

ATTACHMENT 2 : SAMPLE CONTAINER SPECIFICATION

- Building dimensions: Width: 2,4m to 3m (8ft. to 10ft.)
- Length: 3m to 9,1m (10ft. to 30ft.)
- Ceiling height: 2,4m min. (8ft)
- Outside height: 2,8m min. (at 2,4m ceiling height)
- Floor (layers from below): hot dip galvanized steel covering, fiberglass insulation with vapor barrier, timber frame construction, chipboard (formaldehyde free).
- Floor covering: pure polyvinyl chloride welded seam flooring.
- Optional flooring: antistatic cladding for special purposes, wall-to-wall carpets in different colors and quality, synthetic resin flooring for wet unit, aluminum or stainless steel tread plate etc.
- Walls (layers from the outside): pre-finished, micro corrugated hot dip outside cladding: painted and galvanized metal outer skin, fiberglass insulation with vapor barrier, timber frame construction, washable, white laminated chipboard interior (formaldehyde free) or inside cladding: wallpaper -or vinyl- covered gypsum board.
- Roof (layers from outside): hot dip galvanized steel sheets, PU sandwich ceiling panel with white painted and galvanized steel covering.
- Windows: Plastic frame, double glazed windows, white in color.
- Basic sizes: cca. 900 x 1200 mm one leaf with tilt and turn opening for office & living units with window screen, cca. 600 x 450 mm one leaf with tilt opening for ablution units.
- Doors: steel framed and hot dip galvanized steel covered core for entrance door, fireproof insulated.
- Interior doors: white laminated core with timber or steel frame. Hardware: Lockset on all doors except sanitary which shall have a privacy lockset.
- Heating & Cooling (optional): Wall mounted baseboard electrical heaters with integral thermostat, Through-the-wall mounted, electrical room air conditioner or split cooling system.
- Ventilation: through-the-wall extractor fan (for wet units) etc.
- Lighting and Plugs: 1.2-m single incandescent ceiling fixtures 1x36W with wall switches, in the wet units same as above with ground fault protected circuit.
- Power Supply: 220 Volt AC, single phases 50 Hertz. (according to European codes). Main consumer box labeled and located for easy access.
- Sanitary installations: Fixtures: plastic shower stall with curtain, lavatory basin, toilet cabinet, wall-hung urinals, water heater, exhaust fan etc. Sufficient hot-water heaters are included.
- Plumbing: exposed copper or plastic pipes and fittings (minimum 18-mm diameter) with lead free solder joints (at copper pipes), drain lines exposed polyvinyl chloride pipes, drain stub-out at short side of unit. All plumbing is exposed for easy of maintenance. Optional: Vented black/grey water drain pipes with 50-mm vent.
- Insulation: The basic unit has an average U-value of 0,5 Watt/m² Kelvin with 80-mm insulation. The windows and doors have a U-value of 1,4 Watt/m² Kelvin.
- Optional: arctic insulation with lower U-value depending on the site weather conditions.
- Color: All units are RAL 7032 pebble-grey in color.
- Optional: other RAL coded colors.

- Fire resistance: Classified as REI 30 (30 minutes)
- Design Loads: Wind Load: 35 m/s
- Roof: 1,7 kN/Sq.m.
- Floor: 2,0 kN/Sq.m.

ATTACHMENT 3: SPECIFICATIONS

SECTION – DOOR HARDWARE

FASTENINGS

Fastenings of proper standard type, size, quantity, and material shall be supplied with article of hardware. Machine screws and expansion shields shall be used for attaching hardware to concrete or masonry. Fastenings exposed to the weather in the finished work shall be of brass, bronze, or stainless steel, as applicable. Sex bolts, through bolts, or machine screws and grommet nuts, where used on reverse bevel exterior doors equipped with half surface or full surface hinges, shall employ one way screws or other approved tamper proof screws. Screws for the jamb leaf of half mortise and full surface hinges attached to structural steel frames shall be the one way type or other approved tamper proof type.

KEYING

Cylinder locks shall be keyed in sets or subsets as scheduled. [Cylinder locks shall be furnished with the manufacturer's standard construction key system.] Keys for cylinder locks shall be stamped with change number. Keys shall be supplied as follows:

Cylinder locks: 2 change keys each lock.

DOOR HARDWARE SUBMITTALS

Hardware Schedule

Hardware schedule shall list all of the materials to be furnished and shall be submitted for approval. The schedule shall include for each item: quantities, manufacturer's catalog numbers, hinge and door closer sizes, catalog cuts, location and hardware set identification, corresponding manufacturer's catalog numbers, applicable industry standards, lists of abbreviations, and template numbers. Because doors are not uniquely numbered, the Contractor shall devise door designations and prepare a schedule linking the door designations to the hardware sets. The following example is a suitable form for the hardware schedule.

