TECHNICAL SPECIFICATION

DEMOLITION AND DOWNTAKINGS

EXISTING SITE / BUILDINGS / SERVICES

IMPORTANT NOTES TO CONTRACTORS

PRICING THE DOCUMENTS

INCLUSIVE RATES AND PRICES

The quantities in this section have not been measured in accordance with SMM7.

A The Contractor shall include in his rates and prices for all works and materials necessary to complete the scope of works as shown or inferred on the demolition, drawings and specifications (if available) and a detailed site visit with the Design Consultants to establish in detail, the scope of the works; the Contractor shall not be entitled to any claim for additional monies due to his non-compliance or inability to do so.

QUANTITIES

B Contractors are responsible for procuring their own dimensions and quantities on the basis of supplied contract drawings, specifications and from information detailed internal and external inspection of the existing premises. Works **shall not** be subject to remeasurement; only where deemed necessary as a result of an authorised design variation issued by the Architect, will such be considered

C The Contractor shall include for making good within each item being priced

D Removals items shall include for removal and disposal off site unless otherwise stated

REMOVAL OF REDUNDANT SERVICES

The Contractor shall allow for completing all necessary inspections to ascertain the location and scope of works involved in removing all redundant services.Include for removing and capping all redundant services; include for all excavating and backfilling as required

E generally

The Contractor shall be responsible and include for the safe and structured disconnection of live site services to the areas of demolition

F generally

The Contractor shall allow for all necessary liaison and attendance with the local Utility Providers having apparatus in or immediately adjacent to the site

generally

The Contractor shall identify the individual requirements and works associated with providing the individual or temporary services requirements. Permanent services are included for else where

generally

Works associated with providing temporary services arrangements

generally

Removal of foul and storm water drainage including all breaking up, excavations, backfilling and making good all to be established from site inspection and survey with Architect and Engineer

generally

Removal of all existing rainwater installations, gutters, downpipes,drainage connection and the like

Generally

MATERIALS AND WORKMANSHIP

EXCAVATION AND EARTHWORK

General

A. The excavation is to be carried out to the lines and levels shown on the drawings or to such other dimensions as the Engineer or his representative may supply.

B. Excavation and backfilling shall be carried out in such a manner as to avoid damage to adjacent structures and the Contractor shall provide any temporary support that may be required. The Contractor shall be fully responsible for damages to any services or property which might be disturbed or damaged.

Nature of Ground

C. Ascertain the nature of the ground and sub-soil and determine whether water, running sand or any other difficulties are likely to be encountered or whether cutting by hand or mechanical means must be used.

D. Where mechanical excavation is used, the Contractor shall ensure that the sub-soil is capable at the bottom of the excavation to ensure that the ground at finished excavation level is not disturbed in any way. The excavation shall then be completed by hand to the finished levels required.

E. Remove any rocks encountered with wedges and levers or rock drills. Blasting will not be permitted on site.

F. Excavations must be kept dry regardless of the source of the water. If sump holes are necessary, the positions are to be approved by the Engineer.

G. Every precaution must be taken to ensure that moisture conditions in the soil are so controller as to have no deleterious effect on the foundations. Excessive drying out or wetting must therefore be avoided during construction. The bottom 3” of all excavation for concrete work is to be done on the same day as the concrete is placed on it.

Surplus Excavation

H. All surplus excavated material shall be moved from site. All cleared vegetation shall be burnt or otherwise disposed of by the Contractor as approved.

Approval of Bottoms

A. The excavation for all foundations shall be inspected by the Engineer or his representative before any concrete is placed and the Contractor shall give a minimum of twenty four (24) hours notice that such an inspection will be required.

MATERIALS AND WORKMANSHIP

EXCAVATION AND EARTHWORK (Continued)

Level and Ram

B. Level and ram surface of ground and bottom of all excavation to receive concrete or granular to attain a compaction density equivalent to 95% Standard Proctor density. Compaction of fill material is to be done with a 6 ton roller in layers not exceeding 6" compacted thickness.

C. The Contractor is to allow for watering where necessary and for delays which may occur to allow soil to dry out to an appropriate moisture content. Any soft areas which may develop during compaction shall be removed and replaced with selected excavated material.

Excessive Excavation

D. Should excavation be taken unnecessarily below formation level, the difference in level shall be made up with approved material and compacted as specified before at the Contractor's expense. Over excavation below formation level specifically under footing, tie beams, etc., shall be made up in concrete of 1:12 mix at the Contractor's expense.

Damp-proof Membrane

E. The damp-proofing is to be Polythene (polyethylene) sheeting 500 gauge (0.005" thickness).

F. The Polythene sheeting is to be laid over blinded hard-core with minimum 12" end and side laps and carried over walls for the full area of the ground floor slabs.

Geotextile Filter Fabric

G. Filter/separators for ground stabilization shall be nonwoven geotextiles composed of Polypropylene fibers which are formed into a stable network such that the fibers retain their relative position. They must be inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids.

H. Where overlays are required, a minimum of 150mm overlay should be used, and these should be taped, glued or stapled if possible.

Pricing

A. Prices for Excavation and Earthwork shall include:-

1. All considerations arising from the specification.
2. Hand and/or mechanical excavation and disposal in whatever types of soil fillings are encountered, excluding concrete and rock, but including roots,

MATERIALS AND WORKMANSHIP

EXCAVATION AND EARTHWORK (Continued)

drain pipes and other obstructions, and the Contractor shall judge for himself the nature of the conditions.

3. Separating vegetable soil from sub-soil including the provision of separate spoil heaps.

4. Extra difficulties of getting out, disposal and the extra bulking of concrete and rock.

5. Planking and strutting lift in at the Contractor's volition.

6. Temporary retention of fillings.

7. Disposal of trees and other vegetation cut down and grubbed up.

8. Excavation in gravel, hard-core and hard marl.

9. Sheet Piling.

MATERIALS AND WORKMANSHIP

CONCRETE WORK

Scope of Work

A. This work includes the supply of all labour, materials, equipment and services necessary to complete all concrete work as shown or implied on the drawings and/or specification. This includes, but is not necessarily limited to, the following:-

(i) Plain or mass concrete.

(ii) Reinforced concrete

(iii) Reinforcement

(iv) Formwork

General

B. The reinforced concrete works have been designed generally in accordance with the recommendations contained in the British Standard Code of Practice C.P. 8110: 1997 - "The Structural Use of Reinforced Concrete in Buildings", and they are to comply with the recommendations made in Sections 2, 5, and 6 of this Code of Practice whether referred to or not, unless specifically excluded or modified hereafter.

C. Unreinforced concrete works shall comply with all the relevant requirements for reinforced concrete.

Supervision

D. All work is to be supervised by a foreman experienced in concrete construction.

Materials

E. All materials used in the works shall comply in all respects with the current issue of the relevant British Standard, except for any deviations specifically authorized in subsequent clauses of this specification.

Responsibility

F. No approval or acceptance by the Engineer or his representative shall in any way relieve the Contractor of his responsibility for the quality of materials and the standard of workmanship in the finished works, and for the strength, durability and appearance of the finished concrete works.

Cement

G. The cement shall be normal setting Portland Cement complying with B.S.12:1969.

MATERIALS AND WORKMANSHIP

CONCRETE WORK (Continued)

A. All cement shall be delivered in the original sealed containers of the manufacturer. No re-bagged cement will be permitted to be brought on to the site. On no account shall a change in the type or source of supply to permitted during the course of construction and every endeavour shall be made to ensure that the colour of the cement is constant throughout the contract.

