PLACED AGAINST THE SURFACE.

1.3.3. LAYING TILE

DRY SET MORTAR SHALL BE APPLIED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. MORTAR BED SHALL BE BETWEEN 1/8'' AND 3/16'' THICK. TILE SHALL BE LAID TO A TRUE PLANE OR SLOPED TO DRAINS AS REQUIRED. ALL JOINTS SHALL BE 1/4'' WIDE.

WHERE CUTTING IS REQUIRED, CUT EDGES OF TILE SHALL BE DRESSED TO A SMOOTH LINE USING AN ABRASIVE GRINDING WHEEL.

1.3.4. GROUTING

DRY TILE GROUTING IS A MIXTURE OF PORTLAND CEMENT WITH SAND AND ADDITIVES TO PROVIDE RETENTIVITY. THIS GROUT HAS THE SAME CHARACTERISTICS AS DRY-SET MORTAR.

SETTING MORTAR SHALL BE ALLOWED TO SET AT LEAST 2 HOURS BEFORE GROUTING STARTS. THE GROUTING MIXTURE SHALL BE FORCED INTO THE JOINTS WITH A TROWEL OR OTHER SUITABLE MEANS, AND THE JOINTS SHALL BE TOOLED FLUSH WITH THE TILE SURFACE.

1.3.5. CLEANING

THE INSTALLATION SHALL BE KEPT CLEAN AS THE WORK PROGRESSES. WHEN GROUTING, SURPLUS CEMENT SHALL BE REMOVED BY CAREFULLY WIPING WITH A CLEAN DAMP CLOTH, FOLLOWED BY RESTRIKING THE JOINT. UPON COMPLETION OF THE JOB AND AFTER THE GROUTING IS THOROUGHLY SET, THE ENTIRE AREA SHALL BE CLEANED AND WASHED. IF A MURIATIC ACID SOLUTION IS REQUIRED, IT SHALL NOT BE STRONGER THAN 5 PERCENT. FOLLOWING SCRUBBING, THE FLOOR MUST BE IMMEDIATELY AND THOROUGHLY RINSED OFF WITH CLEAN WATER. SPECIAL CARE SHALL BE TAKEN TO PREVENT BURNING OF JOINTS WITH THE SOLUTION. ONLY FIBER BRUSHES

SHALL BE USED FOR SCRUBBING.

THE FINISHED AREA MUST BE CLOSED TO ALL TRAFFIC UNTIL ALL POSSIBILITY OF DAMAGE THERETO IS PAST, AND THEN SHALL BE SUITABLY PROTECTED UNTIL FINAL ACCEPTANCE BY DU PONT.

2. CERAMIC TILE WALLS AND FLOORS

2.1. SCOPE

THIS PORTION OF THE SPECIFICATION SETS FORTH THE QUALITY AND TYPE OF MATERIALS AND WORKMANSHIP REQUIRED FOR THE INSTALLATION OF CERAMIC TILE WALLS, AS CALLED FOR ON THE DRAWINGS.

2.2. METHOD OF MEASUREMENT

METHOD OF MEASUREMENT FOR PAY QUANTITIES UNDER UNIT PRICES SHALL BE ON A SQUARE FOOT BASIS FOR TILE IN PLACE. THE SQUARE FEET OF AREA TO BE PAID FOR SHALL BE DETERMINED BY ACTUAL MEASUREMENT OF FINISHED SPACE COVERED.

2.3. MATERIALS

2.3.1. CERAMIC TILE WALLS

CERAMIC TILE WALLS SHALL BE STANDARD GLAZED INTERIOR TILE CONFORMING TO THE REQUIREMENTS FOR ''STANDARD GRADE'', ANSI A137.1. TILE SHALL HAVE A DUST-PRESSED WHITE BODY, MACHINE MADE WITH CUSHION EDGES. TILE SHALL PREFERABLY HAVE SPACERS ON EDGES TO FACILITATE UNIFORM JOINT THICKNESS. GLAZES SHALL BE COMPLETELY OPAQUE AND THE BODY SHALL NOT SHOW THROUGH THE GLAZE ON ANY EXPOSED SURFACE OR EDGES. THICKNESS OF TILE SHALL BE 3/8'' MINIMUM. IF WALL ABOVE IS CERAMIC TILE, TOP OF BASE SHALL NOT BE SURFACE BULLNOSE.

WALL TILE SHALL BE ''CRYSTALLINE'' GLAZED TILE AS MANUFACTURED BY AMERICAN OLEAN. SIZE SHALL BE 4'' X 4'' AND COLOR SHALL BE

BUCKWHEAT.

2.3.2. CERAMIC TILE FLOORS

CERAMIC TILE FLOORS SHALL BE UNGLAZED MOSAIC TILE MANUFACTURED BY EITHER THE DUST-PRESSED OR PLASTIC METHOD, SHALL CONFORM TO THE REQUIREMENTS FOR ''STANDARD GRADE'', ANSI A137.1, AND SHALL PASS THE ''STANDARD WEATHER TEST''. MOSAIC TILE SHALL BE MOUNTED ON PAPER WITH A REASONABLY UNIFORM JOINT.

2.3.3.

PORTLAND CEMENT, AGGREGATE, HYDRATED LIME AND WATER SHALL CONFORM TO APPLICABLE SECTIONS OF ANSI A108.1.

2.3.4. DRY SET MORTAR CONCENTRATE

DRY SET MORTAR CONCENTRATE SHALL CONFORM TO ANSI 118.1, AS MANUFACTURED BY:

L & M TILE PRODUCTS CO.	- DALLAS, TEXAS
PERMALASTIC CORP.	- DETROIT, MICHIGAN
TECHNICAL ADHESIVES INC.	- EVANSTON, ILLINOIS
THE UPCO COMPANY	- CLEVELAND, OHIO

THE PRODUCT AND METHOD OF USE SHALL BE UNDER LICENSE OF THE TILE COUNCIL OF AMERICA.

THE MORTAR MATERIAL SHALL BE SHIPPED TO THE JOB SITE IN THE ORIGINAL UNOPENED CONTAINERS, AND SHALL BEAR THE SEAL OF THE TILE COUNCIL.

WHERE THE ABOVE SETTING MORTAR IS USED THE GROUTING MATERIAL SHALL BE DRY TILE GROUT AS MANUFACTURED BY THE ABOVE LISTED MANUFACTURERS, AND APPROVED BY THE TILE COUNCIL OF AMERICA.

THIN-BED ''DRY SET MORTAR'' SHALL CARRY THE TILE COUNCIL OF AMERICA (TCA) SEAL OF APPROVAL AND BE AS FOLLOWS:

TYPE A
(PREFERRED MATERIAL FOR GENERAL USE). PRESANDED

PORTLAND CEMENT WITH TCA FORMULA 759 ADDITIVES. REQUIRES ADDITION OF WATER PER MANUFACTURER'S RECOMMENDATIONS.

TYPE B
PREMIX TYPE CONTAINING THE REQUIRED AMOUNT OF PORTLAND CEMENT AND TCA FORMULA 759 ADDITIVES. REQUIRES ADDITION OF 2 PARTS SAND PLUS NECESSARY WATER. MANUFACTURER'S INSTRUCTIONS.

2.4. WORKMANSHIP

2.4.1. SURFACE PREPARATION

SURFACE PREPARATION, LEVELING, MORTAR MIXING AND APPLICATION, SETTING OF TILE, GROUTING, ETC., SHALL BE IN STRICT ACCORDANCE WITH THE PUBLISHED SPECIFICATIONS OF THE TILE COUNCIL OF AMERICA.

2.4.2. PREPARATION FOR LAYING TILE

2.4.2.1. CONCRETE SUBFLOOR

THE CONCRETE SUBFLOOR SHALL BE THOROUGHLY CLEANED AND SATURATED WITH CLEAN WATER. BEFORE SPREADING THE BONDING MIXTURE ALL EXCESS WATER SHALL BE REMOVED.

2.4.2.2. LEVELING COAT FOR MASONRY WALLS

A 1/4'' TO 3/8'' THICK LEVELING COAT IS REQUIRED FOR WALLS AND COVE BASE TO CREATE A SUITABLY SMOOTH SURFACE FOR APPLICATION OF DRY SET MORTAR. LEVELING COAT SHALL BE PROPORTIONED 1 PART PORTLAND CEMENT, 1/2 TO 1 PART HYDRATED LIME AND 4 TO 7 PARTS SAND (BY VOLUME). THE SURFACE OF THE LEVELING COAT SHALL BE TROWELED SMOOTH, LIMITING VARIATIONS TO PLUS OR MINUS 1/16'' AS DETERMINED BY A STRAIGHTEDGE PLACED AGAINST THE SURFACE.

2.4.3. SETTING FLOOR TILE

FLOAT MORTAR OVER BASE SLAB TO A THICKNESS OF 3/32 INCH TO 1/4 INCH. SET TILE TO A TRUE PLANE. APPLICATION SHALL CONFORM TO MORTAR MANUFACTURER'S RECOMMENDATIONS. COVE BASE SHALL BE APPLIED FIRST, THEN CERAMIC TILE FLOOR.

2.4.4. SETTING WALL TILE

FLOAT MORTAR OVER BACKING TO A THICKNESS OF 3/32 INCH TO 1/4 INCH. SET AND BEAT TILE TO A TRUE PLANE. APPLICATIONS SHALL CONFORM TO MORTAR MANUFACTURER'S RECOMMENDATIONS.

2.4.5. GROUTING

USE A WHITE COMMERCIAL CEMENT GROUT, OR DRY-SET GROUT. WHEN A COMMERCIAL CEMENT GROUT IS USED, SOAKING OF WALL TILE AND DAMP CURING ARE NECESSARY. DRY-SET GROUT IS A MIXTURE OF PORTLAND CEMENT WITH SAND AND ADDITIVES TO PROVIDE RETENTIVITY. THIS GROUT HAS SAME CHARACTERISTICS AS DRY-SET MORTAR. SOAKING OF BASE TILE IS NOT NECESSARY, ALTHOUGH DAMPENING IS REQUIRED UNDER VERY DRY CONDITIONS.

SETTING MORTAR SHALL BE ALLOWED TO SET AT LEAST 24 HOURS BEFORE GROUTING STARTS. THE GROUTING MIXTURE SHALL BE SPREAD OVER THE SURFACE WITH A LARGE BRUSH AND THE JOINTS SHALL BE FILLED BY WIPING WITH A CLOTH OR SPONGE. AS WIPING PROCEEDS, IT MAY BE NECESSARY TO APPLY ADDITIONAL GROUT TO LOCAL AREAS WHERE JOINTS WERE NOT COMPLETELY FILLED DURING THE FIRST APPLICATION.

2.4.6. CLEANING AND PROTECTION

CERAMIC TILE - THE INSTALLATION SHALL BE KEPT CLEAN AS THE WORK PROGRESSES. WHEN GROUTING, SURPLUS CEMENT SHALL BE REMOVED BY CAREFULLY WIPING WITH A CLEAN, DAMP CLOTH, FOLLOWED BY RESTRIKING THE JOINT. UPON COMPLETION OF THE JOB AND AFTER GROUTING IS THOROUGHLY SET, THE ENTIRE AREA SHALL BE CLEANED AND WASHED. IF ADDITIONAL WASHING IS REQUIRED, USE A DETERGENT. ONLY FIBER BRUSHES SHALL BE USED FOR SCRUBBING. ACID SOLUTIONS WILL NOT BE PERMITTED.

2.4.7. PROTECTION OF FINISHED WORK

THE FINISHED FLOOR AREA MUST BE CLOSED TO ALL TRAFFIC UNTIL ALL POSSIBILITY OF DAMAGE THERETO IS PAST, AND THEN SHALL BE SUITABLY PROTECTED UNTIL FINAL ACCEPTANCE BY DU PONT.

3. ACOUSTICAL CEILINGS-MINERAL FIBER SYSTEMS

3.1. GENERAL

3.1.1. SCOPE

THIS PORTION OF THE SPECIFICATION SETS FORTH THE QUALITY AND TYPE OF MATERIALS AND WORKMANSHIP REQUIRED FOR THE INSTALLATION OF ACOUSTICAL CEILING UNITS AND RELATED T-BAR SUSPENSION SYSTEM AS SHOWN ON THE DRAWINGS.

3.1.2. METHOD OF MEASUREMENT

THE METHOD OF MEASUREMENT FOR PAY QUANTITIES UNDER UNIT PRICES SHALL BE ON A SQUARE FOOT BASIS, AND SHALL INCLUDE ALL NECESSARY BARS, RUNNERS, CLIPS, SUPPORTS AND OTHER ACCESSORIES REQUIRED FOR A COMPLETE, FINISHED INSTALLATION OF THE SYSTEM INVOLVED.

THE AREA FOR PAYMENT SHALL BE DETERMINED BY ACTUAL MEASUREMENT OF FINISHED WORK IN PLACE. ALL OPENINGS, REGARDLESS OF SIZE, FOR LIGHTS, DIFFUSERS, GRILLES AND OTHER OPENINGS SHALL BE DEDUCTED IN COMPUTING QUANTITY OF ACOUSTICAL TREATMENT.

3.2. MATERIALS

3.2.1. ACOUSITCAL TILE (SHEETS)

3.2.1.1. TILE

IN ALL AREAS EXCEPT AS NOTED HEREIN, TILE SHALL BE A MINERAL FIBER ACOUSTICAL BOARD WITH A FACTORY APPLIED, WASHABLE, WHITE VINYL

LATEX PAINT FINISH - ARMSTRONG ''MINABOARD'' FISSURED DESIGN, 5/8'' THICK AS MANUFACTURED BY ARMSTRONG CORK COMPANY, OR AN APPROVED SUBSTITUTE. THE BASIC MODULE SHALL BE 24'' X 48''. MODIFICATIONS OF THE BASIC MODULE SUCH AS 12'' X 12'', 12'' X 24'', 12'' X 48'', AS WELL AS CUT UNITS, SHALL BE FURNISHED WITH THE CEILING PATTERN IN ALL AREAS IN ACCORDANCE WITH THE APPROVED REFLECTED CEILING PLANS.

TILE FOR TOILET ROOMS SHALL BE A CERAMIC ACOUSTICAL TILES WITH A FACTORY-APPLIED, WASHABLE, WHITE ACRYLIC PAINT FINISH- ARMSTRONG ''CERAMAGUARD'' PLAIN DESIGN, 5/8'' THICK AS MANUFACTURED BY ARMSTRONG CORK COMPANY, OR AN APPROVED SUBSTITUTE. MODIFICATIONS OF THE BASIC MODULE SUCH AS 12'' BY 12'', 12'' X 24'', 12'' X 48'', AS WELL AS CUT UNITS, SHALL BE FURNISHED WITH THE CEILING PATTERN IN ALL AREAS IN ACCORDANCE WITH THE APPROVED REFLECTED CEILING PLANS.

TILE IN LOBBY AREAS SHALL BE MINERAL FIBER CEILINGS, WITH FACTORY APPLIED, WASHABLE, WHITE VINYL LATEX PAINT FINISH AND SELF-LEVELING TONGUE AND GROOVE JOINT AND KERFED FOR CONCEALED SUSPENSION SYSTEMS. ''TRAVERTINE'', FISSURED DESIGN, AS MANUFACTURED BY ARMSTRONG CORK COMPANY. TILE SHALL BE SQUARE EDGE 12'' X 12'' X 3/4''.