Hardware Set 1:

1 1/2 pr.	Hinges, 4 1/2 inch by 4 1/2 inch butts, primed steel.
1 ea.	Lockset, dormitory or exit lock function.
1 ea.	Closer, traditional type, surface, holder arm, hinge side mounting.
1 ea.	Door stop, floor type, manual, with expansion shield and screw.
1 ea.	Threshold, extruded aluminum, 5 inches by 36 inches, flat type with fluted top.

Keying Schedule

Keying schedule shall be submitted for approval.

DOOR HARDWARE PACKAGING, MARKING, AND LABELING

Hardware shall be delivered to the project site in the manufacturer's original package. Each article of hardware shall be individually packaged in the manufacturer's standard commercial carton or container, properly marked or labeled so as to be readily identifiable with the approved hardware schedule. Each change key shall be tagged or otherwise identified with the door for which its cylinder is intended. Where double cylinder functions are used or where it is not obvious which is the key side of a door, appropriate instructions shall be included with the lock and on the hardware schedule.

DOOR HARDWARE PRODUCTS

GENERAL

Hardware shall be sturdy, easy to operate and to maintain, corrosion resistant, and of a quality consistent with theater of operations construction. Hardware shall be common types produced by multiple manufacturers and shall conform to recognized industry standards. Galvanized or prime painted steel shall be the minimum acceptable material quality. Brass, bronze, aluminum, and stainless steel are also acceptable materials. Hardware shall be as indicated in the task orders and as required to meet facility functional requirements and to provide proper door operation.

LOCKS AND LATCHES

To the maximum extent possible, locksets, latchsets, and deadlocks shall be the standard products of a single manufacturer. Manufacturer's standard knob and plain design shall be used.

Cylinder Locks

Cylinders shall have six or seven pins with paracentric keyway. Cylinders and the locks in which they are used shall be the product of the same manufacturer.

Padlocks and Hasps

Padlocks shall be [key operated]. Hasps shall be compatible with and of equivalent strength to the padlock shackles.

DOOR TRIM

Door Pulls and Pushplates

Use door pulls and pushplates on doors not having locks or latches. Door pulls shall be arm, drop ring, bar, or sectional type with or without plate bases. Pushplates may be plastic. Combination push pull plates may be used.

EXIT DEVICES

Exit devices (panic hardware) shall be surface vertical rod exit devices. When used on double doors, apply only on active leaf. Entrance shall be by thumb piece; the key shall lock or unlock thumb piece.

HINGES

Hinge sizes shall conform to the hinge manufacturer's printed recommendations. Hinges shall be as follows:

- a. Full mortise, plain bearing, butt hinges with straight edges and square corners, size 4 1/2 inches by 4 1/2 inches mortised into butt edge of door and the rabbet edge of door frame.
- b. Wrought steel tee hinges, surface mounted, size indicated.
- c. Double acting hinges.

Butt hinges are required for steel and flush wood doors, which are specified in SECTION: STEEL AND WOOD DOORS AND FRAMES. Hinges with loose pins on outswinging exterior doors shall have nonremovable pins. Use two hinges for doors up to 5 feet high, three hinges for doors from 5 feet to 7 feet 6 inches, and one additional hinge for every additional 30 inches or fraction thereof in height.

DOOR HARDWARE EXECUTION

APPLICATION

Hardware shall be located on doors in accordance with industry standards. Application shall be in accordance with manufacturer's recommendations. Door control devices for exterior doors, such as closers and holders, shall normally attach to doors with through bolts such as hex bolts and nuts. Install and adjust surface door closing devices in accordance with the templates and printed instructions supplied by the manufacturer of the devices. Insofar as practicable, doors opening to or from halls and corridors shall have the closer mounted on the room side of the door.

-- End of Section – DOOR HARDWARE

SECTION: PLUMBING, GENERAL PURPOSE

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

Substitutions

The Contractor may substitute equivalent materials and products as described in the following subparagraphs subject to approval of the Contracting Officer's Representative. If approved, the Contractor shall be responsible for the interface of these items into the plumbing systems and all other systems used in conjunction with, or connecting to, the plumbing systems. Locally available products that perform the functions of those specified or indicated in the task orders, but differ slightly in size, configuration, material, etc., may be substituted for products specified or indicated if approved by the Contracting Officer's Representative.

PART 2 PRODUCTS

2.1 PIPING MATERIALS AND ACCESSORIES

Materials and components shall be suitable for the pressures and temperatures encountered in the systems. Pipe materials for various services shall be in accordance with Table of Usage included for each type of system. Pipe fittings and valves shall be compatible with the applicable pipe materials. Jointing methods and materials shall be as recommended by the respective manufacturers and as specified herein. Where piping materials are designated by "Schedule No." or "Type" refer to Pipe Table Minimum Wall Thicknesses for additional information.