Aggregates

B. Fine aggregate shall comply in all respects with B.S. 882 and shall consist of well graded coarse sand, mainly passing a 3/16" test sieve as defined therein.

C. The coarse aggregate shall comply in all respects with B.S.882 and shall consist of natural gravel crushed stone with grading of nominal size from the maximum shown down to 3/16". The grading between the stated limits shall be such as to produce a dense concrete of the specified proportions and of a consistency that will work readily into position without segregation and without the use of an excessive water content.

D. All aggregates shall be clean and free from impurities. If and when considered necessary all aggregates shall be sifted and washed to the Engineer's satisfaction without extra charge.

E. Samples of aggregate are to be submitted to the Engineer for approval at commencement of the work. Once the site sample has been approved by the Engineer the Contractor shall make arrangements with his aggregate supplier to establish that ample supplies of both fine and coarse aggregate of the quality and colour selected are available to complete the contract.

Water

F. The water to be used in the works shall be cleaned and free from all harmful matter in suspension or solution.

Storage

G. All cements shall be stored in a weather proof shed of adequate size having a raised dry floor, or in silos of approved design.

H. Aggregates shall be stored on hard paved areas with adequate dividing walls, or in approved containers, to prevent mixing of different types of aggregate.

I. Cements and aggregates shall be used in the order in which they are received on site, and their storage shall be arranged to facilitate this procedure.

J. Reinforcement shall be stored in racks clear of the ground.

K. Where materials are to be stored on suspended floors or roofs the Contractor shall ensure that such storage will not overload or distort the structural frame.

CONCRETE WORK (Continued)

Rejected

A. All materials which have been damaged or contaminated, or have deteriorated or do not comply with the requirements of this specification shall be rejected and shall be removed from the site immediately at the Contractor's expense.

Quality

B. The contractor shall keep on the site three 6" steel cube molds and a slump measuring cone throughout the course of the contract, and shall allow for the making and testing 3 test cubes for each pour or as directed by the Engineer. The cubes shall be crushed at 7 days or 28 days as directed by the Engineer. Slump tests shall be made at intervals during each poor. The concrete shall be expected to have a slump of about 2" and a slump of more than 4" will not be permitted unless specially agreed to by the Engineer. All testing shall be done in accordance with B.S. 1881:1970, "Methods of Testing Concrete". Concrete strengths shall be as specified on the drawings. 7 days cube strengths are to be 80% of the required 28 day cube strength.

C. In the event of the specified cube strength not being met, that part of the structure which is affected shall be subjected to much other tests as the Engineer may direct, and subsequently may be required to be strengthened if possible or cut out and rebuilt, as the Engineer may direct, all at the Contractor's expense.

Mixing

B. Mix proportions shall be designed by the Contractor for each structural concrete mix specified. The mixes shall be designed to have sufficient workability to allow concrete to be placed and properly compacted by the methods to be used on site.

D. Aggregates shall be measured by WEIGHT. Cement shall be measured by WEIGHT using one or more complete bags to a batch.

E. The quantity of water used in mixing the concrete shall be the minimum necessary to produce a workable mix. Due account shall be taken of the water content of the aggregates, especially following heavy rain.

F. Mixing of the concrete shall be done in a approved mechanical mixer until there is a uniform distribution of materials and the miss is uniform in colour and consistency, but In no case should the mixing continue for less than 2 minutes.

G. The volume of mixed materials in each batch shall not exceed the rated capacity of the mixer. Each batch of concrete shall be completely discharged before the mixer drum is recharged. The mixer drum shall be thoroughly washed out whenever mixing ceases.

CONCRETE WORKS (Continued)

Placing

A. The concrete shall be handled so as to avoid segregation, pollution or loss of the ingredients and shall be placed within 30 minutes from the time of adding the water to the mix and shall not be subsequently disturbed.

B. The concrete shall not be deposited through a chute, dropped through a height greater than 6 feet or deposited through water without special permission of the Engineer.

C. The concrete shall be deposited in the forms as nearly as possible in its final position. Concrete shall be placed while still sufficiently plastic for adequate compaction. The Contractor shall keep on site a complete record of the Works showing the time and date when concrete is placed in each part of the Works. This record shall be available at all times for inspection by the Architect and Engineer.

Compacting

D. Concrete shall be thoroughly compacted during placing and shall be carefully worked around all reinforcement and embedded fixtures and into the sides and corners of the formwork using heavy-duty high frequency poker vibrators, and be additionally tamped and rammed so as to form a dense homogeneous mass.

Curing

E. The concrete, after being placed, shall be protected from the effect of sunshine and rain. All exposed surfaces of concrete shall be completely covered with hessian or other approved material and kept constantly wet for 3 days.

F. Soffit and side forms left in position and watered will be regarded as effective in keeping those surfaces wet.

G. Proprietary curing compounds may be used with the permission of the Engineer.

Ready-mixed Concrete

H. Ready-mixed concrete may be used subject to the joint prior approval of the Architect and Engineer and provided the following additional requirements are complied with:-

(a) The concrete shall be transported to the site in approved containers and shall be continuously agitated until it is placed in its final position.

(b) No water shall be added to the aggregate and cement in the mixer until instructions to do so are given by the foreman on site.

(c) Discharge of concrete shall be completed within 1/2 hour of adding the mixing water to the aggregate and cement.

CONCRETE WORKS (Continued)

Ready-mixed Concrete (continued)

A. (d) The Contractor shall obtain certificates showing batch records of the quantities by weight of all the solid materials, of the total water used in mixing and of the results of all tests. These certificates shall be produced for the Engineer when required.

(e) A minimum of three site test cubes per 10 cubic yards of concrete delivered shall be made and tested in accordance with B.S. 1881 if so required by the Engineer and at the Contractor's own expense.

B. (f) In all other respects the ready-mixed concrete shall comply with the requirements of the specification for concrete.

Wet Weather Concreting

C. Concreting during periods of constant rain shall not be permitted unless aggregate stockpiles, mixes and transporting equipment and the areas to be concreted are adequately covered.

D. During showery weather the Contractor shall ensure that work can be concluded at short notice by the provision of stop ends. On no account shall work be terminated before each section between one stop end and another is completed.

E. Adequate covering shall be provided to protect newly placed concrete from rain,

Formwork

F. Formwork and its supporting members shall be sufficiently strong to carry the works and all incidental loading. The props and lateral supports shall be sufficiently closely spaced to prevent displacement or visible deflection of the shutters under the weight or hydraulic pressure of the wet concrete. All joints in the formwork and joints between the formwork and previous work shall be sufficiently tight to prevent loss of liquid from the concrete through these joints.

G. The Contractor shall allow for a visit to his timber merchant accompanied by the Architect who will select typical sample boards. Not less than three sample boards of each specified width and species of timber shall be submitted to the Engineer for his approval. Such approval shall not relieve the Contractor from responsibility for ensuring an adequate supply of the required quality to produce the desired finish throughout the work.

H. The vertical propping to all formwork shall be carried down sufficiently far to provide the necessary support without damage, overstress or displacement of any part of the construction. Structural props shall be retained in position until new construction is sufficiently strong to support its own weight and any loads to be placed on it during the contract period.