3.2.1.2. NOISE

THE NOISE REDUCTION COEFFICIENT SHALL BE IN THE RANGE OF 0.60 - 0.70.

3.2.1.3.

THE TILE SHALL BE RATED CLASS 25 WHEN TESTED IN ACCORDANCE WITH FEDERAL SPECIFICATION SS-A-118A.

3.2.2. SUSPENSION SYSTEM - ACOUSTICAL TILE

3.2.2.1. STEEL SYSTEM - ALL AREAS EXCEPT AS NOTED

THE ACOUSTICAL PANELS SHALL BE SUPPORTED ON A STEEL INVERTED INTERLOCKING T-BAR SYSTEM. STEEL SYSTEM SHALL BE A GALVANIZED OR

ELECTRO-GALVANIZED STEEL SYSTEM AS MANUFACTURED BY EASTERN PRODUCTS CORPORATION, BALTIMORE MARYLAND; NATIONAL ROLLING MILLS, MALVERN, PA.; OR AN APPROVED SUBSTITUTE, THE EXPOSED FLANGES OF THE 'T' , WALL ANGLES OR CHANNELS AND OTHER EXPOSED PARTS OF THE SYSTEM SHALL BE FINISHED WITH BAKED ENAMEL, FLAT WHITE, MATCHING THE CEILING TILE. TRIM MOLDINGS FOR PERIMETER OF WALLS AS WELL AS ALL OTHER CUT EDGES SHALL BE STEEL CHANNELS OR ANGLES, WITH EXPOSED FACES FINISHED FLAT WHITE AS NOTED ABOVE.

3.2.2.2. ALUMINUM SYSTEM - TOILET ROOMS

THE ACOUSTICAL PANELS SHALL BE SUPPORTED ON AN ALUMINUM INVERTED INTERLOCKING T-BAR SSYTEM. ALUMINUM SYSTEMS SHALL BE AS MANUFACTURED BY L/K-PRODUCTS COMPANY, LOS ANGELES, CALIFORNIA ''ALUMI-COUSTIC'', CUPPLES PRODUCTS CORPORATION, ST. LOUIS, MO., OR AN APPROVED SUBSTITUTE. THE EXPOSED FLANGES OF THE ''T'', WALL ANGLES OR CHANNELS AND OTHER EXPOSED PARTS OF THE SYSTEM SHALL HAVE A FLAT WHITE FINISH.

TRIM MOLDINGS FOR PERIMETER OF WALLS AS WELL AS ALL OTHER CUT EDGES IN ROOMS USING THE ALUMINUM SYSTEM SHALL BE ALUMINUM WITH A FLAT WHITE FINISH. ALUMINUM TEES SHALL BE USED WITH CERAMAGUARD ONLY.

3.2.2.3. CONCEALED SPLINE SYSTEM - LOBBY AREAS

CONCEALED SPLINE SYSTEM SHALL BE GALVANIZED OR ELECTRO-GALVANIZED STEEL SYSTEM AS MANUFACTURED BY EASTERN PRODUCTS CORP., BALTIMORE, MARYLAND; NATIONAL ROLLING MILLS, MALVERN, PA; OR AN APPROVED SUBSTITUTE.

3.2.2.4. T-BARS

MAIN T-BARS SHALL BE 1-1/2'' MINIMUM DEPTH AND SECONDARY 'T' SHALL BE 3/4'' MINIMUM DEPTH, WITH EXPOSED FLANGES OF BOTH T-BARS HAVING MATCHING WIDTHS.

PROVIDE A POSITIVE MEANS OF LOCKING T-BARS TOGETHER AND TO WALL CHANNELS, ETC., USING CLIPS, WELDING, OR CLIPS WITH SCREWS. PROVIDE POSITIVE MEANS OF HOLDING ACOUSTIC PANEL IN LEVEL POSITIONS WHERE REQUIRED USING HOLD-DOWN CLIPS.

3.2.2.5. RUNNER CHANNELS

RUNNER CHANNELS SHALL BE EITHER COLD ROLLED OR HOT ROLLED CHANNELS AND SHALL BE 1-1/2'' FOR HANGER SPACING BETWEEN TWO AND FOUR FEET AND 2'' FOR HANGER SPACING OVER FOUR FEET. MAXIMUM HANGER SPACING SHALL BE SIX FEET.

3.2.2.6. HANGERS

STEEL WIRE FOR SUPPORTING CEILING SYSTEM SHALL HAVE A NET CROSS-SECTIONAL AREA OF 0.008 SQ. IN. (12 GAGE - 0.135'') WITH SPACING NOT EXCEEDING 4'-0'' CENTERS.

ALUMINUM HANGERS SHALL HAVE AT LEAST TWICE THE CROSS-SECTIONAL AREA OF THAT REQUIRED FOR STEEL, WHEN HANGER SPACINGS ARE INCREASED, NET CROSS-SECTIONAL AREA OF HANGERS SHALL BE INCREASED 50% FOR SPACING TO 6'-0'' CENTERS.

HANGERS SHALL BE FASTENED TO P1000 GALVANIZED ''UNISTRUT''. UNISTRUT SHALL BE FASTENED TO THE PRECAST ROOF SLABS AT THE BOTTOM OF THE ''T'' BY USE OF 3/8'' MACHINE BOLTS AS NOTED ON THE DRAWING.

3.3. WORKMANSHIP

3.3.1. TILE

TILE SHALL BE INSTALLED TO THE LINE AND PATTERN SHOWN ON THE APPROVED CEILING PLANS. WHEN COMPLETED, CEILING SHALL BE RIGID, FLAT, AND SMOOTH WITH ALL BARS PROPERLY ALIGNED. ACOUSTICAL UNITS HAVING A DIRECTIONAL PATTERN SHALL BE INSTALLED WITH THE PATTERN RUNNING IN THE SAME DIRECTION WITHIN A GIVEN AREA.

3.3.1.1. MAIN T-BARS

MAIN T-BARS SHALL BE PROVIDED PARALLEL TO ROWS OF LIGHTS WHERE POSSIBLE, AND AT BOTH LONG SIDES OF LIGHTS FOR SUPPORT. IF IT IS NECESSARY TO HAVE MAIN T-BARS PERPENDICULAR TO ROWS OF LIGHTS,

AUXILIARY MAIN T-BARS SHALL ALSO BE PROVIDED AT BOTH LONG SIDES OF LIGHTS FOR SUPPORT. PROVIDE POSITIVE MEANS OF LOCKING T-BARS TOGETHER BY SPECIAL CLIPS, WELDING, OR CLIPS WITH SCREWS. IN NO CASE SHALL ANY T-BARS BE LEFT LOOSE WITH ONLY CEILING BOARD TO PREVENT SPREADING OR DISPLACEMENT. CEILING SYSTEM SHALL BE SECURELY ANCHORED TO WALLS FOR RIGIDITY.

3.3.1.2. MAIN T-BARS

MAIN T-BARS SHALL BE SUPPORTED BY WIRE HANGERS SPACED 4'-0'' ON CENTER MAXIMUM WITH ADDITIONAL HANGERS PROVIDED AT EACH CORNER OF LIGHT FIXTURES. WIRE SHALL BE LOOPED THROUGH CLIPS WITH THE ENDS WOUND AROUND WIRE IN AT LEAST SIX TIGHT LOOPS.

3.3.1.3. CEILING SYSTEM

THE CEILING SYSTEM SHALL BE ARRANGED TO SUPPORT LAY-IN TYPE TROFFER AND RECESSED-TYPE LIGHTS.

3.3.1.4. AIR SUPPLY

AIR SUPPLY GRILLES, DIFFUSERS AND AIR RETURN GRILLES, SHALL BE SUPPORTED FROM THE DUCTWORK AND FURNISHED WITH FLANGES FOUR SIDES FOR SUPPORTING ACOUSTICAL UNITS. WHERE SUCH UNITS ARE LAY-IN TYPE, SUPPLEMENTAL T-BARS AND/OR TRIM ANGLES SHALL BE FURNISHED FOR SUPPORT OF SUCH UNITS.

3.3.1.5. MOLDINGS

SUITABLE MOLDINGS SHALL BE PROVIDED AT ROOM PERIMETERS AND ALL OTHER LOCATIONS WHERE RAW EDGES OF CUT TILE WOULD OTHERWISE BE VISIBLE. MOLDING SHALL BE NEATLY MITERED AT CORNERS BY CUTTING ONLY ONE PIECE ON THE VISIBLE SIDE, THE OTHER TO BE CONTINUOUS TO PREVENT MITERS FROM OPENING UP.

3.3.1.6. SOILAGE

CARE SHALL BE TAKEN TO PREVENT SOILAGE OF CEILING TILE. IF SOILAGE SHOULD OCCUR, UNITS SHALL BE CLEANED OF ALL FINGER MARKS AND OTHER SOILAGE USING METHODS ACCEPTABLE TO DU PONT AND WHICH WILL NOT CHANGE OR DAMAGE THE FINISH ON THE UNITS. STAINED,

DISCOLORED, OR OTHERWISE DAMAGED ACOUSTICAL UNITS ARE NOT ACCEPTABLE AND SHALL BE REPLACED AT NO EXPENSE TO DU PONT.

4. CARPETS

4.1. SCOPE

THIS PORTION OF THE SPECIFICATION DESCRIBES CARPETS TO BE INSTALLED IN ROOMS NOTED ON DRAWING.

4.2. MATERIALS

CONTRACTOR SHALL MAKE AN INSTALLATION ALLOWANCE OF $12 PER SQ. YD. FOR CARPET AND CARPET BASE.

4.3. WORKMANSHIP

CARPET SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. APPLICATION SHALL BE STRIPPABLE ADHESIVE. BASE SHALL BE INSTALLED AS NOTED ON THE DRAWINGS.

5. PAINTING

5.1. GENERAL

ALL PAINT METERIALS SHALL BE THE PRODUCT OF E. I. DU PONT DE NEMOURS AND COMPANY (INC.), FINISHES DIVISION, UNLESS OTHERWISE SPECIFICALLY CALLED FOR, AND SHALL BE DELIVERED TO THE SITE IN THE ORIGINAL UNOPENED CONTAINERS.

5.2. SURFACE PREPARATION

SURFACE PREPARATION SHALL BE IN STRICT ACCORDANCE WITH MANUFACTURER'S PRINTED DIRECTIONS. SURFACES SHALL BE THOROUGHLY CLEANED FREE OF DUST, DIRT, GREASE AND OIL, AND DRY BEFORE APPLYING PAINT. UNPRIMED CARBON STEEL SHALL HAVE ALL LOOSE MILL SCALE, LOOSE RUST AND CONTAMINATION REMOVED. TIGHT MILL SCALE SHALL BE MARKED BY THE CLEANING TOOL INDICATING THAT SCALE IS TIGHT.

SHOP PRIMED STEEL SHALL HAVE ALL DAMAGED SPOTS CLEANED AND THEN TOUCHED UP, USING PRIMER CALLED FOR IN THE PAINTING SCHEDULE. OVERALL PRIME FOR SHOP PRIME IN GOOD CONDITION IS NOT REQUIRED.

5.3. PAINT APPLICATION

5.3.1. PAINT APPLICATION SHALL BE BY BRUSH, ROLLER OR SPRAY.

5.3.2. DRY FILM THICKNESS PER COAT SHALL BE BETWEEN 1.5 AND

2 MIL. TOTAL DRY FILM THICKNESS SHALL BE 5 TO 6 MIL. REGARDLESS OF NUMBER OF COATS SPECIFIED IN PAINT SCHEDULE, THE TOTAL DRY FILM THICKNESS IS THE SPECIFICATION. WHEN FILM THICKNESS IS NOT SPECIFIED, 100 PERCENT HIDING WILL BE REQUIRED REGARDLESS OF NUMBER OF COATS SPECIFIED.

5.3.3. PRIME COATS APPLIED IN THE FIELD

SHALL BE APPLIED THE SAME DAY THE SURFACE IS CLEANED, AND AS SOON AFTER CLEANING AS POSSIBLE. ADDITONAL COATS SHALL BE APPLIED AS SOON AS PRACTICAL. CLEANING AS NOTED ABOVE MAY BE REQUIRED BETWEEN COATS, AND IN ALL CASES, DUST AND DIRT SHALL BE REMOVED BEFORE EACH SUBSEQUENT COAT IS APPLIED.

5.3.4. MISCELLANEOUS STEEL, NOT GALVANIZED, WHICH

WILL BE INACCESSIBLE AFTER ERECTION OF OTHER WORK, SHALL BE SPOT CLEANED AND SPOT PRIMED WITH DULUX ZINC CHROMATE PRIMER BEFORE ERECTION OF OTHER WORK. NO FINISH PAINTING IS REQUIRED FOR INACCESSIBLE STEEL.

5.3.5. WHERE ALUMINUM IS IN CONTACT WITH DISSIMILAR METALS, THE

POINTS OF CONTACT SHALL BE COATED WITH BITUMINOUS PAINT, SUCH AS BITUMASTIC #50.

5.3.6. METAL DOORS, FRAMES, AND MISCELLANEOUS STEEL

ITEMS RECEIVED SHOP PRIMED SHALL BE SPOT PRIMED WHERE REQUIRED WITH DULUX ZINC CHROMATE PRIMER, FOLLOWED BY INTERMEDIATE AND FINISH COATS AS SPECIFIED IN THE PAINTING SCHEDULE.

5.4. THE FOLLOWING LISTED PAINT MATERIALS ARE SPECIFIED FOR

THIS PROJECT. THE ENGINEERING NUMBERS LISTED FOR IDENTIFICATION PURPOSES WITHIN THE TEXT OF THE SPECIFICATION, HOWEVER, THE FULL DESCRIPTION, INCLUDING ENGINEERING NUMBER, SHOULD BE USED WHEN

ORDERING MATERIALS.

ENGRG. NUMBER	CODE ORDER NO.	DESCRIPTION
1004	67-746	733 ''DULUX'' ZINC CHROMATE PRIMER
1007	67-744	765 ''DULUX'' GALVANIZED METAL PRIMER
1017	67-770	''DULUX'' MAINTENANCE PRIMER
2101	853C	''DULUX'' OVALITE ENAMEL UNDERCOAT
3200 SERIES		CUSTOM COLOR ALKYD SG ENAMEL
5100		''DULUX'' METAL PROTECTIVE PAINT
8050	704C	PENETRATING WOOD FINISH
ZAR-UNITED GILSONITE LABS.		ZAR - CLEAR SATIN

5.5. PAINTING SCHEDULE

EXTERIOR PAINTING

STEEL DOORS

PRIME	- 1004
INTERMEDIATE COAT	- 1017
FINISH COAT	- 5100

GALVANIZED STEEL DOOR FRAMES

PRIME - 1007
INTERMEDIATE COAT - 5100
FINISH COAT - 5100

ALUMINUM - NO PAINT

INTERIOR PAINT

STEEL DOORS

PRIME - 1004
INTERMEDIATE COAT - 2101
FINISH COAT - 3200

STEEL FRAMES

PRIME - 1004
INTERMEDIATE COAT - 2101
FINISH COAT - 3200
ALUMINUM FRAME - NO PAINT

WOOD DOORS

1 COAT PENETRATING WOOD FINISH
FINISH COAT ZAR - CLEAR VARNISH SATIN

DIVISION 10
SPECIALTIES

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 10.