2.1.1 Drainage, Waste, and Vent Piping (DWV)

The piping materials for DWV systems shall be of the following types subject to the limitations in the Table of Usage DWV Piping Systems herein and any other limitations included herein or in the task orders.

2.1.1.1 Plastic

Pipe and fittings of polyvinyl chloride (PVC) or acrylonitrile butadiene styrene (ABS) designed for DWV service and suitable for jointing by solvent welding.

2.1.1.2 Copper

Pipe and fittings of copper designed for DWV service and suitable for jointing with solder.

2.1.1.5 Galvanized Steel

Galvanized Schedule 40 steel pipe with galvanized sanitary fittings, and suitable for jointing with threaded connections.

2.1.2.1 Plastic Polyvinyl Chloride (PVC)

Pipe and fittings of Schedule 40 PVC and suitable for jointing by solvent welding. Threads shall not be cut in Schedule 40 PVC pipe. Threaded connections, where required, shall utilize threaded adapters for solvent welding to PVC Schedule 40 pipe. If direct pipe threading is required for any reason, the PVC pipe shall be Schedule 80.

2.1.2.2 Plastic Chlorinated Polyvinyl Chloride (CPVC)

Pipe and fittings of Schedule 40 CPVC and suitable for jointing by solvent welding. Threads shall not be cut in Schedule 40 CPVC pipe. Threaded connections, where required, shall utilize threaded adapters for solvent welding to CPVC Schedule 40 pipe. If direct pipe threading is required for any reason, the CPVC pipe shall be Schedule 80.

2.1.2.3 Copper

Pipe shall be copper water tube, not lighter than that designated Type M, with fittings of pressure type wrought or cast copper or bronze and suitable for jointing with solder. Valves shall be bronze, copper, or brass.

2.1.2.4 Galvanized Steel

Pipe shall be galvanized Schedule 40 steel with galvanized malleable iron fittings and suitable for jointing with threaded connections. Valves shall be bronze or brass material.

2.1.7 Pipe Hangers and Supports

Pipe hangers and supports shall be standard types to suit the requirements. For horizontal piping, unless otherwise indicated in the task orders, the hangers shall be adjustable clevis type with attachments to suit the location

2.1.8 Miscellaneous Materials and Installation Accessories

2.1.8.1 Jointing Materials

Jointing materials such as solder, brazing supplies, solvent cements, gaskets, oakum, lead, pipe thread compound, and other necessities shall generally be types recommended by the respective manufacturers and as further specified herein.

2.1.9 Drains

Floor and shower drains, roof drains, area drains, and other types of drains that may be required shall be provided as indicated in the task order. Where details are not shown in the task order, the drains shall be of a type and size suitable for the application. Drains shall have bodies of cast iron or other suitable material and shall have removable grates. The outlet connection shall be the size of the connecting pipe. The tops of floor drains shall be essentially flat and flush with the adjacent floor.

2.1.10 Hoses and Flexible Connections

Hoses and flexible connections (for connecting pumps, etc., to piping) shall be provided as indicated in the task order. Hoses shall be suitable for the pressure, temperature, and type of media to be handled. Unless otherwise indicated, each hose shall be complete with end fittings as required.

2.2 FIXTURES

Where shown or described in the task orders, the fixtures shall be of the types indicated. The listing herein includes fixtures to be used in the event that specific types are not indicated in the task orders. Fixtures shall be provided with all necessary hardware, fittings, and accessories required for a complete installation.

2.2.1 Fixture Requirements

2.2.1.1 Fixture Selection

Fixtures shall be vitreous china unless otherwise indicated in the task orders, complete with all installation accessories such as traps, flush valves, faucets, stop valves, drain fittings, escutcheons, water supply tubes, and other necessary items.

2.2.1.2 Flush Valves

Flush valves shall be nonhold open type with backcheck stop and vacuum breaker.

2.2.2 Water Closets

Water closets shall be floor mounted or wall hung siphon jet, elongated bowl type, with black plastic elongated open front seat without top cover, wax type gasket, and other accessories for a complete installation.

2.2.2.2 Tank Type

Tank type water closets shall have either a unit mounted tank or elevated tank as indicated in the task order and shall be complete with connecting piping, float valve, and lever or pullchain operated flush valve depending upon the tank location.

2.2.3 Urinals

2.2.3.1 Individual Use Type

Urinals shall be wall hung, siphon jet type with integral trap, extended sides, top supply connection, and back outlet.

2.2.4 Lavatories

Lavatories shall be enameled cast iron, ledge back or shelf back type approximately 20 inches by 18 inches in size, with cast iron steel projecting brackets on the underside at the back for bolting to the wall in a manner that will prevent uplifting. Faucets shall be single lever or individual type.