CONCRETE WORKS (Continued)

Formwork (cont'd)

A. Unless otherwise detailed on the drawings the formwork of all floor beams and slabs shall be constructed with an upward camber giving rise at midspan of 1/8" for each 10' of span. For roof beams and slabs the formwork shall be cambered to give a rise at midspan of 1/4" for each 10' of span.

B. The internal faces of the formwork may be coated with an approved preparation to prevent adhesion of the concrete to the forms, provided that this preparation shall not be allowed to touch the reinforcement. Immediately before the concrete is placed in any section of the formwork, the interior of that section shall be completely cleared of all extraneous materials. Each section of the formwork to structural members shall be inspected and passed by the Engineer's representative immediately before the concrete is placed 8" that section.

C. The structure shall not be distorted, damaged or overloaded in any way by the removal of the fomwork from concrete members. The responsibility for the safe removal of any part of the formwork or strutting shall rest with the Contractor. Before the formwork is removed from any structural member the Contractor shall ensured that the concrete in that member has attained sufficient strength for striking to proceed.

Reinforcement

D. All reinforcement steel bars shall comply with B.S. 4449. Equivalent substitutions may be permitted if application is made to the Engineer six weeks prior to their projected use on site. The application shall be accompanied by sufficient technical data to enable the Engineer to appraise all relevant properties of the steel. Such steel shall comply with B.S. 4449.

E. Welded steel fabric shall comply with the recommendations of B.S. 1221. All mesh shall be delivered to site as flat sheets.

F. Reinforcement bending schedules may be provided listing the cut length, diameter or size, bending dimensions and location of each bar in the works.

G. Before the bars are cut to length the Contractor must check.

1. that reinforcement schedules are provided for each part of the structure sufficiently in advance of his concreting programme.

2. that each schedule includes the correct quantities of reinforcement as detailed on the drawing to which it relates, and

3. that the grades of reinforcement given in each schedule correspond to those shown on the relevant drawing.

The Engineer shall be notified of any errors disclosed by these checks.

MATERIALS AND WORKMANSHIP

CONCRETE WORK (Continued)

Reinforcement (Continued)

A. All reinforcement bars shall be accurately shaped, in a manner that will not injure the material, to the details shown on the drawings and bending schedules. Bars shall not be bent hot. The minimum diameter of former to be used when bending high tensile bars shall be six times the bar diameter except for links, stirrups and ties. These shall fit tightly around the bars at their corners.

B. All reinforcement shall be freed of all loose mill scale and thoroughly cleaned to remove all loose rust, oil, grease or other harmful matter, immediately prior to being placed in position in the works.

C. All reinforcement shall be accurately placed, securely fixed and adequately maintained in the positions shown on the drawings. The concrete cover to the reinforcement detailed on the drawings shall be maintained by use of approved methods. The Contractor shall supply and fix all necessary chairs required to maintain the reinforcement in the correct position. The spacing of chairs and the diameter of bars used in heir manufacture shall be agreed with the Engineer. All laps of fabric and all intersections of bars shall be securely connected with malleable iron wire of suitable size or by another approved method. No metal part of any device used for connecting bars or for maintaining reinforcement in the correct position shall remain permanently within the specified minimum concrete cover to the reinforcement. The minimum concrete cover to reinforcement shall be as specified on the structural drawing.

D. The placing and fixing of all reinforcement between successive construction joints shall be completed, inspected and approved by the Engineer before the concreting of that section of the structure begins. The Contractor shall give the Engineer 24 hours notice of the times for these inspections.

E. Welding of steel reinforcement is not required. No welding of reinforcement shall be put in hand without the written permission of the Engineer.

Construction Joints

F. The positions of construction joints shall be approved by the Engineer. The joints shall be hacked to remove all laitance or loose material and thoroughly washed down before the adjacent section is concreted.

Mortices, Holes, Chases in Concrete

G. Fixing blocks, ends of brackets, bars, bolts, etc. shall be cast in the concrete at the time of placing and all mortices, holes, apertures, chases, grooves, etc. shall be accurately set out in the formwork as the concrete is placed. No part of the concrete works shall be cut away for any such item, or for any other reason, without the Architect’s and/or engineer’s permission.

MATERIALS AND WORKMANSHIP

CONCRETE WORK (Continued)

Mortices, Holes, Chases in Concrete (cont'd)

A. The Contractor shall obtain all Sub-Contractors complete information for their requirements regarding conduits, pipes, fixing blocks or boxes, chases, holes and any other items to be cast or formed in the concrete members, subject to the condition that failure of a Sub-Contractor to supply such information shall not be allowed to delay the progress of the Contract.

B. The Contractor shall ensure that Sub-Contractor's requirements relating to concrete members are approved by the Architect and engineer before work is commenced.

Blinding

C. A 2" layer of blinding concrete (1:4:8) mix shall be placed under all foundations and ground beams.

Finishing Concrete

D. After the removal of the formwork no treatment of any kind other than that required for curing the concrete, shall be applied to the concrete faces until they have been inspected by the Engineer's representative.

E. All concrete faces which are to be plastered or rendered in the finished works shall be thoroughly hacked with a suitable tool to provide an adequate surface key. The use of adhesives or other preparations on any concrete faces shall be subject to the prior approval of the Engineer.

F. Should any patching of exposed concrete surfaces be required, the concrete or mortar of the patch shall be proportioned so as to match the appearance of the adjacent concrete.

G. The surface of all concrete slabs shall be floated to a uniform smooth surface unless otherwise specified.

H. Concrete floor slabs shall be cast in bays of 400 square feet maximum, an interval of 48

Pricing

I. Prices for Concrete Work shall include:-

1. All considerations arising from the specification.

2. Where concrete is cast in earth cuts (i.e. not described as filled into formwork) for any additional concrete over the size stated or shown necessitated by the irregularity of the surface retaining the concrete.

MATERIALS AND WORKMANSHIP

CONCRETE WORK (Continued)

Pricing (cont'd)

3. Cutting, bends, hooks, tying wire, distance blocks and ordinary spacers for reinforcement. The total weights of reinforcement given have been calculated at the weights given in the relevant British Standard.

4. All cleaning and oiling of forms and making good for exposed concrete surfaces after removal of formwork, e.g. cutting off projecting fins, filling out small voids and brushing to exposed aggregate.

5. Where formwork is described as "wrought" or "dressed" for producing a "fair face" finish either by lining the formwork with suitable material and/or filling in voids etc. and rubbing down to a smooth finish to the Engineer's approval.

6. Transporting concrete, hoisting or lowering, placing in position, working around reinforcement where necessary and curing.

7. Formwork including all temporary supports and strutting, notches, overlaps and passings at angles, easing, striking and removing.

MATERIALS AND WORKMANSHIP

BLOCKWORK

Cement and Water

A. Cement and water shall be described under "CONCRETE WORK"

Sand

B. Sand shall be clean fine plastering sand, free from salt, organic matter, clay, loam, dirt or other deleterious matter.

Plasticiser

C. Plasticiser shall be "Rendaplas" or other equal and approved and used in accordance with the manufacturer's instructions.

Mortar

D. Mix mortar for blockwork of cement and sand (1:3) mixed on site in a similar manner to concrete including a plasticiser additive at the rate of quarter pint of plasticiser to every bag of cement and use within one hour of mixing. Mortar which has commenced to set is not to be knocked up again for re-use.

Clay Blocks

E. Hollow clay blocks shall conform to B.S. 3921:1965 of first quality, good, sound, hard and well burnt, true to shape and size, ribbed and scored for plaster, unless otherwise described.