SPECIFICATION NO 6165
SPECIALTIES, DIV 10

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1. PARTITIONS

1.1. SCOPE

THIS PORTION OF THE SPECIFICATION COVERS THE GENERAL REQUIREMENTS FOR OFFICE AND TOILET PARTITIONS.

1.2. OFFICE PARTITIONS

PANELS AND TRIM SHALL BE VINYL COVERED GYPSUM BOARD, ''DURASAN'' MONOLITHIC PANEL AS MANUFACTURED BY NATIONAL GYPSUM COMPANY. SPECIFIC COLOR SHALL BE SELECTED BY DU PONT.

AFTER ATTACHING PANEL TO STUDS, VINYL FLAPS SHALL BE TEMPORARILY HELD BACK BY MASKING TAPE WHILE TREATING VERTICAL JOINTS WITH GOLD BOND QUIK-TREAT COMPOUND OR STA-SMOOTH COMPOUND. JOINT SURFACE SHALL THEN BE SPONGED OR SANDED SMOOTH AND A MILDEW RESISTANT WHEAT PASTE OR ADHESIVE SUCH AS METYLAN SPECIAL ADHESIVE MANUFACTURED BY STANDARD CHEMICAL PRODUCTS, INC. SHALL BE APPLIED. VINYL FLAPS SHALL BE OVERLAPPED AND PRESSED FIRMLY INTO POSITION WITH THE JOINT FINISHER'S BROAD KNIFE. USING A STRAIGHTEDGE AND A SHARP KNIFE, FINISHER SHALL CUT THROUGH BOTH LAYERS OF THE OVERLAPPING VINYL. EXCESS VINYL SHALL BE REMOVED FROM BOTH LAYERS AND VINYL FLAPS SHALL BE REPOSITIONED AND ''IRONED'' INTO A PERFECT BUTT JOINT WITH THE FINISHER'S BROAD KNIFE. MANUFACTURER'S INSTRUCTIONS FOR INSTALLING VINYL, JOINT COMPOUND AND ADHESIVE SHALL BE STRICTLY FOLLOWED.

STUDS SHALL BE 2-5/8'' HEAVY DUTY NESLO STUDS MANUFACTURED BY NESLO MANUFACTURING CORP., DOYLESTOWN, PENNSYLVANIA.

PARTITIONS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. STUDS SHALL BE 24'' O.C. PANELS SHALL BE FASTENED AT END USING SCREWS AND IN MIDDLE USING ADHESIVE. MOLDINGS AND TRIM SHALL BE AS NOTED ON DRAWINGS AND DETAILS.

1.3. METAL TOILET PARTITIONS

METAL TOILET PARTITIONS SHALL BE ''ACADEMY'' PARTITIONS AS MANUFACTURED BY THE SANYMETAL PRODUCTS CO., CLEVELAND, OHIO.

COLOR SHALL BE #33 GREEN.

PARTITIONS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

CONTRACTOR SHALL FURNISH AND INSTALL CHROME PLATED TISSUE HOLDER AND CHROME PLATED COMBINATION ROBE HOOK AND BUMPER.

1.4. ROOM DIVIDERS

WHERE NOTED ON THE DRAWINGS AND DETAILS, FRAMED PANELS SHALL BE 24'' X 96'' HIGH ADAMAS #6462 MANUFACTURED BY CUSTOMWOOD MANUFACTURING CO., ALBAQUERQUE, NEW MEXICO.

PANELS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

1.5. PANELED WALLS

PANELING, WHERE CALLED FOR ON THE DRAWINGS, AND ROOM FINISH SCHEDULE, SHALL BE GEORGIA PACIFIC PANELING, PREFINISHED, STANDARD GRADE, V-GROOVED, RIVERA QUALITY, WITH MATCHING VINYL COVERED METAL TRIM PIECES.

STUDS SHALL BE 2-5/8'' HEAVY DUTY NESLO STUDS MANUFACTURED BY NESLO MANUFACTURING CORP., DOYLESTOWN, PENNSYLVANIA.

PANELS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

DIVISION 14
PLUMBING

DIVISION 1, GENERAL REQUIREMENTS, IS APPLICABLE TO AND A PART OF DIVISION 14.

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1. GENERAL

1.1. SCOPE

THIS SPECIFICATION SETS FORTH THE QUALITY AND TYPE OF MATERIALS AND WORKMANSHIP REQUIRED FOR THE COMPLETE AND SATISFACTORY INSTALLATION OF ALL THE PLUMBING SYSTEMS, FIXTURE, AND ACCESSORY PLUMBING ITEMS AS SHOWN ON THE DRAWINGS AND AS SET FORTH HEREIN.

1.1.1. WORKMANSHIP

ALL WORK MUST BE PERFORMED IN A WORKMANLIKE MANNER CONFORMING WITH ACCEPTED GOOD PRACTICES.

1.1.2. INSTALLATION

WHERE SMALL PIPING IS NOT COMPLETELY SHOWN OR DIMENSIONED ON THE DRAWINGS, IT SHALL BE FABRICATED AND ERECTED IN SUCH A MANNER THAT IT WILL SERVE ITS SPECIFIC FUNCTION.

1.1.3. LAWS - ORDINANCES

ALL PLUMBING WORK SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH ALL MINUCIPAL, LOCAL, STATE AND FEDERAL LAWS, ORDINANCES AND REGULATIONS GOVERNING WORK OF THIS CHARACTER.

ALL MATERIALS AND WORKMANSHIP REQUIRED BY SUCH LAWS, ORDINANCES OR REGULATIONS, INCLUDING REGULATIONS OF THE BUREAU OF HEALTH OR OTHER LOCAL GOVERNMENTAL AGENCY HAVING JURISDICTION, SHALL BE PROVIDED WHETHER OR NOT SPECIFICALLY NOTED HEREIN OR SHOWN ON THE DRAWINGS.

IN LOCATIONS WHERE NO LOCAL CODE EXISTS, WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE NATIONAL PLUMBING CODE ANSI A40.8.

1.2. PERMITS

THIS CONTRACTOR SHALL OBTAIN FROM THE PROPER AUTHORITIES HAVING JURISDICTION, ALL PERMITS NECESSARY FOR THE PROPER AND LAWFUL INSTALLATION OF ALL PLUMBING WORK, AND SHALL PAY ALL FEES FOR SAME.

1.3. PROTECTION OF MATERIALS

ALL MATERIALS SHALL BE PROTECTED FROM DAMAGE. OPEN ENDS OF PIPING SHALL BE KEPT PLUGGED OR CAPPED, AND PIPING IN GENERAL SHALL BE PROTECTED FROM MECHANICAL INJURY.

BEFORE FINAL ACCEPTANCE, DAMAGED AND IMPERFECT MATERIALS SHALL BE REPLACED.

DURING CONSTRUCTION, ALL FIXTURES, EQUIPMENT, AND MATERIALS SHALL BE PROPERLY STORED AND PROTECTED FROM DAMAGE.

1.4. CUTTING AND PATCHING

CUTTING OF WALLS, FLOORS, ETC., SHALL BE AVOIDED WHEREVER POSSIBLE, AND THE CONTRACTOR SHALL ARRANGE TO HAVE NECESSARY OPENINGS, ETC., PROVIDED FOR THE PROPER INSTALLATION OF HIS WORK, AND SHALL SET SLEEVES AS SPECIFIED.

WHERE CUTTING IS UNAVOIDABLE, IT SHALL BE DONE IN A NEAT AND WORKMANLIKE MANNER, AND ALL OPENINGS CUT SHALL BE NEATLY PATCHED TO MATCH SIMILAR ADJACENT CONSTRUCTION.

1.5. TESTS

PIPING SHALL BE TESTED IN THE PRESENCE OF THE DU PONT REPRESENTATIVE AND THE PROPER LOCAL, STATE OR FEDERAL

ADMINISTRATIVE AUTHORITIES HAVING JURISDICTION. TESTS ARE TO BE MADE IN COMPLIANCE WITH ALL APPLICABLE CODES AND ORDINANCES, AND TO THE SATISFACTION AND APPROVAL OF THE ADMINISTRATIVE AUTHORITIES HAVING JURISDICTION.

1.5.1. TEST PROCEDURE

PRIOR TO TESTING, ALL VALVED OUTLETS SHALL BE CLOSED AND OPENINGS IN THE PIPING SYSTEM SHALL BE TIGHTLY SEALED WITH TEST PLUGS, SCREWED PLUGS, CAPS, OR OTHER SUITABLE FITTINGS.

DRAINAGE PIPING SHALL BE TESTED BEFORE FIXTURES ARE INSTALLED. WATER AND OXYGEN PIPING SHALL BE TESTED BEFORE CONNECTION TO MAIN SUPPLY. ALL OTHER SERVICES SHALL BE DISCONNECTED FROM MAIN SUPPLY BEFORE TESTING.

DEFECTIVE FITTINGS SHALL BE REPLACED, AND JOINTS MADE TIGHT. THE USE OF CORROSIVE AGENTS OR THE CALKING OF TREADED JOINTS TO STOP LEAKS IS PROHIBITED.

1.5.2. DRAINAGE SYSTEMS - TEST

THE DRAINAGE SYSTEMS SHALL BE SUBJECTED TO AN AIR PRESSURE TEST OF FIVE POUNDS PER SQUARE INCH OR A HYDROSTATIC TEST EQUAL TO TEN-FOOT HEAD OF WATER. THE PRESSURES MUST BE MAINTAINED FOR A PERIOD OF 15 MINUTES WITHOUT THE INTRODUCTION OF ADDITIONAL AIR OR WATER. THE HYDROSTATIC TEST SHALL BE PERFORMED IN SUCH A MANNER THAT NO JOINT OR PIPE IN THE BUILDING (EXCEPT THE UPPERMOST TEN FEET OF THE SYSTEM) SHALL HAVE BEEN SUBMITTED TO A TEST OF LESS THAN TEN-FOOT HEAD OF WATER.

1.5.3. HOT AND COLD WATER - TEST

HOT AND COLD WATER SUPPLY SYSTEMS SHALL BE TESTED TO A HYDROSTATIC PRESSURE EQUAL TO 150 PER CENT OF THE MAXIMUM OPERATING PRESSURE, BUT NOT LESS THAN 100 LBS. PER SQ. IN. AT THE LOWEST ACCESSIBLE POINT OF THE SYSTEM.

1.5.4. OXYGEN PIPE - TEST

OXYGEN PIPING SHALL BE TESTED WITH OIL FREE DRY AIR OR NITROGEN TO A PRESSURE EQUAL TO 150 PERCENT OF THE MAXIMUM OPERATING PRESSURE, BUT NOT LESS THAN 150 PSIG. THE PRESSURE SHALL BE MAINTAINED UNTIL EACH JOINT HAS BEEN CHECKED FOR LEAKAGE USING SOAPY WATER OR A MEANS OF LEAK DETECTION ACCEPTABLE TO DU PONT. AFTER COMPLETING THE INITIAL TESTING, THE ENTIRE SYSTEM SHALL BE SUBJECTED TO A 24 HOUR STANDING PRESSURE TEST AT 1-1/2 TIMES THE OPERATING PRESSURE, BUT NOT LESS THAN 150 PSIG. THE TEST GAS SHALL BE OIL FREE DRY AIR OR NITROGEN. THE SUPPLY VALVE AND ALL OUTLET VALVES SHALL REMAIN CLOSED, THE SOURCE OF TEST GAS DISCONNECTED, AND THE SYSTEM SHALL REMAIN FREE FOR 24 HOURS.

OIL FREE DRY AIR SHALL CONFORM TO REQUIREMENTS OF GRADE D PAMPHLET G7.1 COMMODITY SPECIFICATIONS FOR AIR BY COMPRESSED GAS ASSOCIATION, INC., 500 FIFTH AVENUE, NEW YORK, NEW YORK 10036.

OIL FREE DRY NITROGEN SHALL CONFORM TO REQUIREMENTS OF GRADE D PAMPHLET G10.1 COMMODITY SPECIFICATIONS FOR NITROGEN BY COMPRESSED GAS ASSOCIATION, INC.

FINAL TESTING - PIPING AND ANALYZING PIPING SHALL BE PROTECTED FROM CONTAMINATION UNTIL READY TO PUT INTO SERVICE. AFTER ALL TESTING AND DRYING IS COMPLETED, THE SYSTEM SHALL BE CONNECTED TO THE OXYGEN SUPPLY SOURCE AND OXYGEN PERMITTED TO FLOW THROUGH EACH OUTLET UNTIL ALL TEST GASES HAVE BEEN PURGED FROM THE LINES. WHEN PURGE FLUSHING IS COMPLETE, THE FLOW FROM EACH OUTLET SHALL BE TESTED USING AN OXYGEN ANALYZER TO ASSURE THE DESIRED PURITY OF OXYGEN.

1.6. CLEANING AND ADJUSTING

AFTER TESTING, STERILIZING AND CLEANING, AUTOMATIC PARTS OF THE PLUMBING SYSTEM , CONTROLS AND THE LIKE SHALL BE CAREFULLY ADJUSTED FOR NORMAL OPERATION.

1.6.1. OXYGEN PIPING

BEFORE ERECTION, ALL OXYGEN PIPE AND FITTINGS SHALL BE THOROUGHLY CLEANED FREE OF OIL, GREASE, AND OTHER READILY OXIDIZABLE MATERIALS BY WASHING IN A HOT SOLUTION OF SODIUM CARBONATE OR TRISODIUM PHOSPHATE (PROPORTION ONE POUND TO 3 GALLONS OF WATER). SCRUBBING AND SCRAPING OF FITTINGS AND PIPE SHALL BE EMPLOYED, WHERE NECESSARY, TO ASSURE COMPLETE CLEANING. AFTER WASHING, THE MATERIAL SHALL BE RINSED THOROUGHLY IN CLEAN HOT WATER. THE PIPE

AND FITTINGS SHALL BE BLOWN DRY USING OIL FREE DRY AIR OR OIL FREE DRY NITROGEN SPECIFIED ABOVE (UNDER TESTING). AFTER CLEANING, PIPE AND FITTINGS SHALL BE PLUGGED AND/OR CAPPED TO PREVENT RECONTAMINATION BEFORE INSTALLATION.

TOOLS USED IN CUTTING OR SIZING OF PIPE SHALL BE KEPT FREE OF OIL AND GREASE. MATERIALS CONTAMINATED SHALL BE RE-WASHED, RE-RINSED, AND RE-DRIED. SHUTOFF VALVES SHALL BE PURCHASED CLEANED AND PREPARED FOR OXYGEN SERVICE. PIPE PREPARED FOR OXYGEN SERVICE AND SEALED AT FACTORY SHALL BE AN ACCEPTABLE ALTERNATE.

1.6.2. STERILIZATION OF WATER SYSTEMS

UPON COMPLETION OF WORK AND TESTS AND BEFORE FINAL ACCEPTANCE, ALL WATER PIPING SHALL BE FLUSHED AND STERILIZED AS REQUIRED BY THE LOCAL GOVERNING PLUMBING CODE OR AS RECOMMENDED IN PARAGRAPH 10.9 OF THE NATIONAL PLUMBING CODE ANSI A40.8.

1.6.3. CLEANING OF FIXTURES

REMOVE ALL PROTECTIVE COVERING, THOROUGHLY CLEAN ALL FIXTURES AND OTHER EQUIPMENT IN CONNECTION WITH THE WORK, POLISH ALL BRIGHT WORK AND LEAVE WORK IN NEAT, CLEAN CONDITION, READY FOR USE.