2.2.5 Shower Bath Outfits

Shower bath outfits shall be provided with a tamper proof flow control device, either integral with the shower head or as a separate unit for assembly between the shower head and the arm. Shower heads shall be of the vandal resistant type.

2.2.6 Shower Cabinets

Shower cabinets shall be approximately 32 by 32 by 76 inches in size, shall be constructed of fiberglass reinforced plastic, and shall be furnished complete with shower rod and curtain, drain, and valves for hot and cold water with supply pipe to a vandal resistant shower head.

2.3 WATER HEATERS

Water heaters shall be package type electric units of the sizes indicated in the task order. Each unit shall be complete with all necessary safety and operating controls including temperature relief valves.

2.3.1 Electric Water Heaters

Electric water heaters shall be provided with adjustable thermostats and an additional high temperature cutout switch.

PART 3 EXECUTION

3.1 WORKMANSHIP

Materials and equipment shall be installed by workmen skilled in the type of work required and in accordance with recommendations of the manufacturer and good construction practice.

3.2 INSTALLATION

Install the plumbing system complete with necessary fixtures, fittings, traps, valves, and accessories. Water and drainage piping shall be extended 5 feet outside the building, unless otherwise indicated in the task order. Connect piping to the exterior service lines, or cap or plug if the exterior service is not in place. Sewer and water pipes shall be laid in separate trenches, except when otherwise shown. Install utilities below the frostline. If trenches are closed or the pipes otherwise covered before being connected to the service lines, the location of the end of each plumbing utility shall be marked with a stake or other acceptable means. A gate valve and drain on the water service line shall be installed inside the building as close to the floor or wall as possible.

3.2.2 Water Pipe, Fittings, and Connections

3.2.2.1 Utilities

The piping shall be extended to fixtures, outlets, and equipment. The hot water and cold water piping system shall be arranged and installed to permit draining. The supply line to each item of equipment or fixture, except faucets, flush valves, or other control valves that are supplied with integral stops, shall be equipped with a shutoff valve.

3.2.2.2 Cutting and Repairing

The work shall be laid out in advance to avoid unnecessary cutting of construction. Damage to buildings, piping, wiring, or equipment as a result of cutting shall be suitably repaired.

3.2.2.3 Protection to Fixtures, Materials, and Equipment

Close pipe openings with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water, chemicals, and mechanical injury. Upon completion of the work, the fixtures, materials, and equipment shall be thoroughly cleaned, adjusted, and operated.

3.2.2.4 Mains, Branches, and Runouts

Install piping as indicated in the task order. Pipe shall be accurately cut and worked into place without springing or forcing. Take care not to weaken structural portions of the building. Aboveground piping shall run parallel with the lines of the building, unless otherwise indicated in the task orders. No water pipe shall be buried in floors unless specifically indicated in the task orders. Changes in pipe sizes shall be made with reducing fittings.

3.2.2.5 Pipe Drains

Pipe drains shall be provided at low points in the water piping so that the entire piping system may be drained if desired. Drain connections shall have threaded plugs, caps, or a suitable drain valve. Disconnection of the supply piping at the fixture is an acceptable drain.

3.2.2.6 Expansion and Contraction of Piping

Allowance shall be made throughout for expansion and contraction of water pipe.

3.2.4 Joints

Installation of pipe and fittings shall be made in accordance with the manufacturer's recommendations. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted. Mechanical couplings may be used in conjunction with grooved pipe for aboveground, ferrous, domestic hot and cold water systems in lieu of unions, welded, flanges, or threaded joints. The gasket shall be molded rubber. Unions and flanges shall not be concealed in walls, ceilings, or partitions. Use unions on pipe sizes 2 1/2 inches and smaller, flanges shall be used on pipe sizes 3 inches and larger.

3.2.4.3 Copper Tube

Joints for copper tubing shall be made with soldered or brazed fittings. Tube shall be cut square with burrs removed. Outside surface of the tube where engaged in the fitting and inside surface of the fitting in contact with the tube shall be cleaned with an abrasive material before assembling. Joint material shall be as follows:

Cold Water	95/5 Solder
DWV	95/5 Solder
Hot Water	95/5 Solder or Brazing Alloy
Compressed Air	95/5 Solder or Brazing Alloy
Fuel Oil	95/5 Solder or Brazing Alloy

95/5 indicates 95 percent tin 5 percent antimony solder. Solder mixture shall not contain lead.

3.2.4.4 Plastic Pipe

Joints for plastic pipe materials shall be made with solvent cements suitable for the materials to be joined. Use threaded joints only where required for disconnection and inspection.