Concrete Blocks

F. Concrete blocks shall conform to B.S 1180:1944 of first quality, good, sound, hard and well cured and true to shape and size of the types described. Where plaster finish is required on concrete blocks, rough textured type blocks shall be supplied; where "fair face" finish is required all blocks shall be smooth textured with clean unbroken edges.

Laying Blocks

G. Thoroughly wet clay blocks before laying. Solidly bed all joints of blockwork with mortar 3/8" thick. Tool joints of exposed blockwork which is not to be plastered for depth of 3/8" before the mortar has set to form a concave joint and leave the edges of blocks well defined.

H. Build blockwork in stretcher bond unless specifically stated otherwise and carry up regularly and truly with no part rising more than three courses above the adjoining work. Keep perpends, quoins, etc., strictly true and the whole properly bonded together. Build cross-walls at the same time with main walls and properly bond together. Special car shall be taken that all vertical joints are filled with mortar.

MATERIALS AND WORKMANSHIP

BLOCKWORK (Cont'd)

I. All walls of screen blocks or angle cut vent blocks shall be built fair face in stack bond and finished with flush pointed joints on both faces.

J. Expanded metal reinforcement shall be incorporated in the horizontal joints of blockwork every third course where described. Reinforcement strips shall be about 3" wide in 4" thick blockwork and s 4 1/2" wide in 6" thick blockwork and shall be laid with minimum 9" end laps.

K. Vertical reinforcement shall be incorporated win the "filled blocks" as shown on details. This reinforcement will be firmly anchored into the foundations.

L. Blockwork shall be tied to vertical steelwork or concrete column every third course, where described, with strips of expanded metal reinforcement 15" long, one end tack welded to the side of the steelwork or fixed in the column, and the other end bent and built into a horizontal joint of the blockwork. Ties shall be about 3" wide in 4" thick blockwork and 4 1/2" wide in 6" thick blockwork.

Any defective blocks found in the work shall be cut out and replaced by sound ones at the Contractor's expense.

MATERIALS AND WORKMANSHIP

ROOFING

A Guarantees

All guarantees shall be handed to the Architect at the end of the defects liability period.

B Galvanized Steel

Galvanized steel sheet roofing shall comply with BS 3083 (for standard corrugated sheeting).

C Aluminum

Aluminum sheet roofing shall comply with BS 2855 (for standard corrugated sheeting) and BS 3428 (for troughed sheeting).

D Fixing Roof Sheeting

The laying of sheets shall commence at the westernmost end of the roof slopes so that exposed edges are downwind. The bottom edges shall be carefully lined up so as to present perfectly straight lines on completion.

Fixing galvanized steel and asbestos-cement sheets to wood shall be with galvanised drive screws with plastic washers and covers, and to steelwork shall be with galvanized hook bolts with plastic washers and covers, alternatively they may be fixed with galvanized self-tapping screws and plastic washers.

Fixing aluminum sheets to timber shall be with aluminum alloy drive screws with saddles, plastic washers and covers, and to steelwork shall be with aluminum alloy hook bolts with plastic washers and covers, alternatively they may be fixed with aluminum alloy self-tapping screws and plastic washers.

Side laps of metal sheeting shall be secured with self-tapping screws of like material and plastic washers.

E Flashings

Flashings shall be of the material and thickness or gauge specified and shall be fixed with minimum 6 inch laps and wherever possible so that exposed edges of laps are downwind.

F ASPHALT WORK

Testudo Mineral Membrane (UV exposed membrane)

Elastoplastomeric, polymer-bitumen torch-on membrane, reinforced with rot-proof non-woven single strand spunbond polyester fabric

*1.0 Waterproofing

1.10 Roofs /Decks with UV exposed membranes

1.11 Where so designated on the drawings, surfaces shall be waterproofed with a high performance, single layer torch on, reinforced, polymer-bitumen waterproofing membrane system.

1.12 General

All surfaces shall be prepared, primed and the membrane applied strictly in accordance with the current manufacturer technical data sheet.
All work shall be carried out by a pre-qualified contractor, who is well trained in the application of the specific, documented, membrane system.
All materials used in conjunction with the new membrane system, shall be approved by the membrane manufacturer.

1.13 Surface Preparation

All surfaces to which the new membrane is to be applied, shall be smooth, clean, dry, and free from irregularities. Sand / cement fillets, polymer modified, shall be installed at all change in direction of substrate locations (e.g. from horizontal to vertical). With sheet membranes all internal and external corners shall be double detailed in accordance with the manufacture's recommendations.
All substrate cracks and surface imperfections are to be filled, sealed and dry prior to membrane application.

1.14 The membrane layer is to be 4.5kg, elasto-plastomeric, based on distilled bitumen, plastomers and elastomers, reinforced with non-woven spunbonded polyester fabric. When tested in accordance with UEAtc directive Jan 1984 shall exhibit the following properties:

Impermeability to water		>= 60 kPa	(EN1928)
Tensile strength	longitudinal:	750 N/5 cm	(UNI8202)
	transverse:	650 N/5 cm	
Ultimate elongation	longitudinal:	50%	
	transverse:	50%	
Service temperature:		-10°C to 100°C	(continuous ambient)
Application temperature:		5°C to 45°C	(ambient)

CARPENTRY AND JOINERY

DEFINITIONS

A Plugging

The term 'plugging' shall mean the provision and fixing of hardwood or approved proprietary plugs, or, at the Contractor's option, fixing by means of a cartridge operated rivet gun or other approved mechanical means.

B Finished Sizes

In accordance with the provisions of SMM clause P1 (b) wrought work is hereby described as being to finished sizes.

C Hardwood or the like

The term 'hardwood or the like' which is used as a statement of background to which ironmongery is to be fixed shall be deemed to include plywood and other manufactured materials except where these materials are faced with metal, laminated plastics or the like.

D Stored Materials

The items for remixing materials in the works described such materials as 'stored' and this description shall be deemed to include selecting, cleaning, removing from store to the appropriate location of the Works and fixing.

E Selected

The term 'selected' shall be to include for selecting the timber for appearance, matching adjacent pieces for similarity of grain and colour and keeping clean for staining, polishing, varnishing or similar finish.

F Softwood for Carpentry

Unless otherwise described softwood for carpentry shall be the best available of its type.

G Softwood for Joinery

Unless otherwise described softwood for joinery shall comply with BS 1186 Part I and shall be the best available of its type.

H Hardwood

The Contractor shall notify the Architect and shall obtain written approval in respect of the type(s) and source(s) of the hardwoods he proposes to use.

I Anti-termite, Treatment

All softwood, except imported manufactured items if already properly treated, shall be treated with an approved anti-termite compound applied under pressure in an approved treatment plant, such as the 'Tanalizing' and 'Wolmanizing' process. The only exception to this joinery timber is described as for varnishing or clear finish which shall be treatment with 'Atlas' or other approved clear preservative.

CARPENTRY AND JOINERY (Cont'd)

A **Adhesives for Timber**

Adhesives for timber shall comply with BS 1204 Part 1WBP for external work and MR for internal work.

B **Adhesives for Laminated Plastics Sheet**

The adhesives for fixing decorative laminated plastics sheet shall be one of those recommended by the manufacturer of the sheet.

C **Nails**

Nails shall comply with BS 1202 Part 1, bright finish unless otherwise described.