2. PLUMBING FIXTURES

2.1. GENERAL

2.1.1. FIXTURE DESIGNATIONS

LETTERS **A**, **B**, **C**, ETC., IN FIXTURE TITLES REFER TO SIMILAR NOTATIONS ON THE DRAWINGS AND ARE USED TO IDENTIFY THE INDIVIDUAL FIXTURES AS THEY OCCUR IN THEIR VARIOUS LOCATIONS.

2.1.2. FIXTURE QUALITY

ALL FIXTURES SHALL BE NEW. CATALOG NUMBERS SPECIFIED ARE ILLUSTRATIVE OF THE TYPE, DESIGN, AND QUALITY REQUIRED.

FIXTURES OF OTHER MAKES MUST BE SIMILAR IN TYPE AND DESIGN AND EQUAL IN QUALITY TO THOSE SPECIFIED AND WILL BE ACCEPTABLE UPON APPROVAL BY DU PONT.

2.1.3. TRIM QUALITY

BRASSWARE EXPOSED TO VIEW SHALL BE POLISHED AND CHROMIUM PLATED, EXCEPT WHERE OTHERWISE SPECIFICALLY NOTED.

BRASSWARE CONCEALED BELOW FINISHED SURFACES OF FIXTURES SHALL BE ROUGH FINISH, NOT PLATED.

2.2. WATER CLOSETS

2.2.1. WATER CLOSET **F**

WALL-HUNG, WHITE VITREOUS CHINA, BLOWOUT ACTION, ELONGATED BOWL, WITH 1 1/2 INCH TOP INLET SPUD. BOWL-AMERICAN STANDARD SANIT.

2510.248. CHROMIUM PLATED FLUSH VALVE-SLOAN VALVE CO., ROYAL 112YV. SEAT-SWEDISH CRUCIBLE STEEL CO. (OLSONITE) NO 95

2.2.2. WATER CLOSET BOWL CARRIERS.

CONTRACTOR TO PROVIDE CLOSET CARRIERS FOR WALL HUNG UNITS.

UNIT TO HAVE ADJUSTABLE FOOT SUPPORT, CARRIER FACE PLATE WITH UNIVERSAL ADJUSTMENTS CORROSION-RESISTANT ADJUSTABLE COUPLING FIXTURE BOLTS WITH BEARING NUTS. WASHERS, AND CHROMIUM-PLATED FACE NUTS. CLOSE FITTING TO INCLUDE INTEGRAL HUB FOR VENT OUTLET, AND ELONGATED WATERWAY FOR VERTICAL ADJUSTMENTS.

UNIT TO INCLUDE ALL NECESSARY GASKETS TO ENSURE WATERTIGHT INSTALLATION.

CARRIERS TO BE STYLED FOR SPECIFIC CLOSET DESIGN (BLOWOUT OR SIPHON JET)

VENDOR - ZURN INDUSTRIES - Z 12C5 SERIES

2.3. URINALS

2.3.1. URINAL ""JC""

WALL HUNG, WHITE VITREOUS CHINA, WASHOUT TYPE WITH INTEGRAL STRAINER, EXTENDED SHIELDS, INTEGRAL FLUSHING RIM, 3/4 INCH TOP INLET, 2 INCH THREADED OUTLET CONNECTION. BOWL-AMERICAN STANDARD SANITARY - 6500.011. FLUSH VALVE-SLOAN VALVE CO. ROYAL 186.

2.3.2. URINAL BOWL CARRIERS

UNITS TO BE RIGID CONCEALED TYPE WITH TWO CAST IRON WEB FEET AND TUBULAR STEEL UPRIGHTS, ADJUSTABLE, TUBULAR STEEL ALIGNMENT TRUSS AT FLOOR, A VERTICALLY ADJUSTABLE NUTS AND WASHERS, AND A VERTICAL ADJUSTABLE STEEL BEARING PLATE WITH TWO BEARING BOLTS.

VENDOR - ZURN INDUSTRIES SERIES Z 1221

2.4. LAVATORIES

2.4.1. LAVATORY ''B'' (EXP. DRAINAGE/CONCEALED SUPPL.)

WHITE VITREOUS CHINA 20 INCH X 18 INCH WITH INTEGRAL BACK NOT LESS THAN 4 INCHES HIGH, RECTANGULAR BASIN, SPLASH LIP, SOAP DEPRESSION, AND CONCEALED WALL HANGER. SUPPLY FROM WALL BOWL 0351.072, SUPPLY FIXTURE 2122.331, SUPPLIES 2303.154, TRAP 4419.016 WITH C.P. NIPPLE AND FLANGE 4446.019, AND PLUG 2412.013, AS MANUFACTURED BY AMERICAN STANDARD OR AN APPROVED SUBSTITUTE.

2.4.2. WOMENS VANITY LAVATORIES

APPROXIMATELY 19'' X 16'' ENAMELED CAST IRON LAVATORY TO FIT INTO ''FORMICA'' COUNTER TOP. AMERICAN STANDARD MODEL 3211.059, LESS POP-UP DRAIN. HOT AND COLD WATER FAUCET.

SUPPLY FIXTURES

SINGLE LEVER TYPE - AMERICAN STANDARD 2179.059
SINK DRAIN - AMERICAN STANDARD 2411.015
SINK SUPPLY - AMERICAN STANDARD 2303.154
TRAP - AMERICAN STANDARD 4428.017

2.5. SERVICE SINKS

2.5.1. SERVICE SINK ''BE''

CAST IRON WITH ACID RESISTING ENAMEL INSIDE, APPROXIMATELY 22 INCHES BY 18'' STANDARD). SINK UNIT-AMERICAN STANDARD SANITARY-7692.023. TRAP-AMERICAN STANDARD SANITARY- 7798.176. FAUCET-SPEAKMAN CO - S 4830 VB

2.5.2. WARD ROOM SINK - SEE PLUMBING NOTES W-437194.

2.5.3. ICE MAKER

ICE MAKER SHALL BE WHIRLPOOL CORPORATION MODEL ECK-CG 50#/24 HOUR CAPACITY, 35 LB. STORAGE WITH 3/4 X 3/4 CUBE GRID.

2.5.4. WHIRLPOOL BATH

BATH SHALL BE ILLE ELECTRIC CORP. MOBILE MODEL HM 200 AND SHALL HAVE A SEAMLESS STAINLESS STEEL TANK, FOUR BALL BEARING CASTERS, ELECTRIC TURBINE EJECTOR AND AREATOR, TURBINE EJECTOR RAISING AND LOWERING DEVICE, THERMOSTATICALLY CONTROLLED ELECTRIC HEATER, FOOT SUPPORT AND HEATER GUARD, DIAL THERMOMETER MOUNTED ON TANK WITH DIP TUBE, SEPARATE ELECTRIC DRAIN PUMP WITH VERTICAL STAND PIPE AND SWING ARM, AUXILIARY FLOOR DRAIN VALVE CONTROL PANEL AND FILLER HOSE WITH FAUCET ADAPTER.

2.5.4.1. ACCESSORIES

ARM REST ILLE HM A11
ADJUSTABLE SUSPENSION SHEET ILLE HM A14
MOBILE ADJUSTABLE HIGH CHAIR ILLE HM A16

2.6. SHOWERS

2.6.1. PREFABRICATED SHOWER COMPARTMENT

WALL SHALL BE CONSTRUCTED OF NOT LESS THAN 16 GAGE STEEL GALVANIZED AND BONDERIZED, FURNISHED WITH WHITE BAKED ENAMEL, 36" X 36" X 72" HIGH.

RECEPTOR SHALL BE FIBER REINFORCED ABS PLASTIC OR OTHER APPROVED BY DU PONT WITH INTEGRAL WASTE FILTERING CAST BRASS WITH CHROMIUM PLATED BRASS STRAINER AND 2" TAIL PIECE.

COMPARTMENT SHALL BE FURNISHED WITH 1" O.D. CHROMIUM PLATED BRASS TUBING CURTAIN ROD, NYLON FABRIC SHOWER CURTAIN WITH CHROMIUM PLATED CURTAIN RINGS AND GROUMETS.

2.7. OXYGEN STATION OUTLETS

2.7.1. OXYGEN STATION OUTLETS

SINGLE UNIT - DUAL OUTLET - RECESSED TYPE FOR CONCEALED WALL PIPING - OXYGEN STATION UNIT. ONE PIECE STAINLESS STEEL FRONT FACIA WITH NAME PLATE SPECIFYING OXYGEN SERVICE.

COUPLERS SHALL BE SO DESIGNED THAT BOTH PRIMARY AND SECONDARY CHECKS PROVIDE A POSITIVE GAS SEAL WHEN EQUIPMENT IS DISCONNECTED.

EACH COUPLER TO HAVE ITS OWN 6'' LONG - TYPE K - 3/8'' OD X 1/4'' ID COPPER TUBE CONNECTING PIECE TO 5C PISG OXYGEN LINE DROP IN WALL.

UNIT SHALL CONFORM TO NFPA #56F REQUIREMENTS.

VENDOR - NATIONAL CYLINDER GAS COMPANY
MODEL 700100-64 (028802)
OR APPROVED EQUAL.

2.8. HOSE BIBBS

HOSE BIBB SHALL BE A BRASS ANGLE SILL COCK WITH 3/4 SOLDER JOINT INLET INTEGRAL WALL FLANGE AND 3/4'' HOSE THREADED OUTLET, M1C222 (STYLE V-1015 E&H) AS MANUFACTURED BY MUELLER BRASS CO. OR AN APPROVED SUBSTITUTE.

2.8.1. SHOWERS ''CBD'' (FOR EXPOSED PIPING)

PREFABRICATED SHOWER ASSEMBLY - WITH BALANCED PRESSURE MIXING VALVE. CONCEALED INTEGRAL MOUNTING LUGS FOR SECURING SHOWER TO WALL. CONNECTING CHROME PLATED BRASS CHANNEL COVER CAST BRASS MANIFOLD WITH INTEGRAL ALLEN KEY OPERATED SUPPLY STOPS AND SHOWERHEAD. 1/2'' STRAIGHT UNION COUPLINGS ON 2-1/4'' CENTERS FOR OVERHEAD SUPPLIES. COMPLETE WITH SELF DRAINING CAST BRASS SOAP DISH . SPEAKMAN CO. # S 1790 AF.

2.9. WATER HAMMER ARRESTERS

WATER HAMMER ARRESTERS SHALL BE ONE OF THE FOLLOWING AS CALLED FOR ON THE DRAWINGS.

	J.R.SMITH	WADE	ZURN
TYPE A	5005	W-5	1700-100
TYPE B	5010	W-10	1700-200
TYPE C	5020	W-20	1700-300

2.10. WATER HAMMER ARRESTERS - HEAVY DUTY

ON LARGE SYSTEMS WHERE HIGHER WATER PRESSURES OR VELOCITIES ARE ENCOUNTERED, ONE OF THE FOLLOWING HEAVY DUTY - FACTORY-CHARGED ARRESTERS WILL BE USED AS CALLED FOR ON THE DRAWINES.

J. R. SMITH MFG. CO. MODEL 5060
ZURN COMPANY NO. Z-1712

3. PLUMBING MATERIALS

3.1. CAST IRON SOIL PIPE

3.1.1. SERVICE WEIGHT SOIL PIPE/GASKET JOINTS

GASKETED - SERVICE WEIGHT CAST IRON SOIL PIPE AND FITTINGS SHALL CONFORM IN PHYSICAL AND CHEMICAL PROPERTIES WITH ASTM A74. PIPE AND FITTINGS TO HAVE HUBS AND PLAIN END SPIGOTS. DIMENSIONS SHALL BE IN ACCORDANCE WITH COMMERCAIL STANDARD CS-188. PIPE LENGTHS EXCEEDING 5'-0" ARE ACCEPTABLE.

FOR UNDERGROUND USE THE PIPE AND FITTINGS SHALL BE FACTORY COATED WITH COAL TAR VARNISH.

FOR ABOVE GRADE USE THE PIPE + FITTINGS SHALL BE FURNISHED WITHOUT COAL-TAR VARNISH COATING. JOINTS SHALL BE MADE BY USING POSITIVE ELASTOMERIC COMPRESSION TYPE GASKETS CONFORMING TO ASTM C 564.

GASKETS SHALL BE MADE OF DUPONT NEOPRENE AS THE SOLE ELASTOMER. ONLY SERVICE WEIGHT (SV) GASKETS MARKED WITH MANUFACTURERS NAME OR TRADEMARK SHALL BE USED. GASKET LUBRICANT APPLICATION TO BE PER MANUFACTURERS RECOMMENDATIONS. PIPE + FITTINGS SHALL BE PLAINLY MARKED WITH MANUFACTURERS INITIAL OR TRADEMARK AND WITH THE LETTERS "SV" FOR SERVICE WEIGHT.

3.2. STEEL PIPE

3.2.1. GALVANIZED STEEL PIPE

GALVANIZED STEEL PIPE SHALL BE BUTT WELDED OPEN HEARTH PROCESS NOT REPHOSPHORIZED, CONFORM TO ASTM A53, AND BE GALVANIZED IN ACCORDANCE WITH ASTM A 120. ALL NIPPLES 8" AND SHORTER SHALL BE SCHEDULE 80.

3.3. FITTINGS FOR STEEL PIPE

3.3.1. CAST IRON FITTINGS

CAST IRON SCREWED RECESSED DRAINAGE PATTERN FITTINGS SHALL CONFORM TO USAS B16.12 AND SHALL BE GALVANIZED INSIDE AND OUT USING THE HOT-DIP PROCESS, ASTM A153.

3.3.2. GALVANIZED MALLEABLE IRON FITTINGS

GALVANIZED MALLEABLE IRON SCREWED PATTERN FITTINGS SHALL CONFORM TO USAS B16.3 WITH GALVANIZING CONFORMING TO ASTM A338.

3.3.3. FORGED STEEL THREADED BUSHINGS

FORGED STEEL THREADED BUSHINGS AND PLUGS SHALL CONFORM TO ASTM A105 GRADE II.

3.3.4. FORGED STEEL SOCKET WELD FITTINGS

FORGED STEEL SOCKET WELDING SHALL CONFROM TO USAS B16.11 ASTM A234 GRADE WP8.

3.3.5. FLANGE WELD FITTINGS

FLANGE FITTINGS SHALL BE 150 LB. WELDING NECK OR SLIP-ON FLANGES CONFIRMING TO USAS B16.5, ASTM A181 GRADE I ORII.

3.4. COPPER TUBING AND FITTINGS.

3.4.1. TYPE "L" COPPER TUBING

TYPE 'L' SEAMLESS HARD TEMPER COPPER TUBING SHALL CONFORM TO ASTM B88.

3.4.2. TYPE "K" COPPER TUBING

TYPE 'K' SEAMLESS HARD ANNELAED COPPER TUBING CONFORMING TO ASTM B88 HARD TEMPER IS TO BE USED IF FITTINGS ARE USED IN LIEU OF BENDING.

ANNEALED TUBING IS TO BE USED WHEN TUBING IS TO BE BENT. WHEN ANNEALED TUBING IS USED ROUNDING AND SIZING TOOLS SHALL BE USED. MINIMUM BENDING RADIUS SHALL BE 5 PIPE DIAMETERS.