3.2.5 Dissimilar Pipe Materials

Connections to water heaters and connections between ferrous and nonferrous metallic pipe shall be made with dielectric unions or flanges. Connecting joints between plastic and metallic pipe shall be made with transition fitting for the specific purpose.

3.2.6 Pipe Hangers, Inserts, and Supports

Furnish and install pipe hangers, inserts, and supports in their proper and permanent location. Install inserts in correct locations before the concrete is poured. For wood construction, joists shall be bridged where necessary, using lag screws of the same diameter as hanger rods for hanger fasteners. Supports for plastic pipe shall be types recommended by the manufacturer. Pipe supports for insulated pipe shall have a diameter large enough to include the insulation.

The location of hangers and supports shall be coordinated with the structural work to assure that the structural members will support the intended load.

3.2.6.1 Horizontal Pipe Hangers and Supports

Horizontal pipe hanger support spacing shall be as recommended by the respective pipe manufacturers. Install hangers and supports at locations not more than 3 feet from the ends of each runout and not over 1 foot from each change in direction of piping.

3.2.6.2 Vertical Piping

Supports shall be located at intervals of not more than 8 feet from end of riser and near vent terminations.

3.2.7 Flashing for Roof and Wall Penetrations

Flashing and/or sealing shall be provided at piping projections through roofs or exterior walls to prevent water penetration. Flashing and sealing materials shall be suitable for the use and shall have configurations and chemical compositions compatible with adjacent construction materials.

3.2.8 Pipe Cleanouts

Pipe cleanouts shall be the same size as the pipe except that cleanout plugs larger than 4 inches will not be required. A cleanout installed in connection with drain piping shall consist of a long sweep 1/4 bend or one or two 1/8 bends extended to the place shown. A cast brass or cast iron ferrule with countersunk cast brass head screw plug shall be calked into the hub of the fitting. Plastic pipe cleanouts shall be threaded cleanout plugs. Cleanouts installed in finished floors subject to foot traffic shall be provided with a chrome plated cast brass, nickel brass, or nickel bronze cover secured to the plug or cover frame and set flush with the finished floor. Heads of fastening screws shall not project above the cover surface.

3.2.9 Relief Valves

No other valves shall be installed between the relief valve and the water heater. The relief valve shall be installed where the valve actuator comes in contact with the hottest water in the heater. Whenever possible, the valve shall be installed directly in a tapping in the tank or heater. When heaters are not provided with a relief valve tapping, the valve shall be installed in the hot water outlet piping. A discharge pipe the size of the valve outlet shall be connected to the valve outlet and terminated at a safe location.

3.3 FIXTURES AND FIXTURE TRIMMINGS

Angle stops, straight stops, or stops integral with the faucets shall be furnished and installed with fixtures. Plumbing fixtures and accessories shall be installed within the space shown.

3.3.1 Fixture Connections

Where space limitations prohibit standard fittings in conjunction with the cast iron floor flange, special short radius fittings shall be provided. Connections between earthenware fixtures and flanges on soil pipe shall be made absolutely gastight and watertight with a closet setting compound or neoprene gasket and seal.

3.3.2 Flush Valves

Flush valves shall be secured to prevent movement by anchoring the long, finished, top spud connecting tube to the wall adjacent to the valve.

3.3.3 Height of Fixture Rims Above Floor

Lavatories shall be mounted with rim 31 inches above finished floor. Wall hung drinking fountains shall be installed with rim 42 inches above floor. Wall hung service sinks shall be mounted with rim 28 inches above the floor.

3.3.4 Shower Bath Outfits

The area around the water supply piping to the mixing valves and behind the escutcheon plate shall be made watertight by calking or gasketing.

3.3.5 Fixture Supports

Fixture supports for off the floor lavatories, urinals, water closets, and other fixtures of similar size, design, and use shall be of the chair carrier type. The carrier shall provide the necessary means of mounting the fixture, with a foot or feet to anchor the assembly to the floor slab. Adjustability shall be provided to locate the fixture at the desired height and in proper relation to the wall. Support plates, in lieu of chair carrier, shall be fastened to the wall structure.

3.3.6 Backflow Prevention Devices

No plumbing fixture, equipment, or pipe connection shall be installed that will provide a cross connection or interconnection between a potable water supply and any source of nonpotable water. The backflow prevention device shall be located so that no part of the device will be submerged. Access shall be provided for maintenance and testing.

3.3.7 Access Panels

Access panels shall be provided for concealed valves, controls, dampers, or any item requiring inspection or maintenance. Access panels shall be of sufficient size and located so that the concealed items may be serviced, maintained, or replaced.

3.3.8 Traps

Each fixture and piece of equipment requiring connections to the drainage system, except grease interceptors, shall be equipped with a trap. Each trap shall be placed as near the fixture as possible.