D **Wood Screws**

Wood screws shall comply with BS 121 0 and shall be galvanized steel unless otherwise described.

E **Fixing Accessories**

Fixing accessories unless otherwise described shall comply with BS 1494.

F **Mastic**

Mastic for bedding and/or pointing timber shall be Arbomast B. R. Sealant (Gun Garde) Secomastic Butyl or Sealastik Butyl (soft cartridge) unless otherwise described.

G **Samples or Materials**

Samples of specifically named hardwoods, veneered plywood and blackboards are to be deposited with the architect and approved by him before and the materials used shall be equal to such samples.

H **Storage of Materials**

Materials shall be protected from the weather during transit to the site and shall be stored under cover clear of the ground and protected from dampness. Timber for joinery shall be stored in clean, dry ventilated structures.

I **Moisture Content**

The moisture content of all timber for use in the Works shall be within the limits given in BS 1186 Part 1: 1971, for each use and shall be maintained until the building is completed.

J **Carpentry Generally**

The whole of the carpentry work is to be framed, fixed and executed in the best and most workmanlike manner. Joints shall be so placed that knots do not occur in tension zones.

The word 'framed' is to be understood as including all the best methods of jointing woodwork together by mortice and tenon, dovetail or other method.

In addition the quality of workmanship for structural timbers shall be not less than that recommended in CP 112 Part 5 as modified by any specific requirements given in these Preambles.

CARPENTRY AND JOINERY (Cont'd)

A **Carpentry Generally (Cont'd)**

Timbers when fixed are to hold the full thickness described less an allowance of 1/8 inch for each wrought face where specified.

B **Joinery Generally**

The quality of workmanship shall be not less than that set out in BS 1186 Part 2 as modified by any specific requirements given in these Preambles.

Nails, sprigs, etc. shall be punched below the surface; holes shall be stopped with putty or other equal and approved filler, specially selected to match colour and texture of timbers which are to be polished etc.

Screws, (other than brass screws with cups) shall be countersunk head wood screws driven to 1/2 inch below the surface. Screw heads in work for painting shall be stopped in putty or other equal and approved filler before any trace of rust appears; all rusted screws shall be replaced before painting. Screw heads in work described as flush pelleted shall be let in at least 1/4 inch below the surface and pelleted in grain with matching hardwood glued in.

Cross-tongued joints shall be glued.

Prices for wrought timbers, sheet materials etc., shall include for scribing to irregularities in other finishings, blockwork, etc., to give a tight even fit and for pencil rounding arises of exposed external angles and edges shown to be plain.

C **Framed Joinery**

Joinery work described as 'framed' shall be jointed using mortice and tenon, combed or dovetail joints only as defined in BS 11 86 Part 2.

D **Surface finish on Joinery**

The surface finish on joinery shall be such that if properly finished with a gloss paint imperfections in manufacture will not be apparent.

E **Double Tenons**

Lock rails shall have double tenons.

F **Cutting back Tenons**

Tenons in the edges of door stiles to receive clear finish shall be cut back 1/4 inch and made good with matching wood.

G **Door Frames and Linings**

Door frames and linings shall be constructed in accordance with BS 1567 and BS 459 part 3 except that profiles and sizes of individual members shall be as hereafter described.

CARPENTRY AND JOINERY (Cont'd)

A **Priming before Fixing**

Priming of or first coat of clear treatment on joinery before fixing has been measured in the painting and decorating work section but prices for joinery shall include for printing, lacquering or varnishing (as appropriate) any surfaces exposed by cutting and fitting.

B Ironmongery

Ironmongery shall be wrapped and protected until the completion of the work. Any which is found to be defective or damaged is to be replaced, as the Architect may direct, with new or re-lacquered at the Contractor's expense.

Locks, hinges, fastenings, etc., shall be oiled, adjusted and left in perfect working order on completion and keys are to be properly labeled and delivered to the Architect.

Fixing accessories e.g. screws, bolts, etc. shall be of appropriate metal to match the item of ironmongery unless otherwise described.

The prices for striking plates shall include for cutting back to suit the frames to which they are to be fixed.

The prices for fixing ironmongery, except hinges, shall include for removing before painting and subsequently re-fixing.

C Door

Doors shall be constructed in the joinery shops of the Contractor or by a specialist joinery manufacturer and not upon the site. Timber for use in doors shall be specifically selected for straightness and freedom from faults, tenoned, glued and wedged or pinned together. Plywood covering for doors shall be glued to the framework and lipped at vertical edges.

Cores for hollow semi-solid and solid core flush doors shall comply with the provisions of BS 459 Part 2.

MATERIALS AND WORKMANSHIP

STRUCTURAL STEELWORK

Scope of Work

The work includes, but is not limited to:-

1. Furnishing all labour, materials, tools, equipment and transportation required to shop detail, furnish, fabricate, shop paint and deliver and erect structural steelwork as shown on the drawings and specified herein.
2. Three (3) sets of shop detail and erection drawings and anchor bolt setting diagrams for all structural steel shall be submitted to the Engineer for approval at least seven days before fabrication is commenced. Any material fabricated before final approval of shop drawings will be done at the risk of the Contractor. Approval will not relieve the Contractor of his responsibility for correctness of connections and accuracy of fabrication.

Codes and Standards

The requirements of the applicable portions of codes, standards and specifications hereinafter mentioned, shall govern the work. Any procedure, material or operation specified by reference to the British Standards shall comply with the requirements of the current specification of standard listed. This Project Specification shall govern in any conflict between this specification and listed standards. In conflicts between standards the one having the more stringent requirements shall govern.

Materials

Structural steel shall be furnished in conformation with all specification requirements of the following governing authorities:

BS - British Standard Institution

Materials shall be as follows:-

1. Structural steel to BS 4360, Grades 43C
2. Standard strength bolts, nuts and washers to BS 4190
3. Round Bars — BS 4229: Part 2
4. High strength bolts, screws and nuts to BS 3692 Grade 8.8
5. Cold Rolled Zed purlins to BS 2994
6. Welding electrodes to BS 639 Class A
7. Shop paint shall be Zinc Chromate Metal Primer of approved equal;

All steel for structural steel work shall be weldable quality to BS 4360 Grade 43C except otherwise stated or agreed with the Architect.

STRUCTURAL STEELWORK (Cont'd)

Materials (Cont'd)

Steel rectangular hollow erections shall be to 13S 4360 Grade 43C.

Bolts and nuts shall comply with the requirements of BS 3692 Grade 8.8 and 13S.4190. Grade 4.6 as applicable and washers shall comply with the requirements of BS 4320: 1968. An adequate surplus of nuts, bolts, screws and washers shall be supplied to allow for losses and damage during erection.

Shop Details

Except as noted on the drawings or as otherwise specified herein, shop details shall be governed by BS 449:1969 Part 2 as revised and amended to date.

Substitutions of sections or modifications of design details or both shall be made only when approved by the Engineer and at no additional cost to the Employer.

All details shall develop full strength of main members and shall be of such design as to use the minimum amount of material. However, all connections of main members shall be at least equivalent to BS 449 standard connection.

All shop connections shall be welded unless otherwise noted or specified.

Field connections shall be made with high tensile steel bolts, except where so indicated on the drawings or allowed by the Engineer.

Bolt Holes

All holes shall be accurately marked off and drilled. No burning of holes shall be permitted.