3.4.3. FITTINGS

FITTINGS SHALL BE SOLDERED, AND SHALL BE CAST BRASS CONFORMING TO ANSI B16.18, OR WROUGHT COPPER OR BRONZE CONFORMING TO ANSI B16.22.

COLD BENDS ARE PREFERRED WHERE SPACE IS AVAILABLE. MINIMUM RADIUS OF BEND EQUALS 5 PIPE DIAMETERS.

3.4.4. SOLDER

SOLDER (50% TIN - 50% LEAD) IN WIRE FORM SHALL CONFORM TO ASTM B32 ALLOY GRADE 50A. FLUX SHALL BE AS RECOMMENDED BY THE SOLDER MANUFACTURER.

3.4.5. LOW TEMPERATURE BRAZING ALLOY

LOW TEMPERATURE BRAZING ALLOY (80% COPPER, 15% SILVER AND 5% PHOSPHORUS) IN ROD OR WIRE FORM SHALL CONFORM TO AMERICAN WELDING SOCIETY SPECIFICATION A5.8 CLASSIFICATION BCUP-5 AND FLUX SHALL BE AS RECOMMENDED BY THE MANUFACTURE OF THE ALLOY.

3.5. VALVES

3.5.1. GENERAL

IN GENERAL, BALL VALVES SHALL BE USED FOR SHUT-OFF ON WATER DROPS 2" AND SMALLER, INCLUDING SHUT-OFF TO WATER COOLER, WATER HEATER, AND MEDICAL AREA EQUIPMENT. GATE VALVES SHALL BE USED FOR SHUT OFF ON WATER SUPPLY SIZES LARGER THAN 2". GLOBE OR ANGLE VALVES SHALL BE USED FOR THROTTLING SERVICE AND AS DRAIN VALVES.

STOPS SHALL BE USED FOR SHUT-OFF SERVICE ON SUPPLIES TO INDIVIDUAL PLUMBING FIXTURES WHERE STOPS ARE NOT INCLUDED IN THE BRASSWARE OF

THE FIXTURES.

3.5.2. VALVE CODE DESCRIPTION

VALVES LISTED ARE INDICATIVE OF TYPE AND QUALITY REQUIRED. VALVES BY OTHER MANUFACTURERS OF SIMILAR QUALITY AND FUNCTION MAY BE USED ONLY UPON PRIOR APPROVAL BY THE AUTHORITY ISSUING THIS SPECIFICATION. IN SOME CASES, THE PLANT HAS STANDARDIZED ON SPECIFIC MAKES AND TYPES OF VALVES FOR SOME SERVICES, AND IN SUCH CASES THIS CONTRACTOR WILL BE SO INFORMED AND SHALL FURNISH THE SPECIFIC VALVES REQUIRED.

ALL GATE, GLOBE AND ANGLE VALVES SHALL BE UNION BONNET. THIS IS A SAFETY REQUIREMENT - NO ALTERNATE TYPE WILL BE PERMITTED.

IN ALL CASES WHEN ORDERING VALVES THE TYPE OF SERVICE SHALL BE STATED, AND THE PACKING, LUBRICANT, ETC., SHALL BE THE MANUFACTURER'S STANDARD FOR THE SPECIFIC SERVICE)

3.5.3. VALVE CODE NUMBERS BY SERVICE

VALVE CODE NUMBERS LISTED HEREIN ARE FOR IDENTIFICATION PURPOSES, AND ARE DEFINED UNDER BELOW.

3.5.3.1. VALVES FOR WATER -

COPPER LINES - SOLDER END

TYPE	CODE
GATE	G11B, G12L
GLOBE	T12L
ANGLE	A12L
CHECK	C11A, C12C
STOP	X10C
BALL	B12Y

-STEEL LINES - SCREWED ENDS

TYPE	CODE
GATE	G13N
GLOBE	T13F
ANGLE	A13F
CHECK	C13A, C11B

-STEEL LINES - FLANGED ENDS

TYPE	CODE
GATE	G21F

3.5.3.2. VALVES FOR OXYGEN

TYPE	CODE	SHUT-OFF SERVICE
GLOBE	SVP1	

VALVE SHALL BE ORDERED FROM MANUFACTURER PREPARED, CLEANED, AND SEALED, READY FOR OXYGEN SERVICE.

3.5.4. VALVE LIST BY CODE NO. & MANUFACTURER

CODE	ACCEPTABLE MANUFACTURERS
GATE VALVES	
G11B	WALWORTH 2SJ, OHIO BRASS 990C, NIBCO S124
G12L	STOCKHAM B124, HAMMOND 18648, NIBCO S135
G13N	CRANE 424, POWELL 2375S, WALWORTH 36
G21F	CRANE 465-1/2, FAIRBANKS C4CS, JENKINS 651A.
GLOBE VALVES	
T12L	POWELL 1823, NIBCO 235
T13F	CRANE 212P, JENKINS 556P, POWELL 2608A
SVP1	1/2" M2554, 1"-, M2507 NATIONAL CYLINDER GAS, DIVISION OF CHEMTRON CORP. (OXYGEN SERVICE)
ANGLE VALVES	
A12L	POWELL 1824, NIBCO 335-3
A13F	POWELL 2610A, CRANE 214P, JENKINS 558P
CHECK VALVES	
C12C	POWELL 1841, NIBCO S-443-B
C11A	JENKINS 1222, POWELL 1825, STOCKHAM B309
C13A	POWELL 560, JENKINS 762A, CRANE 36
C11B	POWELL 578, STOCKHAM B320
STOP	
X10C	NIBCO 625

3.6. CLEANOUTS

3.6.1. GENERAL

CLEANOUTS SHALL BE INSTALLED IN LOCATIONS AND OF MATERIALS AS SHOWN ON THE DRAWINGS. CLEANOUT CONNECTIONS AND EXTENSIONS ON UNDERGROUND DRAINAGE LINE SHALL BE MADE WITH Y-BRANCH AND 1/8 BEND FITTINGS. ALL CLEANOUTS SHALL BE FULL SIZE OF PIPE ON WHICH THEY OCCUR.

3.6.2. CLEANOUTS ON STACKS & VENTS

PROVIDE CLEANOUTS AT BOTTOM OF ALL WASTE AND VENT STACKS ABOVE FLOOR.

WHERE CONNECTIONS ARE REQUIRED FOR ABOVE FLOOR DRAINAGE, THE CLEANOUT SHALL BE IMMEDIATELY ABOVE THE CONNECTION OR COMBINATION CLEANOUT - BRANCH FITTINGS ARE ACCEPTABLE.

3.7. FLOOR AND ROOF DRAINS

3.7.1. CAST IRON FLOOR AND ROOF DRAINS

CAST IRON FLOOR AND ROOF DRAINS SHALL BE OF SIZE AND TYPE INDICATED ON THE DRAWINGS; OF JOSAM MFG. CO., ZURN CO., NORMAN BOOSEY MFG. CO., J.R. SMITH MFG. CO., OR AN APPROVED SUBSTITUTE.

3.7.2. AREA DRAIN

AREA DRAIN SHALL BE ZURN CO. #2351 WITH MONEL SCREEN, 4" SIZE, OR APPROVED SUBSTITUTE.

3.7.3. FLOOR DRAINS BY TYPE & MANUFACTURER

FLOOR DRAINS SHALL BE OF THE FOLLOWING TYPES, AND WILL BE SO INDICATED ON THE DRAWINGS. SIZE SHALL BE AS SHOWN ON DRAWINGS.

TYPE	DESCRIPTION
V	SIMILAR TO ZURN Z415 SERIES

3.7.4. ROOF DRAIN BY MANUFACTURER

SIZE WILL BE SHOWN ON DRAWINGS. SIMILAR TO JOSAM 46300X OR AN APPROVED SUBSTITUTE.

3.8. ROOF VENT CONNECTIONS

ALL PLUMBING VENTS PASSING THRU FLAT ROOFS, SHALL BE RUN THRU NEOPRENE ROOF VENT FLASHINGS. "MONO-FLASH" MONARCH RUBBER CO., HARTVILLE, OHIO.

3.9. PIPE HANGERS AND CLAMPS

3.9.1. LOCATION

PIPE HANGERS AND CLAMPS SHALL BE AS CALLED FOR HEREIN, UNLESS OTHERWISE SPECIFICALLY NOTED ON DRAWINGS.

3.9.2. TYPE

PIPE HANGERS SHALL BE RING OR CLEVIS TYPE MALLEABLE IRON OR STEEL FOR PIPE 2" AND SMALLER, STEEL FOR PIPE 2-1/2" AND LARGER. HANGER RODS SHALL BE CARBON STEEL RODS OR BOLTS THREADED WITH PROVISIONS FOR VERTICAL ADJUSTMENT, AND PROVIDED WITH NUT OR LOCKNUT. WHERE SEVERAL SUPPLY SERVICES ARE GROUPED TOGETHER, TRAPEZE HANGERS ARE ACCEPTABLE.

HANGER SIZING AND DETAIL SHALL BE SUBJECT TO OWNER'S APPROVAL BEFORE INSTALLATION IS STARTED.

3.9.3. SPACING ON HORIZONTAL PIPE

HORIZONTAL CAST IRON SOIL PIPE SHALL BE SUPPORTED BACK OF EACH BELL.

COPPER, STEEL AND WROUGHT IRON LINES SHALL BE SUPPORTED 8'-0" O.C. FOR SIZES 1" AND SMALLER, AND 10'-0" O.C. FOR SIZES LARGER THAN 1-1/2". SEE DRAWING FOR EXCEPTIONS ON SPACING.

OXYGEN SUPPLY SHALL BE SUPPORTED AT 6'-0" MAXIMUM SPACING FOR 1/2" SIZE AND 8'-0" MAXIMUM SPACING FOR 3/4" SIZE.

3.9.4. SPACING ON VERTICAL RISERS

VERTICAL RISERS SHALL BE SUPPORTED AT EACH FLOOR (EXCEPT AT FLOOR SLABS ON EARTH) BY HEAVY STEEL PIPE CLAMPS.

3.9.5. SECURING HANGERS AND CLAMPS

FOR ATTACHMENT TO STEEL MEMBERS, PROVIDE MILD STEEL BEAM CLAMPS. A DIELECTRIC SHIELD IS TO BE PROVIDED WHERE THE COPPER PIPING COMES IN CONTACT WITH GALVANIZED STEEL. FOR ATTACHMENT TO CONCRETE CONSTRUCTION, T-SLOT OR CONTINUOUS SLOT INSERT SHALL BE SET BEFORE CONCRETE IS POURED OR SLABS SHALL BE DRILLED FOR EXPANSION BOLTS.

HANGER SHALL BE ATTACHED TO PRECAST "T"S BY MEANS OF SPLIT PLATES SET IN JOINTS BETWEEN UNITS, BY THREADED RODS WITH WASHERS SET THRU HOLES DRILLED IN FLANGE, THE "T" OR BY EXPANSION BOLTS IN THE FLANGE. NO DRILLING WILL BE PERMITTED IN THE WEB OF THE "T" UNITS.

METHOD OF SECURING HANGERS AND CLAMPS TO BUILDING CONSTRUCTION SHALL BE APPROVED BY DU PONT.

3.10. SLEEVES AND PLATES.

SLEEVES THROUGH MASONRY PARTITIONS SHALL BE SCHEDULE 40 STEEL PIPE. PROVIDE CAST IRON SPLIT FLOOR PLATES ON ALL PIPE PASSING THRU SLEEVES.

3.11. UNIONS

3.11.1. UNIONS ON COPPER TUBING

UNIONS ON COPPER TUBING SHALL BE GROUND JOINT TYPE, CAST OR WROUGHT BRONZE, FOR 125 PSI SERVICE WITH SOLDER ENDS.

3.11.2. GALVANIC INSULATING UNIONS

GALVANIC INSULATING UNIONS SHALL BE INSTALLED AT THE CONNECTION OF HOT AND COLD WATER LINES TO THE WATER HEATERS.

THE UNION NUT THREAD PIECE SHALL BE GALVANIZED MEALLEABLE OR CADMIUM PLATED STEEL.

THE INSULATING NUT SHALL HAVE A CORE OF **ZYTEL** NYLON RESIN, OR SIMILAR DIELECTRIC MATERIAL, WITH FEMALE THREADS THAT MATCH THREADED PIECE.

THE TAILPIECE SHALL BE FITTED WITH A COPPER SOLDER JOINT ADAPTER RING. A RUBBER GASKETS SHALL SEPARATE THE INSIDE ENDS OF THREAD AND TAILPIECE. THE UNION SHALL BE EPCO AS MANUFACTURED BY EPCO SALES COMPANY, CLEVELAND OHIO, OR MACO AS MANUFACTURED BY MAY PRODUCTS COMPANY, GALESBURG, ILLINOIS.

4. PLUMBING EQUIPMENT

4.1. WATER HEATER - ELECTRIC.

4.1.1. GENERAL

HEATER SHALL BE A VERTICAL, CYLINDRICAL STORAGE TYPE. TANK SHALL BE GLASS-LINED COPPER BEARING STEEL OF ALL WELDED CONSTRUCTION, DESIGNED AND BUILT FOR A WATER WORKING PRESSURE OF 125 LBS. PER SQUARE INCH.

THE TANK SHALL BE PROVIDED WITH REINFORCED TAPPED IPS CONNECTIONS, FOR BOTTOM COLD WATER INLET AND TOP CONNECTION FOR HOT WATER OUTLET WHICH WILL ACCOMODATE A COMBINATION TEMPERATURE AND PRESSURE RELIEF VALVE.

TANK SHALL BE PROVIDED WITH A DRAIN VALVE FOR HOSE CONNECTION AND A MAGNESIUM ROD FOR ELECTROLYTIC CONTROL ACCESSIBLE FROM TOP OF UNIT FOR REPLACEMENT.

4.1.2. CAPACITY AND RECOVERY

THE STORAGE AND RECOVERING CAPACITIES SHALL BE AS CALLED FOR ON THE DRAWING.

LOWER OR LOWER AND UPPER HEATING ELEMENTS DEPENDING ON CAPACITY REQUIREMENTS SHALL BE PROVIDED AND SHALL BE IMMERSION OR SURFACE TYPE. THE HEATER SHALL BE PROVIDED WITH SNAP ACTION THERMOSTAT ADJUSTABLE BETWEEN 120 DEG AND 180 DEG F AND BE COMPLETE WITH ALL ELECTRICAL CONDIUTS AND WIRING BETWEEN CONTROLS, HEATING ELEMENTS AND OUTLET BOX FOR ELECTRICAL CONNECTIONS ON THE OUTER JACKET.

CURRENT CHARACTERISTICS SHALL BE AS SHOWN ON DRAWING.

4.1.3. TRIM

COMBINATION TEMPERATURE AND PRESSURE RELIEF VALVE.

VALVE SHALL HAVE BRONZE BODY WITH INTERNAL PARTS OF NON-CORROSIVE

METAL, HAVE EXTENSION TYPE THERMOSTAT, SAFETY TEST LEVER AND AUTOMATIC RESEATING FEATURE.

THE VALVE SHALL HAVE A RELIEVING CAPACITY OF NOT LESS THAN CALLED FOR ON DRAWING.

TEMPERATURE RELIEF SHALL BE SET AT 210 DEG F AND PRESSURE RANGE SET AT 75 TO 150 PSI. THE VALVE SHALL CONFORM TO ANSI A40.8.