3.4 INSULATION

Insulation for plumbing system piping and components shall be provided with manufacturer's recommended insulation.

3.5 TESTS, FLUSHING, AND STERILIZATION

3.5.1 Drainage and Vent System Testing

The testing medium may be either water or air. In water testing, all openings in the piping shall be tightly closed, except the highest opening and the system filled with water to point of overflow. Water shall be held in the system for not less than 15 minutes with no evidence of leaks. In air testing, the compressed air shall be introduced through any suitable opening

and all other openings shall be tightly closed. Test pressure of 5 psig shall be held for not less than 15 minutes without introducing additional air.

3.5.2 Water Supply System Testing

The water supply system shall be tested with potable water at a pressure of not less than 100 psig. The test pressure shall be held for 15 minutes with no evidence of leaks.

3.5.3 Fuel Oil and Compressed Air System Testing

Fuel oil and compressed air systems shall be tested with compressed air or nitrogen at a pressure of 125 psig. The test pressure shall be held for 15 minutes with no drop in test pressure.

3.5.4 System Flushing

After tests are completed, potable water piping shall be flushed. In general, sufficient water shall be used to produce a minimum water velocity of 2.5 feet per second through piping being flushed.

3.5.5 Sterilization

After pressure tests have been made, the entire domestic hot and cold water distribution system to be sterilized shall be thoroughly flushed with water of sufficient velocity until all entrained dirt and other foreign material have been removed, before introducing chlorinated material. The chlorinating material shall be either liquid chlorine or hypochlorite. The chlorinating material shall be fed into the water piping system at a constant rate at a concentration of at least 50 parts per million (ppm). A properly adjusted hypochlorite solution injected into the main with a hypochlorinator or liquid chlorine injected into the main through a solution feed chlorinator and

booster pump shall be used. The chlorine residual shall be checked at intervals to ensure that the proper level is maintained. Chlorine application shall continue until the entire main is filled. The water shall remain in the system for a minimum of 24 hours. Each valve in the system being sterilized shall be opened and closed several times during the contact period to ensure its proper disinfection. Following the 24 hour period, no less than 25 ppm chlorine residual shall remain in the system. Water tanks shall be disinfected by the addition of chlorine directly to the filling water. Following a 6 hour period, no less than 50 ppm chlorine residual shall remain in the tank. The system including the tanks shall then be flushed with clean water until the residual chlorine is reduced to less than one part per million. During the flushing period each valve and faucet shall be opened and closed several times. From several points in the system the Contracting Officer's Representative will take samples of water in properly sterilized containers for bacterial examination. The sterilizing shall be repeated until tests indicate the absence of pollution for at least 2 full days. The systems will not be accepted until satisfactory bacteriological results have been obtained.

SECTION INTERIOR ELECTRICAL

This section covers interior lighting and power systems in wood framed and metal framed buildings and includes outside lighting fixtures and equipment attached to the building structure. The Contractor shall incorporate the applicable requirements of this section to the specific project.

1.2 GENERAL REQUIREMENTS

1.2.1 Standard Products

Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products.

1.2.2 Nameplates

All major items of equipment shall have permanent nameplates that show the type, specific unit number, and electrical power requirements.

1.2.3 Electrical Compatibility

The Contractor shall provide equipment suitable for the service voltage and frequency.

1.4. ALTERNATES

Local procurement of wiring conductors will be permitted if the material meets European norm specifications. The Contractor shall be responsible for any modifications in the work that may be necessary to use the alternates.

1.5. OUTDOOR EQUIPMENT

Electrical equipment located outside of a building but dedicated to the functional operation of the facility shall be installed under the provisions of this specification.

1.6. SUBMITTALS

The Contractor shall submit, for information, drawings and manufacturer's information for all Contractor furnished material as required by the Contracting Officer's Representative.

1.7. DELIVERY AND STORAGE

All products, including Government furnished property, shall be protected from weather, dirt, and physical damage.

PART 2 PRODUCTS

2.1 GENERAL

The Contractor shall provide all new equipment except for items listed as Government furnished property in each task order.

2.2 GROUNDING

All grounding conductors shall be soft drawn copper and shall have green insulation when installed in conduit. Ground rods shall be 3/4 inch diameter by 8 foot long copper clad steel.