Shop Drawings

Two copies of each of the Contractor's fabrication drawings shall be submitted to the Engineer for approval before fabrication commences. Should revisions be necessary, two further copies of the revised drawings shall be submitted to the Engineer. The Engineer's approval shall in no way relieve the Contractor of full responsibility for the accuracy or otherwise of the drawings

Fabrication Tolerances

All completed members shall be free from twists, kinks, bends and open joints.

A variation of 0.75nun is permissible in overall length of members with both ends finished for contact bearing.

Members without ends finished for contact bearing may have a variation from the detailed length not greater than 1.5mm for members 9m or less in length and not greater than 3min for members over 9m in length.

Shop Work

Shop work shall be governed by BS 449 as revised and amended to date.

STRUCTURAL STEELWORK (Cont'd)

Shop Work (Cont'd)

Rolled material, before being laid out or worked shall be straight within the tolerances allowed by BS 449. If straightening is necessary, it shall be done by methods that will not damage the metal. Gas cutting shall preferably be done by machine. Gas cut edges which will be subjected to substantial stress or which are to have weld metal deposited on them shall be free from gouges. Any gouges that remain from cutting shall be removed by grinding. All re-entrant corners shall be shaped notched-free to a radius of at least 12mm.

Welding shall be done in accordance with the requirements of the BS 5135:1974. All welding, whether shop or field shall be done by the electric-are method.

Every effort and precaution shall be taken and methods used in making continuous welds to avoid distortion of the member due to welding operations. Unless otherwise approved on the basis of results obtained, continuous welds shall be made up of intermittent welds spaced to prevent excessive heating of the metal and jointed into a continuous weld by filling in between intermittent welds with a series of short welds. Welds shall be solid and homogenously a part of the metals joined and free of pits or slag or scale inclusions. Surfaces of welds shall be uniform and regular and shall be full area indicated or required to develop the necessary strength of the joint.

Where noted on the drawings, structural members shall be shop-assembled, checked for alignment and match-marked to insure correct and accurate fit.

Shop Painting

After inspection and approval and before leaving the shop, all steelwork shall be cleaned by wire brushing or by other approved methods, of weld, slag, flux deposit, dirt and other foreign matter. Oil and grease deposits shall be removed with a solvent cleaner. Areas specified to have no shop paint shall, after fabrication, be cleaned of dirt and other foreign material by thorough sweeping with fibre brush.

All structural steel except concrete enclosed columns shall be given two shop coats of paint. Surfaces in contact alter assembling need have no paint. Surfaces of "friction type" high strength bolted connections, and surfaces within 50iiim of field welds shall not be painted.

Paint shall be mixed and applied in strict accordance with the paint manufacturer's printed directions. Each coat of paint applied to the steelwork, when dry, shall have a minimum thickness of 0.030mm.

Machine finish surfaces shall be protected against corrosion by a rust inhibiting coating that can be easily removed prior to erection or which has characteristics that make removal unnecessary prior to erection.

Delivery

Fabricated steelwork shall be delivered to the job site in accordance with sequence and schedule that will permit efficient, continuous erection. Steelwork shall be correctly and legibly marked and match marked.

Welding Procedure

Where it is necessary to weld two different grades of steel together the welding procedure for the higher grade should normally he adopted.

STRUCTURAL STEELWORK (Cont'd)

Weld Deposit

In all welding processes the electrodes or consumables shall give a weld deposit having mechanical properties not less than the minimum specified for the sections to be joined.

Welding Process

Manual metal arc welding process in accordance with BS 5135:1974 shall be used for all structural steelwork. The electrodes used shall be suitable for welding in all positions.

Specification for Electrodes

Structural steelwork to BS 4360 Grade 43C up to 19min thick shall be welded with electrodes conforming to BS 639:1976 Sections 1 and 2. When welding thicknessess are greater than those stated above for both grades of material electrodes to I3S 639 Sections 1 and 4 shall be used.

Welding Environment

Welding shall be carried out in a workshop under controlled conditions whenever practical. During site welding precautions shall be taken to protect the work piece from adverse weather conditions. When surfaces to be welded are wet they shall be heated until they are warm to the touch for a distance of not less than 75mm on either side of the joint. The surfaces to be joined shall be dry, cleaned and free from rust, oil, grease, paint or anything which is likely to be detrimental to weld quality.

Welding Positions and Sequences

The welding positions and sequences of welding work pieces shall be such as to prevent any distortion of the structural steelwork member.

Treatment of Steel Surface

Structural steelwork surfaces shall be wire-brushed to remove mill scale, rust and other deleterious materials to the approval of the Engineer, followed by the application in the workshop of the zinc chromate priming coats. The manufacturer's instructions shall be strictly adhered to for the steelwork preparation and protective application.

Delivery to Site and Erection

All machined edges and surfaces shall be adequately protected against damage during handling at site.

Temporary braces and/or stay wires shall be provided as necessary to hold the structure rigid against all loads including wind and shall not be removed until erection is complete and the steelwork is aligned and leveled to the satisfaction of the Engineer.

METALWORK

A Holes for Attachments

Where lugs and other subsidiary members are given in the descriptions of main members of plates, bars, sections or tubes, holes required for the screws, bolts or rivets by which the subsidiary members are attached to the main members shall be deemed to be included.

B Plugging

The term ‘plugging’ shall mean the provision and fixing of hardwood or approved proprietary plugs, or, at the Contractor’s option, fixing by means of a cartridge operated rivet gun or other approved mechanical means.

C Painting

The preparation of surfaces shall be deemed to be included with the items for painting. Specific requirements relating to the preparation of surfaces are given in the WORKMANSHIP section of these Preambles. In the absence of specific requirement surfaces shall be prepared in the manner recommended by the manufacturer of the paints being used.

D Welding

In the absence of specific requirements the techniques and materials employed in welding shall be selected with due regard to the character of the work and the metals being connected.

E Stored Materials

The items for refixing materials in the Works describe such materials as ‘stored’ and this description shall be deemed to include selecting, cleaning, removing from store to the appropriate location of the Works and fixing.

F Screws

Screws shall comply with BS 1210.

G Bolts

Bolts shall comply with BS 4190.

H Paints

Paints shall comply with the specification clauses given in the Materials and Workmanship section of the Preambles to the PAINTING AND DECORATING work section.

METALWORK (Cont'd)

A Galvanizing

Galvanizing shall comply with BS 729 Part 1. Where an item is described as 'galvanized after manufacture' the whole item shall be entirely coated with zinc after fabrication by complete immersion in a zinc bath in one operation, all excess zinc shall be removed to leave the finished surface clean and uniform.

B Storage of Materials

All components shall be stacked under and clear of the ground surface. Metal windows shall be stacked upright. Galvanized components shall not be stacked on rough surfaces.

C Fabrication Generally

All smithing and bending shall be soundly and neatly executed, care being taken not to overheat the metals being worked.

D Joints in the Running Length

The prices generally shall be deemed to include all joints in the running length of long members or composite units including those which may be introduced by the Contractor to facilitate transporting and fixing.

E Priming and Painting

Priming and painting shall comply with the specification clauses given in the Materials and Workmanship section of the Preambles to the PAINTING AND DECORATING work section.

F Holes

Holes shall be made to the exact sizes stated in the measured items and all burrs shall be removed before connections are made

G Grinding

Grinding shall be carried out by using a hand file or a suitable abrasive powder, the method chosen being suitable to obtain the finish described in the measured items.