VALVES SHALL BE WATTS REGULATOR COMPANY SERIES 4D, OR AN APPROVED SUBSTITUTE.

4.1.4. INSULATION

THE TANK SHALL BE FULLY INSULATED; SIDES, TOP AND BOTTOM, AND TANK INSULATION SHALL BE ENCASED IN A CYLINDRICAL HEAVY GAGE STEEL JACKET WITH BAKED ENAMEL FINISH. PROVIDE REMOVABLE PANELS IN JACKET FOR ACCESS TO HEATING ELEMENTS AND CONTROLS.

4.1.5. SUPPORTS

THE HEATER SHALL BE SUPPORTED ON STEEL OR CAST IRON LEGS NOT LESS THAN 6" HIGH.

4.1.6. VENDORS

THE HEATER SHALL BE "SUPER DELUX SERIES" MANUFACTURED BY W. L. JACKSON MFG. COMPANY, INC., CHATTANOOGA, TENNESSEE, OR AN APPROVED SUBSTITUTE.

4.2. ELECTRIC WATER COOLERS

4.2.1. WATER COOLER "DH"

FIVE GALLON PER HOUR CAPACITY. HAND OPERATION. - WALL MOUNTED. AMBIENT TEMPERATURE BELOW 90F. HALSEY-TAYLOR MODEL WM3A. WESTINGHOUSE MODEL WLC 7LG, OR APPROVED EQUAL.

4.2.2. WATER COOLER "DHH"

FIVE GALLON PER HOUR CAPACITY HAND OPERATION, WALL MOUNTED, AMBIENT TEMPERATURE BELOW 90 DEG F WITH HOT WATER HEATER AND DISPENSER. HALSEY-TAYLOR WM8A-CB MODEL, WESTINGHOUSE MODEL WLH-07-LG.

4.2.3. SPECIFICATIONS FOR "DH" - "DHH"

GENERAL SPECIFICATIONS. NOTE:CAPACITIES TO BE BASED UPON THE FOLLOWING OPERATING CONDITIONS:

A. AMBIENT TEMPERATURE 90 F
B. INLET DRINKING WATER TEMPERATURE 80 F
C. OUTLET DRINKING WATER TEMPERATURE 51 F
D. WASTE THROUGH PRECOOLER (WHEN PROVIDED) 60%

CONDENSING UNIT FORCED AIR-COOLED, HERMETICALLY SEALED.

WATER COOLING UNIT STORAGE TYPE WITH TINNED COPPER OR STAINLESS STEEL WATER STORAGE TANK AND SEAMLESS COPPER TUBING REFRIGERANT COIL, OR INSTANTANEOUS TYPE WITH CONTINUOUS COIL OF SEAMLESS COPPER TUBING.

PRECOOLER COUNTERFLOW TYPE WITH DOUBLE-WALL CONSTRUCTION. PRECOOLER ACCEPTABLE BUT NOT REQUIRED.

REFRIGERANT FREON FLUORINATED HYDROCARBON.

MOTOR SINGLE-PHASE, AC, 115-VOLT, 60-CYCLE, WITH THERMAL OVERLOAD PROTECTION, TO BE LISTED BY UNDERWRITERS' LABORATORIES, INC.

CORD AND PLUG NOT LESS THAN SIX LINEAL FEET OF NO 16 AWG, THREE-CONDUCTOR TYPE SO RUBBER- INSULATED AND NEOPRENE-JACKETED CORD.

CONTROLS CAPILLARY TUBE TYPE REFRIGERANT CONTROL. ADJUSTABLE THERMOSTAT FOR WATER TEMPERATURE CONTROL.

CABINET BODY ENAMELED-FINISHED SHEET STEEL. VINYL OR STAINLESS STEEL AVAILABLE ON MOST MODELS. SEE VENDOR'S CATALOG.

CABINET TOP: STAINLESS STEEL 18-8.

BUBBLER ALL TYPES SHALL BE CHROMIUM-PLATED BRASS HAND-OPERATED WITH ADJUSTABLE STREAM REGULATOR.

TYPES AHF AND BHF. FOOT-PEDAL OPERATED WITH ADJUSTABLE STREAM REGULATOR.

GLASS FILLER CHROMIUM-PLATED BRASS HAND-OPERATED GLASS FILLER TO BE FURNISHED AS ADDITIONAL EQUIPMENT. WHEN REQUIRED, ADD SUFFIX G TO TYPE DESIGNATION.

REMOTE CONNECTION TAPPED OUTLET IN REAR OF CABINET FOR REMOTE FIXTURE CONNECTION.

GUARANTEE ENTIRE COOLER TO BE GUARANTEED FREE FROM ALL DEFECTS IN MATERIAL OR WORKMANSHIP FOR THE PERIOD OF ONE YEAR FROM DATE OF PURCHASE. HERMETICALLY SEALED CONDENSING UNIT TO BE SIMILARLY GUARANTEED FOR AN ADDITIONAL FOUR YEARS IMMEDIATELY FOLLOWING THE ONE -YEAR GUARANTEE ON ENTIRE COOLER.

4.2.4. WATER LINE FILTER

A FILTER SHALL BE PROVIDED ON COLD WATER SUPPLY AT EACH WATER COOLER AND AT SUPPLY TO EACH VENDING MACHINE REQUIRING WATER. FILTER SHALL BE APPROXIMATELY 8-1/2" HIGH BY 5" DIAMETER, CHROME PLATED BRASS WITH 3/4" IPS FEMALE OUTLET, 3/4" IPS MALE INLET, DRAIN VALUE, REMOVABLE TOP AND BE FURNISHED COMPLETE WITH CHARCOAL CHANGE, FILTER PAPER PLUS 12 REPLACEMENT FILTER PAPERS. FILTRINE MFG. CO "TASTEMASTER" 4TM WATERLINE FILTER.

4.3. OXYGEN CYLINDER MANIFOLD

TEN CYLINDER MANIFOLD WITH TWO BANKS OF FIVE CYLINDERS EACH - ARRANGED FOR STRAIGHT ROW INSTALLATION.

UNIT TO INCLUDE FULL AUTOMATIC CONTROL FOR AUTOMATIC CHANGEOVER FROM THE "IN USE" TO THE "RESERVE" BANK OF CYLINDERS UPON EXHAUSTION OF THE "IN USE" BANK OF CYLINDERS - GUARANTEEING A CONTINUOUS SUPPLY OF OXYGEN TO THE OXYGEN DISTRIBUTION PIPING SYSTEM.

UNIT TO INCLUDE ALL NECESSARY TRIM, VALVES, PIGTAILS, REGULATORS AND SO ARRANGED AS TO PERMIT REMOVAL OF EMPTY CYLINDERS AND MAINTENANCE TO COMPONENTS WITHOUT INTERRUPTION OF SERVICE. MANIFOLD TO DELIVER 50 PSIG OXYGEN TO BUILDING OXYGEN SHUTOFF VALVE AS SHOWN ON PLUMBING PLANS.

VENDOR - NATIONAL SYLINDER GAS CO. #12C51C-62 MANIFOLD FOR OXYGEN SERVICE OR AN APPROVED EQUAL.

ABOVE DESCRIBED MANIFOLD TO INCLUDE:

1. HIGH LOW PRESSURE SWITCH
   NATIONAL CYLINDER GAS CO. #180402-64

2. 4 LIGHT ALARM PANEL
   NATIONAL CYLINERT GAS CO. #180221-64

3. POWER SUPPLY BOX
   NATIONAL CYLINDER GAS CO. #180245-64

SEE PLUMBING DRAWING W-439234 FOR LOCATION OF ALARM PANEL.

5. INSULATION FOR PIPING (PLUMBING WORK ONLY)

THIS SPECIFICATION SETS FORTH THE MATERIALS AND WORKMANSHIP REQUIRED FOR APPLYING INSULATION TO PLUMBING PIPING, (INCLUDING DRAINAGE AND SERVICE LINES).

5.1. SERVICES REQUIRING INSULATION

THE FOLLOWING SERVICES SHALL BE INSULATED:

DRINKING WATER ABOVE GROUND

HOT WATER ABOVE GROUND

5.2. MATERIALS

5.2.1. PIPE INSULATION

INSULATION FOR PIPING SHALL BE 1" THICK OWENS-CORNING SELF-SEALING LAP PIPE INSULATION.

5.2.2. FITTING INSULATION

FITTING INSULATION SHALL BE EITHER THAT SHOWN ABOVE WITH JACKET REMAINING IN PLACE OR REMOVED AS REQUIRED, OR 1" THICK GLASS FIBER.

5.2.3. INSULATION FINISH

WHERE INSULATION JACKET IS CUT OR WHERE EXPOSED GLASS FIBER IS USED EXTERIOR FINISH SHALL BE BENJ FOSTER 'SEALFAS' MASTIC - COLOR WHITE.

FINISH IS NOT REQUIRED FOR PIPE INSULATION ABOVE CEILING OR CONCEALED IN CHASES.

PIPE & FITTINGS SCHEDULE
Pipe and Fittings according to Service

Line No.	Service	Pipe	Fittings
B95	Oxygen - 50 psi Max	Type K Copper	Solder Joint Wrought copper or bronze. Low temperature brazing alloy. (Do not use cast fittings)

The complete oxygen installation shall conform in all respects to the National Fire Protection Bulletin 56F

PIPE & FITTINGS SCHEDULE
Pipe and Fittings according to Service

Line No.	Service	Pipe		Fittings
B1 B4	Sanitary Waste Aboveground Sanitary Vent Aboveground	3" & Larger	Cast Iron Service Weight Neoprene Gasket	Cast Iron Service Weight Neoprene Gasket
		2" & Smaller	Galv. Steel Sch. 40 Nipples 8" and shorter Schedule 80	Galv. Cast Iron Drainage Pattern Screwed
B2	Sanitary Waste Belowground		Cast Iron Service Weight Neoprene Gasket	Cast Iron Service Weight Neoprene Gasket
B6 B7	Storm Drainage Aboveground Storm Drainage Belowground		Cast Iron Service Weight Neoprene Gasket	Cast Iron Service Weight Neoprene Gasket
B30 B34	Cold Water - 60 PSI Max. Hot Water - 60 PSI Max.		Type L Copper	Solder joint Cast brass, Wrought copper or bronze 50-50 solder
B20	Cold Water - 150 PSI Max.		Galv. Steel Schedule 40 Nipples 8" and Shorter, Schedule 80	Galv. Malleable Iron Screwed. Bushings & plugs forged steel. ALTERNATE Forged steel socket welded. Fit-up to flange Supply 150 lb. Welding Neck or slip-on flanges.

DIVISION 15 - MECHANICAL

HEATING, VENTILATING AND AIR CONDITIONING

1. General

1.1 The General Conditions, Special Conditions and requirements of all other divisions in this specification apply equally to all work in this section.

1.2 In estimating the work involved in this contract, the contractor shall familiarize himself with all documents for the entire project, visit the site, and acquaint himself with all existing and limiting conditions which have a bearing on his work.

2. Scope

2.1 The heating, ventilating and air conditioning systems shall be fabricated and installed in accordance with the following drawings:

W 434450 Floor Plan - Sheet 1
W 435301 Floor Plan - Sheet 2
W 435302 Sections and Details
W 435303 Roof Plan, Sections & Details

2.2 Temperature controls for the air conditioning unit DA 9313-5500-50 shall be as follows:

2.2.1 Control components shall be as indicated on diagram shown on W 435302.

2.2.1.1 DA 9313-5500-53 - Temperature control system shall consist of controls for air conditioning unit DA 9313-5500-50. Sequence of operation shall be as follows:

2.2.1.2 Room Temperature Control - Zones 1 through 10.

On a rise in room temperature, room thermostat T-1 gradually positions the electric heat control unit C-1 to supply less power to the electric heating coil then in sequence through the high signal discriminator D-1 and the staging network S-1 opens refrigerant solenoid valves #1 and #2. The reverse sequence shall occur on a fall in room temperature.

2.2.1.3 Humidity Control (1 Zone only)

On a rise in relative humidity in the space, the room humidistat, H1, through the high signal discriminator D-1 and the staging network S-1, opens refrigerant solenoid valves #1 and #2 in step sequence. The reverse sequence shall occur on a fall in relative humidity.

2.2.2 An electric thermostat shall be installed in rooms 1, 2, 3, 9, and 34 for control of electric duct heaters DA 9313-5500-50.1, 50.2, 50.3, 50.6 and 50.7 respectively.

2.2.3 An electric thermostat shall be installed in corridor 45 for control of baseboard heaters DA 9313-5500-50.6.

2.2.4 A tight shut-off damper, complete with an electric damper operator shall be installed in the toilet exhaust fan suction duct. Dampers shall be normally open. This damper operator shall be electrically connected to the emergency switch in the Instrument Control Room of the Operations Building.

2.2.5 A tight shut-off damper complete with an electric damper operator will be provided in the outside air intake of air conditioning unit DA 9313-5500-50. Damper will be normally open. This damper operator shall be electrically connected to the emergency switch in the Instrument Control Room of the Operations Building.

2.3 Air conditioning unit DA 9313-5500-50 shall be purchased by Du Pont and delivered to the plant site. It shall be the responsibility of the contractor to install these units in accordance with applicable drawings. All other heating and ventilating equipment shall be as specified on the drawings and shall be purchased and installed by the contractor.

2.4 Substitution of equipment, other than specified, can be made only upon receipt of written approval by Du Pont Engineering Department in the form of drawing revisions or formal correspondence.

2.5 Pneumatic tubing can be copper or plastic, or a combination of both, at the discretion of the contractor. Fittings for copper or plastic tubing are to be brass flareless - Intrulok (Parker-Hannifin Company).

2.6 Temperature control components shall be as follows:

2.6.1 Room humidistat - Johnson Service Co. HC-4550 or Honeywell equivalent.

2.6.2 Room Thermostat - Johnson Service Company TC-4550 or Honeywell equivalent.

2.6.3 Power supply for damper operator - Johnson Service Company. TQ-3000 or Honeywell equivalent

2.6.4 Power supply for room humidistat and room thermostat - VQ-4200 or Honeywell equivalent.

2.7 All roof openings for ductwork, other than under air conditioning units shall be sealed air and water tight after ductwork is installed.

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Specification 6165
Electrical Division 16

DIVISION 16
ELECTRICAL

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ELECTRICAL

1. GENERAL

1.1 The General Conditions, Special Conditions, and requirements of all other divisions in this specification apply equally to all work in this section.

1.2 In estimating the work involved in this contract, the Contractor shall familiarize himself with all documents for the entire project, visit the site and acquaint himself with all existing and limiting conditions which have a bearing on his work.

2. SCOPE

2.1 Furnish all materials, equipment, labor, and related items required to complete work indicated on drawings and/or specified. Attention is directed to the General Conditions and other sections of the specification which affect the work under this section. The work under this section includes, but is not limited to, the following:

2.1.1 Electrical service to the building shall be 480 volt, 3 phase, 3 wire, 60 Hz provided by Du Pont. Contractor is to provide for the main feeders to the building as shown on drawings. Du Pont will terminate the feeders at the appropriate motor control centers.

2.1.2 Install required motor control centers and motors which will be provided by Du Pont. Contractor to provide all fuses and motor overload heater elements for all motor control center equipment.

2.1.3 Provide and install required dry transformers, distribution panels, wire, raceway systems, safety switches, and lighting panels necessary to distribute power to utilization points as indicated on electrical drawings.