2.3 CONDUCTORS

Separate lighting and power outlet circuits will be provided. No aluminum conductors will be used in the construction of the facilities. All wires shall be terminated separately and labeled with circuit designations. To the covers of all panels, tags, lettered in English, showing panel description and designation, shall be affixed. Wire and cable installation throughout the facilities, unless otherwise noted, shall be run in cable tray as much as possible, branching off the tray in non-metallic conduit to the end-use device, light fixture, or outlet, as required. Cables from the main distribution panel, to the secondary section of the generator panel shall be plastic coated NYY-J. Cables for emergency lighting shall be specially marked. Wires and cables manufactured more than 12 months prior to the date of delivery to the site shall not be used. Plastic sheathed cable for installation in installation systems, in conduits, surface or flush mounted, 0.6/1 KV, DIN VDE 0271. Conductors 4 mm², 12 AWG, and smaller shall be stranded copper. Conductors larger than 4 mm², 12 AWG, shall be solid core copper.

2.3.1 Color Coding

Conductors shall be color-coded in accordance with VDE 0293

Neutral	Light Blue
Phase L1	Black

Phase L2	Brown
Phase L3	Gray
Ground	Yellow and Green

2.3.2 Power

For Branch Circuits: NYM-J cable in acc. to DIN VDE 0250-204

For Feeder Circuits: NYY-J cable in acc. to DIN VDE 0276-603

For Plenum Use: EPR in acc. to EN 60601-2-38.

2.3.1 Service Entrance Cable

Service entrance cable shall be aerial or underground as identified in the task order. Service entrance conductors shall be size No. 8 AWG or larger.

2.3.2 Nonmetallic Sheathed Cable

Nonmetallic sheathed cable (NM and NMC) is a factory assembly of two or more insulated conductors having an outer sheath of moisture resistant, flame retardant, nonmetallic material.

2.3.2.1 Type NM is approved for both exposed and concealed work in normally dry locations.

2.3.2.2 Type NMC is approved for both exposed and concealed work in dry locations, in moist, damp, or corrosive locations, and in outside and inside walls of masonry block or tile.

2.3.2.3 Type NM and Type NMC shall not be used as service entrance cable or embedded in concrete.

2.3.4 Conductor Insulation

Conductor insulation shall be suitable for the application.

2.4 LIGHTING FIXTURES

Fluorescent fixtures shall have electronic ballasts unless specifically indicated otherwise in the task order. Provide HID fixtures with tempered glass lenses when using metal halide lamps.

2.4.1 Lighting Accessories

Accessories such as straps, mounting plates, nipples, or brackets shall be provided. Suspended fixtures shall be provided with swivel hangers and suspension rods of 3/16 inch minimum diameter.

2.4.2 Lamps

All lighting fixtures shall be equipped with new lamps at completion of construction.

2.5 RACEWAYS

Conduit shall be socket connected using a solvent glue approved by the manufacturer. Suitable transition adapters shall be used for connection to screwed conduit raceway systems.

2.6 BOXES

Boxes shall be constructed of high impact resistant plastic.

2.7 DEVICE PLATES

One piece device plates shall be zinc coated steel, cast metal, or impact resistant plastic.

2.8 RECEPTACLES

2.8.1 Single and Duplex Receptacles

Single and duplex receptacles shall be rated at 20 amps and 220 volts and shall be Schuko two pole, three wire grounding type with polarized parallel slots.

2.8.2 Weather Proof Receptacles

Weather proof receptacles shall be mounted in a box with gasketed cover and cast metal cover plate. The cap shall be attached by a short length of chain or provided with a spring hinged flap.

2.8.3 Special Purpose Receptacles

Special purpose receptacles shall be of the type, rating, and number of poles required for the purpose.

2.9 WALL SWITCHES

Wall toggle switches shall be totally enclosed with phenolic compound bodies. Switches shall be rated at 15 or 20 amps and 220 volt a.c. service depending on the application.

2.10 CIRCUIT BREAKERS

Circuit breakers shall be thermal magnetic type and shall have voltage, current, and interrupting ratings as indicated.

2.10.1 Molded Case Circuit Breakers

Single pole breakers shall be full module size. Multi pole breakers shall be of the common trip type with a single operating handle installed at the factory. Breakers shall have interchangeable, adjustable magnetic trips in 225 amperes frame and larger. Breakers coordinated with current limiting fuses shall be rated at 100,000 symmetrical amperes interrupting capacity.

2.10.2 Low Voltage Circuit Breakers

Breakers 800 amps and above shall have continuous, short time withstand and interrupting current ratings and frame sizes as indicated. Breakers shall have adjustable solid state trip elements. Breakers shall be stored energy and shall be manually operated.

2.11 PANELBOARDS

Panelboards shall be constructed of sheet steel painted inside and out, shall be equipped with a hinged lockable door, and shall be rated for the voltage and ampere service intended.

Panelboards shall be equipped with molded case breakers.

2.12 SERVICE EQUIPMENT

Service disconnecting means shall be of the [enclosed molded case circuit breaker] [fusible safety switch] type with external handle for manual operation. Enclosure shall be sheet metal with hinged cover for surface mounting unless indicated otherwise.