H Connections

Drift pins, where used, shall not distort the work nor enlarge the holes.
All bolts shall be fitted with the correct washer and no thread shall bear upon the thicknesses connected.

PLUMBING AND ENGINEERING INSTALLATIONS

DEFINITIONS

A Welding

In the absence of specific requirements the techniques and materials employed in welding shall be selected with due regard to the character of the work and the metals being connected.

B Backgrounds requiring Plugging

The term 'backgrounds requiring plugging' shall mean any or all of the backgrounds described in SMM clause SI(h)(iv) and shall be deemed to include the associated plugging.

C Plugging

The term ‘plugging’ shall mean the provision and fixing of hardwood or approved proprietary plugs, or, at the Contractor’s option, fixing by means of a cartridge operated rivet gun, or other mechanical means.

D Surface Finishes

In the absence of specific requirements the treatment and finish of standard gutter brackets and of pipe fittings shall be appropriate to the finish of the gutters and pipes with which they are associated.

E Curing, Patching, Repairing etc.

The plumbing specialist shall furnish the Contractor with the sizes and locations of chases and openings in walls, partitions, etc. before they are built. The Contractor shall furnish and install, without delay in the execution of the work of other trades, the sleeves or boxes in the forms of floors slabs for all his pipes before the floor slabs are poured.

The Contractor shall do all drilling required for the installation of hangers.

All cutting of waves, partitions, floors, etc. required for the installation of work called for under this section will be done by the contractor. Cutting of structural members shall not be done without the approval of the Architect. All patching will be done by the Contractor. Any cutting or patching required in connection with the installation of this work, due to errors on the part of the plumbing specialist, shall be paid for by him.

A Excavation and Backfilling

The Contractor shall do all excavating and backfilling necessary to the installation of the work, including the patching and repair of pavements; shall provide all sheeting and shoring required to perform and protect the excavations and to safeguards employees, and shall remove from the premises all rubbish and surplus earth occasioned thereby. Trenches

shall not be backfilled until the facilities therein have been tested and the work has been accepted as tight.

SERVICES SPECIFICATION

B Generally

The Contractor's attention is drawn to any items referring to PLUMBING AND ENGINEERING INSTALLATIONS in the Services Specification.

PLUMBING SPECIFICATIONS

TABLE OF CONTENTS

1.01.0 **NOTICE:**

1. General conditions and schedule of drawings apply to and are hereby made part of this Section.

2. Contractor shall consult these Sections in detail as he will be responsible for and governed by conditions set forth therein and work indicated.

3. Nothing in this document is intended to conflict with the provisions of the Main Contractor and if any duplication or discrepancies should exist, the Main Contract documents hold precedence.

1.02.0 **SCOPE OF WORKS:**

The project under consideration consists of the provision of the Plumbing system to the **New Mill Building and the New Washrooms & Lockers Building.**

The Contractor will be required to visit the site and review the prevailing site conditions in order to have a true appreciation of the extent of the works.

The Contractor shall review the Architectural, Interior Design and Structural drawings, copies of which can be viewed by appointment. The Contractor shall exercise due diligence.

Except as otherwise specified, the work under this contract shall consist of furnishing all labour, materials and equipment for the complete execution of the works as shown on the accompanying drawings and generally described in these specifications to the satisfaction of the Engineer and all relevant public authorities. It is not intended that these specifications or accompanying drawings show every detail. It shall include all items necessary to make a finished installation, whether specifically indicated or not.

The costing and execution of the works include but are not limited to:-

1. Enclosing of water utility company meters and all exposed valves in valve boxes.

2. Complete domestic water "blue band" galvanise steel piping for all points, inside and outside of the building; Water closets, and Faucets, etc.

3. Complete soil, waste and vent piping system extending beyond the foundation wall.
All soil and waste piping shall be PVC Class-200 SDR 21.

4. Complete soil pipework to sewer system
All soil and waste piping shall be PVC Class-200 SDR 21.

5. Supply and installation of waste system to grease trap

6. Installation of all plumbing fixtures and trim.

7. Supply and installation of condensate drains.

8. Supply and installation rainwater pipework and accessories

9. Provision of "as installed" and "record drawings"

10. Provision of the required documents (submittals) prior, during and on close of the installation.

11. Supply and installation of piping sleeves for future use.

1.03.00 CODES AND STANDARDS (PLUMBING):

All materials furnished and work done shall comply with Local Codes in current practice.

In the absence of Local Codes, Codes and Standards of the Caribbean Community, U.S.A, United Kingdom or Canada are acceptable unless specifically indicated otherwise in these documents.

1.04.00 MECHANICAL PLANS:

1. The mechanical plans are intended to be diagrammatic and are based on one manufacturer's equipment. They are not intended to show every item in its exact location, the exact dimensions, or all the details of the equipment. The contractor shall verify the actual dimensions of the equipment proposed to ensure that the equipment will fit in the available space.

2. Installation shall be within the limitations imposed by the architectural, structural, electrical and plumbing requirements, with adequate space for maintenance.

1.05.00 GUARANTEES:

1. All equipment, materials, and workmanship shall be guaranteed for a period of one year, beginning with the date of acceptance of the project in writing. Special warranties will be called for under some sections of EQUIPMENT. This warranty shall be in writing and shall include written copies of factory warranties with expiration dates on items of equipment where the warranty date might differ from the acceptance date, such as five-year warranty of sealed refrigerant systems. No warranty shall start before acceptance date.

2. The contractor's warranty shall include at least two inspections of the system to repair and replace any items found to be defective during this period. The first shall be approximately six months after the acceptance of the system and the second at the end of the first year.

1.06.0 **REQUIRED SUBMITTALS:**

1. Submittals shall be clearly marked to show the intended item, with identification as to unit number or other marking to show locations, service, and function. Submittals not marked to identify the equipment and application will be rejected.

2. Any equipment installed without prior acceptance shall be subject to rejection unless such items were identified by name and model number in the bid documents.

3. The supplier, by submitting, certifies that the materials or equipment proposed is satisfactory for the application intended, including adverse conditions that may prevail at the job site, and that the materials and equipment are in current production with no known plans to cease production.

4. Contractor agrees that submittals processed by the engineer are not change orders; that the purpose of submittals by the contractor is to demonstrate to the engineer that the contractor understands the design concept; and that this understanding is demonstrated by indicating which equipment and materials he or she intends to furnish and install and the fabrication and installation methods he or she intends to use.

5. Contractor further agrees that if deviations, discrepancies, or conflict between submittals and contract documents are discovered either prior to or after submittals are processed by the engineer, the contract documents shall control and shall be followed.

6. Submittals shall include:

1. All equipment; pumps, heaters, etc.

2. Voltage, phase and amps of each electrical item such as motors, heaters, etc.

3. Pipe, valves, insulation, etc.

4. Working and Shop drawings.

1.07.00 **EQUIPMENT INSTALLATION:**

(a) All work shall be performed by competent mechanics using proper tools and equipment to produce first-quality work. All work shall be neatly installed, accessible for maintenance, and complete with all accessories required.

(b) Align, level and adjust equipment for satisfactory operation; install so that connecting and disconnection of piping and accessories can be done readily, and so that all parts are easily accessible for inspection, operation and maintenance.

(c) Install material and equipment in accordance with manufacturer's written instructions and recommendations; submit such data to Architect prior to installation and consider this data part of these specifications.