2.1.4 Provide and install electrical system grounding and equipment grounding as required by the National Electrical Code and the electrical drawings.

2.1.5 Telephone system to include sleeves through floors and walls, raceway, outlets, junction boxes, and other necessary hardware required to provide a complete installation except wiring and telephone equipment. Phone locations and main raceway are shown on drawings. Consult with the telephone company for most opportune location of sleeves and junction boxes. Additional raceway over that shown on drawings may be required.

2.1.6 Provide and install a complete system of lighting, exit lighting, and emergency lighting as shown on drawings.

2.1.7 Certain motor-driven equipment such as pumps, fans, etc., will be provided by the Plumbing, Heating, Ventilating, Air Conditioning, and General Contractors, with built-in or separate controllers, thermostats, motors, etc., as covered by the specifications for these systems. The Electrical Contractor shall ascertain from these Contractors all pertinent electrical data for motors and control equipment, and electrical characteristics for any other special materials or equipment to be furnished, and/or installed by them, the connections for which are to be furnished by the Electrical Contractor, as specified elsewhere in these specifications. Due allowances for these provisions shall be made by the Electrical Contractor.

The Electrical Contractor shall examine the specifications for General Construction, Plumbing, Heating, Ventilating and Air Conditioning, Special Equipment, as he will be required to furnish and install all wiring to motor-driven equipment and apparatus and controls described under these specifications. Provide all equipment not furnished by other contractors required to make systems operate properly.

2.2 Latest effective publications of following standards, codes, etc., as apply, form a part of these specifications, the same as if written fully herein and are to be followed as minimum requirements. Minimum requirements do not relieve the contractor from furnishing and installing higher grade materials and workmanship than herein specified.

Local Building, Electrical and Fire Codes

National Electrical Code

Standard Rules of American Institute of Electrical Engineers

National Electrical Manufacturers' Association (NEMA)

Applicable provisions of the National Fire Protection Association (NFPA)

2.3 Electrical classification of the building is general purpose.

2.4 The drawings made specifically for the electrical work for this contract are:

W-432541	W-436342
W-432542	W-436343
W-433841	W-436344
W-434801	W-442202
W-435106	W-442227

3. REQUIREMENTS

3.1 Coordinate the installation of wiring, raceways, outlet boxes, panel boards, sleeves, anchors, and other concealed or embedded items so that this work is properly in place before concrete or partitions are in place.

3.2 Electrical system layouts indicated on drawings are generally diagrammatic. except if dimensioned, and locations of outlets and equipment are approximate. Routing of raceways and location of outlets and equipment shall be governed by structural conditions and obstructions.

This is not to be construed to permit redesigning systems, and outlets shall be interconnected as shown on drawings. Locate and install equipment requiring frequent maintenance and operation so it will be readily accessible. The right is observed to make any reasonable change in location of outlets and equipment prior to "roughing-in" without involving additional cost.

Work indicated, but having details omitted, shall be provided complete to perform function intended, without extra cost.

3.3 All openings and recesses necessary for the installation of the work in this division will be provided by the General Contractor, provided each Contractor furnishes him all the information in time so as not to delay his work. If the information is late or incorrect, the particular contractor affected shall, at his own expense, have the trade which originally installed the work do the required cutting and patching consistent with the workmanship of the surrounding area.

3.4 Permits and licenses necessary for the execution of the work shall be secured and paid for by the Contractor. The Contractor shall give all notices and comply with all laws, ordinances, rules, and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the drawings and/or specifications are at variance therewith, he shall promptly notify Du Pont in writing of any necessary changes in work. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules, and regulations and without such notice to Du Pont, he shall bear all costs arising therefrom.

4. SHOP DRAWINGS

4.1 The Contractor shall submit, within 30 days after the award of the contract, a list of materials required for the project. This list shall be complete and include all items or systems called for in this contract. Partial lists shall identify the specific item, manufacturer, and vendor. Vendor information only will not be acceptable. Wherever items of materials submitted are not the noted make or type, they shall be so identified; and the submission shall include detailed descriptive data for review. Failure to provide sufficient data will be cause for rejection. Preapproval will not be made of any substitution or source, and vendors or suppliers will not be permitted to make submissions or solicit approvals.

4.2 The Contractor shall prepare the necessary shop drawings showing details of construction where required to complete the installation and submit them for approval to Du Pont prior to the final installation.

4.3 After approval of the material list, the Contractor shall secure descriptive drawings or catalog cuts of equipment to be furnished under his contract. He shall review these shop drawings for conformance to Contract documents prior to submission for approval. No equipment shall be ordered until they have been approved.

4.4 Submission, number of copies, and procedure shall be established at the first project meeting. All items shall be submitted in sufficient time to permit proper consideration and action thereon, and at least 30 days before approval is needed.

4.5 Where equipment proposed by the Contractor differs from that shown on the drawings or specified, he shall submit approval drawings showing the manner in which the layout is affected by the substitution.

4.6 The drawings illustrate the space allocated for equipment and each contractor shall install equipment specified. Any Contractor making a substitution must pay for necessary modifications.

4.7 The Contractor shall keep one copy of approved shop drawings at the job site filed in a suitable metal container. The shop drawings shall be catalogued and kept in good repair, and shall be available for use by Du Pont.

5. MATERIALS AND METHODS

5.1 General

Materials of the types for which there are Underwriters' Laboratories standard requirements, listing and labels shall have listing of Underwriters' Laboratories and be so labeled or shall conform to their requirements, in which case certified statements to the effect shall be furnished by the manufacturer with a copy of an examination report by the recognized independent testing laboratory acceptable to the Du Pont Company. Use only new materials and equipment.

Materials other than those listed herein shall be of the size, type, and capacity indicated by the drawings. Insofar as possible, use one type and quality. Materials shall conform to the standard listed with each item in the following paragraphs:

5.2 Raceways and Fittings

5.2.1 All conduits shall be concealed from view, unless otherwise noted, being either buried in the concrete floor slabs, walls, or masonry, or run above suspended ceiling. Under no circumstances will horizontal runs of conduit be permitted in walls or partitions. In structural slabs, run raceways at least 1-1/2 inches below top of slab and above bottom reinforcing steel.

5.2.2 The minimum size of any conduit shall be 3/4 inch except conduit for telephone service which may be smaller. Conduits shall be sized according to the National Electrical Code schedules except where larger sizes are shown. Each length of conduit shall bear the marker's trademark and approved UL label. Thin wall conduit can be used for telephone service; all other conduit for power and lighting service to be aluminum or rigid galvanized.

5.2.3 Flexible conduit may be used only for short connections not exceeding 18 inches. Flexible conduit shall be made of heavily zinc coated sheet metal strip in interlocked construction. Where flexible raceway is installed in damp or wet locations, the conduit shall be the liquid-tight type UL listed. It shall be installed in such a manner that liquids tend to run off the surface and not drain toward the fittings. Sufficient slack shall be provided to reduce the effects of vibration. Provide visible grounding bonding jumper on all flexible conduit except on portable fixture connections. Bonding jumpers shall not be spiraled. "Valtech" fittings on the flexible conduits are to be used.

5.2.4 Raceway system shall be capped during course of construction; clean inside of raceways before installing conductors.

5.2.5 All threaded joints shall be made up tight. Places where threads are left exposed and where protective coatings have been removed in handling shall be painted with one coat of lead and oil of color to match raceway finish.

5.2.6 Provide expansion joints in raceway system where required by structural conditions.

5.2.7 Couplings and connectors for thin-wall conduit shall be rain-tight.

5.2.8 Conduits shall be reamed, burrs removed, and shall be double locknutted and bushed where they enter boxes, fittings, or cabinets, except at threaded hubs.

The entire system shall be thoroughly and efficiently grounded with all screw joints being run up hard into the couplings. Running threads will not be permitted. Only approved threaded couplings shall be used.

5.2.9 Aluminum conduit and fittings shall not be imbedded in plaster or masonry such as concrete slab, walls, pier, column, concrete block, cinder block, or brick; nor shall it be used for direct burial in earth.

5.2.10 Horizontal runs of conduit shall be supported from overhead construction at intervals as listed in Table 346-12 of the National Electrical Code, using clevis-type hangers and round steel rods or steel trapeze hangers. Perforated strap iron hangers are not permitted. Where three or more raceways are run parallel in a group, trapeze hangers of steel angles or channels and steel hanger rods shall be used. Conduits shall be U-bolted to every third hanger and the first hanger each side of each bend. Welding of conduits to any support or building structure will not be permitted. Rust spots on hangers to be cleaned and painted.

5.2.11 All conduits run in masonry or concrete which is below building floor level shall be provided with taper threaded galvanized couplings in lieu of standard conduit couplings. All threads shall be coated with high conductivity aluminum paint and coupled up water tight.

5.2.12 Exposed conduits shall be installed with cast condulet-type fittings and outlet boxes, unless specifically indicated otherwise on the drawings. Fittings for flexible metallic tubing shall be of the type especially adapted for this purpose, and should conform with the requirements of the National Electrical Code. Condulet fittings shall be Crouse-Hinds, Appleton, Killark.

5.3 Boxes

5.3.1 Furnish and install pull boxes where necessary in the raceway system to facilitate conductor installation. In general, conduit runs of more than 100 feet or with more than three right angle bends shall have a pull box installed at a convenient intermediate location. All such pull boxes shall be noted on the Contractor's shop drawings.

5.3.2 All boxes shall be made of galvanized steel or aluminum of metal gauge and physical size as required by the NEC for the number and size of conduits and conductors involved, Boxes shall have removable screw covers. Boxes shall be securely mounted to building structure with supporting facilities independent of conduit entering the box. Where aluminum conduit is installed, aluminum junction boxes shall be provided.

5.3.3 Outlet boxes of proper type and size as required by building conditions shall be placed at all receptacles, switch, telephone and special outlets. Outlet boxes shall be firmly secured in place, and set true and flush with the finished surface. Where walls have plaster finish, outlet boxes shall be set accordingly, and shall be provided with plaster covers where required.

5.3.4 Outlet boxes, where concealed, shall be of one piece pressed steel (not sectional), square or rectangular or octagonal, 4-in. minimum galvanized or sherardized. Pressed steel outlet boxes shall be provided with the proper size knockouts for the conduits, and all knockouts not to be used must remain closed.

5.3.5 Where finished surfaces are of tile or cinder block, and conduits are concealed, outlet boxes shall be provided with approved covers with square corners and depth to suit the thickness of the wall of the tile or cinder block.

5.3.6 Pressed steel outlet boxes shall not be used on exposed or exterior conduit work. Where conduits run exposed, all outlet boxes shall be cast metal with suitable gasketed covers and fittings. Boxes for ceiling outlets, which receive fixtures shall have fixture studs permanently fastened to the box construction. Outlet boxes for exterior lights shall have gasketed covers.

5.3.7 Contractor shall examine all architectural and detail drawings before locating outlets. Outlets shall be placed as required to harmonize with moldings, panels, cabinets, mirrors, etc. Outlet locations shall not be obtained from scale dimensions on electrical drawings but from measurements on architectural plans and/or details.

5.3.8 If an outlet is installed by this Contractor in such a location as to be out of proper relation to beams, walls, or other details of the building, its location shall be corrected by, and at the expense of this Contractor.

5.4 Wires and Cables

5.4.1 Power and lighting conductors, 600 volt and below, No. 2 AWG and smaller, shall be copper, 600 volt, having polyvinyl chloride (PVC) insulation with an outer nylon jacket of Zytel® No. 33 or 33H. Wire shall be dual rated THHN-THWN of sizes shown on drawings. The minimum size wire used shall be No. 12 AWG. Control circuit wiring may be No. 14 AWG.

(Exception: 1/0 copper wire to be used for feeders from 100 a. QMB switches as shown on drawings.

All wires up to and including No. 10 AWG shall be solid and all wires larger than No. 10 AWG shall be stranded for lighting and receptacle circuits. All control wiring and power wiring including motor feeders shall be stranded. All stranded wire to be equipped with a compression lug at its termination.

Wire sizes No. 1/0 AWG and larger rated 600 volt shall meet the requirements of the specifications as stated above, except that conductors shall be aluminum. The aluminum alloy used for aluminum wire shall comply with the following:

	Minimum	Maximum	Units
Ultimate Tensile Strength	16,000	19,000	psi
Yield Strength	14,000	-	psi
Elongation at Failure	10	-	%
Conductivity, IACS	61	-	%

The above characteristics must be maintained after annealing for four hours at 250°C.

5.4.2 Wire and cable shall be new, manufactured since January 1972: shall have size, grade of insulation, voltage, and manufacturer's name permanently marked on the outer covering at regular intervals; shall be delivered in complete coils or reels with identifying size and insulation tag, and be UL labeled.

5.4.3 Wire and cable shall be suitably protected from the weather and damage during storage and handling and shall be in first-class condition when installed.

5.4.4 Sizes, insulation, and voltage rating shall be as indicated on the drawings and/or as specified.

5.4.5 All wires shall be color coded. Neutral conductors shall be white; Phase A, red; Phase B, black; Phase C, blue; and grounding conductors, green. This phase identification shall be continuous from the main service to all panelboards and motors and shall include all feeders and branch circuit wiring installed as part of this contract.

5.4.6 Wire shall be pulled into raceways under moderate tension. Manufacturer's recommended pulling tensions shall not be exceeded. Any lubricant used shall not have a deleterious effect on the conductor insulation. No oil or grease is acceptable.

5.4.7 Each lighting and receptacle branch circuit shall be provided with a separate neutral. The neutral conductor shall be identified with its respective phase conductor by appropriate marking with phase number or letter or by color coding.

5.4.8 All feeder cables shall be continuous from origin to panel or equipment termination without running splices in intermediate pull or splice boxes. Where taps and splices are necessary and previously approved, they shall be made in approved splice boxes with suitable connectors. Unless otherwise noted, each conduit raceway shall contain only those conductors constituting a single feeder circuit. Special precautions shall be taken to assure a continuous ground current return path.

5.4.9 All cable terminals, taps, and splices shall be made secure with solderless, pressure-type connectors. Connectors shall be installed with approved hydraulic tools to assure a permanent and consistent mechanically secure, high-conductivity joint. Where conductors are to be connected to metallic surfaces (ground connections to building steel), the surfaces shall be polished before installing the connector. Lacquer coating of conduits shall be removed where ground clamps are to be installed.

5.4.10 All stranded copper wires shall be terminated at panelboards, switchboards, or equipment with Thomas & Betts Company solderless compression-type lugs. Connectors used for aluminum cable shall be complete with anti-oxidant provided in the wire cavity similar to that provided by Burndy "Penetrox A." No connections shall be made to feeders passing through wire troughs or junction boxes (taps not permitted.)

5.4.11 The Electrical Contractor shall furnish and install all hangers, racks, cable cleats, and supports required to make a neat and substantial cable installation.

5.4.12 Each feeder and branch circuit cable or conductor group in panel boxes or troughs shall have a permanent pressure-sensitive label with suitable numbers and letters for easy identification.

6. GROUNDING SYSTEM

6.1 Grounding shall comply with the requirements of the National Electrical Code with all final grounds being made to the existing building ground loop and/or approved ground rod.

6.2 The following list is representative of the parts which shall be solidly grounded:

Switches and Starters
Frames of Motors
Electric Systems Neutral
Conduit System Complete
Distribution Panels
Motor Control Centers - No. 4/0 bare copper grounding conductor shall be extended from each motor control center to the peripheral grounding bus.