2.13 POWER SWITCHBOARD ASSEMBLIES

Assemblies shall be metal enclosed, free standing, general purpose ventilated type and shall be installed to provide front access. Buses shall be copper or aluminum. Assembly shall be approximately 90 inches high. Arrangement of circuit breakers and other items specified shall be as indicated on the drawings. Circuit breakers shall be fixed typed molded case circuit breakers.

2.14 CABINETS

Cabinets for communication systems shall be zinc coated sheet steel and shall be equipped with a full width hinged door and flush catch. Boxes shall be provided with a 5/8 inch plywood backboard for installation of equipment.

2.15 FUSES

A complete set of fuses shall be provided for switches, panelboards, switchgear, and motors, as required. Fuses shall have a voltage rating not less than the circuit voltage.

2.16 MOTOR CONTROL

Each motor, or group of motors, requiring a single control shall be provided with a suitable controller that will perform the functions required of the motor. All motors of 1/8 hp or larger shall be provided with thermal overload protection. Polyphase motors shall have overload protection in each ungrounded conductor. The overload protection device shall be provided either as an integral part of the motor or controller or shall be mounted in a separate enclosure. Unless stated otherwise, the protective device shall be a manual reset. Single pole or double pole

tumbler switches designed for a.c. operation may be used as manual controllers when motor current rating does not exceed 80 percent of the switch ampere rating. Automatic control devices such as thermostats, float switches, or pressure switches may control the starting or stopping of motors directly, provided the devices are rated for the service intended. When the automatic device does not have the required load rating, it shall be used in combination with a magnetic starter to secure the same results. Each motor shall be provided with a disconnecting means even though not indicated. Switches shall disconnect all ungrounded conductors.

2.17 TRANSFORMERS

Utilization transformers shall be general purpose dry type in an indoor enclosure. Single phase or three phase transformers shall have not less than two windings per phase. Use of dry type transformers is limited to 500 kVA maximum. Use of auto transformers is not allowed. Standard taps shall be provided on the high voltage side.

PART 3 EXECUTION

3.1 WORKMANSHIP

Materials and equipment shall be installed by workmen skilled in the type of work required and in accordance with the recommendations of the manufacturer and good construction practice.

3.2 WIRING METHODS

Wiring shall consist of insulated conductors in raceway.

3.3 RACEWAY INSTALLATION

Raceways shall be sized for a maximum fill of 40 percent and shall be supported at intervals of not over 10 feet using pipe straps, conduit clamps, wall brackets, or ceiling trapezes. Install raceway horizontal and perpendicular to the room surfaces.

Rigid plastic conduit (Panduit) is the expected raceway material.

3.3.5 Roof Penetrations

Flash all raceway extending through roofs and seal it watertight.

3.3.6 Locknuts and Bushings Installation

Use locknuts and bushings to attach raceway to device boxes and enclosures.

3.4 CONDUCTOR INSTALLATION

Install conductors in a careful manner to avoid kinks or damage. Conductors pulled into raceway shall be lubricated where the pull begins. Splices shall be made in boxes or enclosures. No splices shall be pulled into the raceway. Conductor identification shall be made at the time of conductor installation.

3.5 LIGHTING FIXTURE INSTALLATION

Install lighting fixtures in a symmetrical pattern for best illumination, but individual fixtures may be field located to avoid interferences or to provide for a special lighting requirement. The lighting circuit loads shall be divided as equally as practicable between all circuit phases. Lighting fixtures shall not be connected directly to metal roof panels.

3.6 BOX INSTALLATION

Boxes for mounting light fixtures shall not be less than 4 inches square unless the fixture requires a smaller box. Boxes for wall switches shall be 48 inches above the floor. Boxes for wall receptacles shall be 34 inches above the floor. Connect boxes fastened to wood with wood screws or screw type nails.

3.7 WALL SWITCH AND RECEPTACLE INSTALLATION

Wiring shall be attached to the device with screw type terminals or solderless pressure type terminals having a suitable conductor release arrangement. No more than two switches shall be installed in a single gang position. Switches shall be rated at 15 or 20 amps and 220 volts a.c. service depending on the application.

3.8 PANELBOARD INSTALLATION

Panelboards shall be wall mounted so that top breaker operating handle is not more than 73 inches above the floor.

3.9 UNDERGROUND SERVICE CONDUITS

Install empty conduits for underground electric service cable and telephone cable as indicated. Conduits shall terminate approximately 5 feet from the building wall and 2 feet below the ground surface.

3.10 GROUNDING INSTALLATION

Except where specifically indicated otherwise, all exposed noncurrent carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductors, and neutral conductors shall be grounded. The ground connection shall be made at the main service equipment and shall extend and be connected to a ground clamp and ground rod at the service entry point of the building.

-- End of Section --