6.3 All ground-type receptacles shall be grounded to the grounding metal system.

6.4 All grounding conductors shall be one piece and intervening splices shall not be permitted. All connections of grounding conductor cables to grounding buses shall be made with approved grounding connectors as listed in Du Pont Engineering Standard SE28B.

6.5 All grounding shall be installed in accordance with the applicable provisions of Articles 5 through 7, and 10 through 12 of Du Pont Electrical Standard E1P, and Articles 4, 5, 6, and 7 of Du Pont Electrical Standard E13P.

7. ELECTRICAL DISTRIBUTION SYSTEM

7.1 Feeders

7.1.1 Furnish and install a complete 480 volt, 3 phase, 3 wire system. The Electrical Contractor shall furnish and install all feeders shown on drawings. Feeders shall be type THWN-THHN wire in conduit or tray.

7.1.2 Furnish and install complete 120/208 volt, 3 phase, 4 wire systems for the lighting, miscellaneous power and heating loads and convenience outlets. Furnish and install all feeders from the transformers to the branch circuit panels. Feeders to the panels to be type THWN-THHN wire in conduit.

7.2 Transformers

Provide and install dry-type distribution transformers similar to General Electric Company Type QHT, rated three phase, 150°C rise, 480 volts primary, and 208Y/120 volts secondary with Type H insulation. They shall meet the applicable NEMA, ASA, and IEEE standards and shall be furnished with six approximately 2-1/2% fully rated kva taps in the high-voltage winding, four below rated primary voltage and two above. Each transformer shall have built-in vibration isolators and a maximum sound level of 45 decibels. They shall be furnished with UL label and compression-type, solderless connectors. The wiring compartment shall be located on the bottom front of the unit and shall be completely accessible from the front for all connections and tap changing. The wiring compartment shall be isolated from the core and coil by means of a suitable thermal barrier. The finish shall be light gray enamel ASA No. 61 over a suitable rust inhibitor. KVA rating shall be as shown on the drawings.

7.3 Branch Circuits

The system of feeder and branch circuits for power and lighting shall be connected to panel busses in such a manner as to electrically balance the connected loads as close as it is practicable.

7.4 Electric Panels

7.4.1 Provide and install electric panels in locations generally as shown on the drawing. Panels shall have the number of branch circuit protectors shown and ratings indicated on the panel schedules.

7.4.2 Panels shall be dead front type designed for operation on three phase, 4 wire, 120/208 volt systems as indicated on drawings. Each protector shall be provided with a 1, 2, or 3 pole, heavy-duty type circuit breaker of current rating indicated on the drawings. Breakers shall be plug-on, thermal-magnetic with 5000 AIC sym. at 250 volt and readily removable from front of board without disturbing adjacent units.

7.4.3 The bus bars shall be hard drawn copper of at least 98% conductivity, in continuous lengths, and of such size and current density as not to exceed 1000 amperes psi. Busses shall be designed so that when carrying the full rated capacity they shall not have a temperature rise of more than 30°C above that of the surrounding atmosphere. All bus bars shall have the capacity of the breakers to which they connect. Bus shall run full height of panel for insertion of future breakers in all spare space whether or not it is equipped with a spare breaker. Each panel shall have a neutral bus. Panels shall be as manufactured by the Square D Company as noted on drawings.

Mechanical connectors shall only be used with copper cables. Compression-type fittings shall be used with aluminum cables feeding the distribution panels. Contractor must assure himself that the aluminum compression fittings will fit onto the bus and that there is sufficient clearance from back box for bending cable and for electrical clearances. Larger than standard back boxes may be required.

7.5 Panel Cabinets

7.5.1 Panelboard cabinets shall be located as shown on the drawings.

7.5.2 Cabinets shall be surface or flush mounted as indicated and shall consist of code gauge steel boxes, made of galvanized sheet steel, of sufficient depth, width, and length to mount the panelboards hereinbefore specified and shown on drawings.

7.5.3 Cabinets shall be provided with suitable lugs for mounting, also provided with approved steel faces and doors. Faces and doors to be not less than No. 12 U.S. gauge; doors to be hung with heavy hinges and secured with locks and pulls. Locks for all electric panels and control cabinets to be the same so as to be openable with a common key.

7.5.4 Cabinets shall be given a baked finished gray enamel paint at the factory.

7.5.5 All cabinets shall have wiring gutters at top, bottom and side of sufficient size to adequately accommodate the conduits, wires and cables entering and leaving same.

7.5.6 Top of cabinet shall not exceed 78 inches from the floor when mounted.

7.5.7 Fronts for all panel cabinets shall have adjustable indicating-type clamps and be single door construction, the door to open over the circuit breaker section. Fronts shall have suitable angle iron rests near bottom to aid in installation and removal.

7.5.8 Circuit directory holders shall be metal frames welded to the inside of the cabinet doors and having transparent cover under which shall be placed neatly typed schedules showing circuit controls. The panelboard designation, as shown on drawings, shall be stenciled on the inside of the door above the directory in 1-inch high letters.

7.5.9 Panels shall be mounted on a unistrut arrangement supported from wall or floor where indicated on drawings.

7.5.10 Where blank space for future circuit breakers or fused switches is indicated, bus bars shall be arranged for connection of circuit breakers or fused switches so that the blank covers can be removed and the circuit breakers or fused switches can be installed from the front of panel without removing same from the cabinet. Bus bars shall be of sufficient size to serve the future circuit breakers without exceeding the specified standards.

7.5.11 Each terminal of all branch circuits and mains shall be color coded by marking terminal of Phase A, red; Phase B, black; and Phase C, blue. Branch circuit loads shall be equally divided between the phases. Connections of single pole circuits shall be as follows: Circuit No. 1 to Phase A; Circuit No. 3 to Phase B; Circuit No. 5 to Phase C, etc., with numbers in consecutive order from left to right and top to bottom.

7.5.12 All panelboards shall be equipped with insulated neutral bar for the wiring being connected and a separate grounding bar.

7.6 Receptacles - Switches - Relays

7.6.1 Standard duplex receptacles shall be rated 15 amp or 30 amp, 125 volt with parallel or slot and "U" ground in a rugged plastic housing and with screw terminals arranged for side and back wiring.

7.6.2 Wiring devices shall be selected from the following list:

All outdoor receptacles to be Harvey Hubbel Cat. No. 5211 cast aluminum lift cover with 5242 receptacle mounted in an FS box.

	AH	Bryant	Hubbell	P&S
Duplex Receptacles	--	--	5242-I	--
Clock Receptacles	5708	2828 GS	5235	1544
Vending Machine Receptacles	5716	9530 GR	9308	5920
Single Pole Switches	1891-I	4801-I	1201-I	501
Three-Way Switches	1893-I	4803-I	1203-I	503
Pilot Light	T1375	1375	1375	1374

(b) Cover plates for switches, receptacles and telephone outlets shall be ivory bakelite, uniline smooth face design, Arrow Hart, Series 72000, Bryant, Hubbell, Pass & Seymour, or GE.

7.6.3 Relays shall be industrial type 300 volt Square D Type "GO" installed as shown on drawings.

7.7 Lighting Fixtures

7.7.1 Provide and install a complete complement of lighting fixtures, wired and connected in place, tested, cleaned, and left in satisfactory operating condition as indicated on drawings and of types shown on the symbol drawings.

7.7.2 In instances where specific type of fixture has not been assigned an outlet, this Contractor shall provide and install a complete fixture for the outlet of the type and wattage assigned to outlets of similar use.

7.7.3 All lighting outlets shall have a lighting fixture, unless otherwise directed. All lighting equipment shall be designed and arranged for operating on single phase, 3 wire, 120 volt, 60 cycle circuits as indicated on the drawings.

7.7.4 All fixtures shall be set perfectly plumb with canopies and openings in, or on, ceilings or walls.

7.7.5 Fixtures shall be complete with all necessary appurtenances, wiring, lampholders, shadeholders, lamps, reflectors, glassware, canopies, wall bases, pendants, etc., and shall be wired with Type THHN fixture wire not less than No. 14 AWG. All pendants and canopies shall be of the type required for the specific lighting fixture and shall be of the same manufacture as the lighting fixture.

7.7.6 All fluorescent fixtures shall be completely wired with high-power factor ballasts (not less than 92%), with thermal protection, lampholders, etc., all of which shall be made readily accessible for ease of maintenance and repair.

7.7.7 All exposed metallic parts of fixtures such as pendants, canopies and ceiling trims of all recessed fixtures shall be finished as directed.

7.7.8 In instances where the ceiling construction will not adequately support the fixtures, this Contractor shall provide and install appropriate and adequate auxiliary supports attached to substantial building construction in an approved manner.

7.7.9 The size of glassware, reflectors, recessed boxes, etc., shall be in accordance with the wattage indicated at the outlets on the drawings and/or outlined in the schedule.

7.7.10 Photocell control of outside lighting shall be used. Control is shown on drawings.

7.7.11 All lamps shall be furnished and installed under this section. All fluorescent lamps shall be warm white, rapid start, General Electric Company, with 40 W. main lighter lamps being used having a lamp life of 15,000 hours at 3 hours/start, or Sylvania, or Westinghouse. Incandescent lamps shall be inside frosted 130 volts extended service A99 unless otherwise noted.

7.7.12 All fixtures shall bear the National Board of Fire Underwriters' label. All ballasts shall be Class "P" high power factor, General Electric Company "Bonus Line."

7.8 Baseboard and Duct Heaters

7.8.1 Four 1 kw baseboard heaters are to be supplied and installed by the Contractor as shown on drawings.

7.8.2 Five duct heaters are to be supplied and installed by the Contractor as shown on drawings.

8. ELECTRICAL POWER EQUIPMENT

8.1 Motors

Motors shall be supplied with the equipment or supplied by Du Pont and delivered to the site as noted on drawings. The Contractor will not be required to buy any motors. The Contractor shall install and connect up all motors including required feeders and control circuits as indicated on the project drawings and/or the vendor equipment drawings. The Electrical Contractor shall furnish and install all controls and pilot devices not furnished with the driven equipment required to make equipment operate as defined in this specification or as warranted by the equipment manufacturer. Pushbuttons shall be heavy-duty type.

8.2 Motor Control Centers

Contractor shall install all motor control centers. All motor control centers shall be line voltage magnetic, with three ambient-compensated, bimetallic-type overloads, and fusible switch-type disconnect, FRS Fusetron, dual element Class K5 fuses sized as recommended by the NEC. Motor control centers shall be General Electric Company "7700-line."

Each starter shall have a dual fused 120-volt primary control transformer. These control centers will be purchased and delivered to site by Du Pont.

8.3 Manual starting switches consisting of a snap switch and a suitably sized thermal overload device in each ungrounded conductor shall be provided where indicated on the drawings for all 120 volt, single phase motors. Manual switches shall be Allen-Bradley Bulletin No. 600, Cutler Hammer, or Square D Company of drip-proof construction.

8.4 Remote start-stop pilot light stations with lock-out stop buttons shall be heavy duty oil-tight pushbutton type Square D, Class 9001. Contacts shall be rated for 6 amperes at 120 volts.

8.5 Conduits terminating at the motors shall terminate in a cast iron terminal box provided by the motor manufacturer. The connections to the motors shall be made in sealtight flexible conduit with strain relief connectors. Bonding jumper to be provided over flexible conduit as specified in Article 5.2.3 above.

8.6 Conduits connecting to motors shall be installed so they will not interfere with space around the equipment.

8.7 Nameplates

Each load break switch, starter, circuit breaker or safety switch shall be marked with an engraved, laminated, colored phenolic nameplate. Lettering and/or numbering shall be positioned on the front of the equipment so as to be clearly visible. The engraving shall be a minimum of 3/16 in. in height with white enameled undercut characters on a dark background, The legend on the nameplates shall be so composed as to clearly indicate the function of the equipment and shall be secured to the equipment with screws. Colors shall be as directed by the Owner.

9. PUBLIC ADDRESS & FIRE ALARM SYSTEMS

9.1 Public Address System

9.1.1 Contractor to install public address handsets as shown on drawing. Handsets and wiring to be purchased and delivered to the site by Du Pont. Wiring to be terminated in the P.A. junction box as shown on drawings.

9.2 Fire Alarm System

9.2.1 Contractor to purchase and install fire alarm repeater buzzers as shown on drawings. Wiring to be terminated in the F.A. junction box as shown on drawings.

10. FINAL INSPECTION AND TEST

10.1 Prior to test, all feeders, subfeeders, and branch circuits shall be continuous from origin to each outlet; all panels, feeders, equipment, and devices connected and fuses in place.

10.2 The Contractor shall perform all of the megger testing (2500 volt d.c.) of motors, motor feeder cables, motor control centers, lighting and power distribution panels and lighting panels.

10.2.1 Motor feeders resistance range to be acceptable if 300 to 1000 megohms per 1000 ft of cable.

10.2.2 Motor control centers: 10 megohms/section. Under adverse humidity conditions, minimum acceptable is 1 megohm/section.

10.2.3 460 volt motors: 50 megohms.

10.2.4 Lighting and distribution panels: Expect 10 megohms; acceptable, 1 megohm.

10.2.5 When tests do not meet the minimum acceptable values stated, the specific item shall be reviewed with Du Pont so that a mutually acceptable solution to the deficiency may be resolved.

10.2.6 Contractor to provide testing equipment necessary to conduct all tests. Du Pont shall be notified of time of test so that authorized representative may witness same, if desired. Submit three certified copies of test reports to Du Pont.

10.3 All components, both singularly and as a whole, shall be adjusted and left in a satisfactory operating condition.

10.4 All overload devices, including equipment furnished under other divisions of the specifications, shall be set and adjusted to suit the load conditions and all tests made to determine actual loads. This Contractor shall be responsible for proper rotation, and final adjustments to all motors.

10.5 All parts of the installation, including cabinets, panels, lighting fixtures, etc., shall be cleaned, dusted, and washed before final acceptance.

10.6 All equipment will be inspected just prior to close up by representatives of Contractor and Owner for completeness and cleanness of installation.

Local Building, Electrical and Fire Codes

National Electrical Code

Standard Rules of American Institute of Electrical Engineers

National Electrical Manufacturers' Association (NEMA)

Applicable provisions of the National Fire Protection Association (NFPA)

2.3 Electrical classification of the building is general purpose.

2.4 The drawings made specifically for the electrical work for this contract are:

W-432541	W-436342
W-432542	W-436343
W-433841	W-436344
W-434801	W-442202
W-435106	W-442227

3. REQUIREMENTS

3.1 Coordinate the installation of wiring, raceways, outlet boxes, panel boards, sleeves, anchors, and other concealed or embedded items so that this work is properly in place before concrete or partitions are in place.

3.2 Electrical system layouts indicated on drawings are generally diagrammatic except if dimensioned, and locations of outlets and equipment are approximate. Routing of raceways and location of outlets and equipment shall be governed by structural conditions and obstructions.

This is not to be construed to permit redesigning systems, and outlets shall be interconnected as shown on drawings. Locate and install equipment requiring frequent maintenance and operation so it will be readily accessible. The right is observed to make any reasonable change in location of outlets and equipment prior to "roughing-in" without involving additional cost.

Work indicated, but having details omitted, shall be provided complete to perform function intended, without extra cost.