(d) The system is to be installed in the position shown on the drawings. The manufacturer shall supply details of upstands to which his system shall be securely fixed. Power will be provided up to a main isolator by the Client. The installer will do all wiring after the isolator to his equipment.

(e) Variations to the design can be proposed by the manufacturer based on the manufacturers experience and are welcomed. In all cases these variations are to be accompanied by cost figures showing the variation in relation to the initial solution. Each variation is to be accompanied by a clear statement of its benefit and how it is accomplished. The initial solution serves as a fair basis for comparison.

1.08.00 **PLUMBING FIXTURES AND TRIM:**

1. Install supplied plumbing fixtures shown on the drawings and as specified in the Bill of Quantities with the required supports, accessories and all drainage and water connections to make the fixtures complete.

2. Examine areas which are to receive the work of this Section and do not proceed until un-satisfactory conditions are corrected.

3. Protect the surfaces of all plumbing fixtures from damage before during and after their installation and until the work is completed and accepted by the Architect, and leave all fixtures clean and in operation.

4. Fixtures of vitrified earthenware and porcelain shall be first grade ware when finished shall be free from warp and shall have fine, smooth, clean surfaces free from fire cracks, checks, discolouration or other defects. They shall be evenly glazed smooth and finished with a high gloss and absolutely impervious to moisture.

All fixtures shall be guaranteed against crazing and other defects. All visible parts of the trimmings of all fixtures including faucets, escutcheons, wastes, strainers, traps etc shall be chrome-plated. Control/Stop Valves shall be provided at all fixtures.

1.09.00 **AS INSTALLED AND RECORD DRAWINGS**

The Sub-contractor shall keep one copy of all drawings, specifications and approved shop drawings of the work in good order, available to the Engineer and to his representatives.

As the work progresses, the sub-contractor shall record changes to the project as built. At the completion of the installation and before the final inspection the sub-contractor shall have completed an accurate set of "AS INSTALLED DRAWINGS."

The responsibility for the production of these drawings is that of the sub-contractor. The sub-contractor shall therefore allow in his pricing for keeping accurate records of his "AS INSTALLED" changes to the Contract Drawings, for liaison work, and for their production. The sub-contractor shall also allow for the cost of any reproducible sepia/mylar negatives of the Engineer's drawings he may require in order to facilitate him in the preparation of the "AS INSTALLED DRAWINGS" providing they indicate the actual installed conduit pipe and duct runs etc. and incorporate the changes to the project as installed.

1.10.00 **PIPE MATERIALS AND ASSEMBLY:**

.01 **PIPE MATERIALS:**

In general the various pipes to be installed by the Contractor under this Specification shall be run as indicated and as specified herein, as required by the particular conditions at the site, and as required to conform to the generally accepted standards so as to complete the work in a neat and satisfactory workable manner. The piping shown on the drawings shall be considered as diagrammatic for clearness in indicating the general run and connections and may or may not in all parts be shown in its true position. This does not relieve the Contractor from responsibility for the proper erection of systems of piping in every respect suitable for the work intended as described in the Specifications.

.01 **PIPE SLEEVES:**

Generally where pipes pass through interior walls or floors 22-gauge galvanised sheet iron or PVC sleeves shall be used. In walls they shall finish with each finished surface. The pipes passing through concrete beams or walls and masonry exterior walls shall be provided with galvanised wrought iron or PVC pipe sleeves. The inside diameter of these sleeves shall be at least 1/2" greater than the outside diameters of the service pipe.

After the pipes are installed, in the case of pipes sleeving through exterior beams or walls, the Contractor shall fill the annular spaces between the pipe and its sleeve with mastic or with shredded lead. Use packing as required to accomplish this.

The filler shall be suitable for the temperature of the pipe surface, shall not run and shall form a watertight joint. Insulation on the lines passing through these sleeves shall be omitted for the length of the sleeves.

It shall be the Contractor's responsibility to supply, install and fix all sleeves and water stops before concrete is poured.

.02 **PIPES AND FITTINGS:**

FITTINGS:

All PVC elbows, tees and other fittings used with pipework under pressure shall be schedule 80.

PVC PIPES:

All PVC pipes shall be rigid polyvinyl chloride of uniform good quality and free from cracks, holes, notches, and other injurious defects. The pipe shall be reasonably round; the internal surfaces shall be smooth, clean and free of grooving. The pipe shall have a socket at one end for solvent welding.

All cold water pipe and fittings shall be manufactured to ASTM D 1785-68 or ASTM D2241-69 and be suitably marked longitudinally in the following order: -

1. ASTM D1785-68 Schedule_____/Pressure _____

2. Nominal Size and Class.

All soil and waste piping shall be PVC class-200 SDR 21

Notwithstanding the above the Engineer reserves the right to request samples of Pipe and Fittings for his approval.

JOINTS:

The Joint type used shall be subject to approval of the Engineer and the appropriate local authority but in general the following types will be acceptable.

a. Pipes smaller than 3" - Screwed or Solvent Welded.

b. Pipes larger than 3" - Solvent Welded or Sleeve Coupling with rubber gasket.

Transition to other materials shall be effected with one of the following fittings: -

1. Stub Flange Assembly

2. Male Adaptor (2" and smaller)

Nominal Pipe Size (in.)	Maximum Support Interval Horizontal Pipe (ft)	Maximum Support Interval Vertical Pipe (ft)
Up to 1 1/4"	4	4
1 1/2 to 2"	4.5	4
3"	5	4
4"	**6**	**6**

cPVC – CHLORINATED POLYVINYL CHLORIDE PIPES AND FITTINGS

PIPES:

All cPVC pipes shall be of uniform good quality and free from cracks, holes, notches and other injurious defects.

All hot water piping and fittings shall be manufactured to ASTM D1784.

GALVANISED STEEL PIPE:

PIPE:

All galvanised steel pipe shall be Schedule-40 (or `Blue Band' to BS 1387:1967) galvanised mild steel, of uniform good quality. All underground piping shall be wrapped with a bituminous tape such as Densopol 60 NT.

Each length shall be marked with the Manufacturer's name and shall be free from injurious flaws, seams and other defects.

All galvanised steel pipe and fittings shall conform to the appropriate American or English standards.

JOINTS:

Joints in galvanised steel pipe shall be of the screw type. Screw Joints shall have all threads sharp, true and tapered removing all burrs by reaming smooth. An approved joint compound shall be applied to the male threads only. Lead compounds shall not be used.

The pipe ends shall be machined at right angles to the axis. Joints in pipes larger than 3" may be of the sleeve coupling type with an approved gasket.

INSTALLATION:

When installing galvanised steel pipe the distances between supports shall be as

follows: -

Nominal Pipe (in.)	Maximum Support Interval Horizontal Pipe (ft)	Maximum Support Interval Vertical Pipe (ft)
1/2" to 3/4"	6	8
1 to 3"	8	10
4"	12	12

Piping shall be made up of a sufficient number of unions to permit dismantling for inspection and maintenance.

Piping shall be installed in a neat and workmanlike manner and lines outside of buildings shall be parallel to building walls wherever possible.

COPPER PIPES:

Wherever so specified, shall comply with the following requirements:

PIPE: Pipe shall be of seamless copper, type as specified, hard drawn straight length standard size, suitable for general plumbing. The material shall be of such quality and purity that the finished product shall have the properties and characteristics prescribed in Specification ASTM-B88 and shall be cold drawn to size, cold worked and annealed as necessary to produce the required temper and surface finish. The materials shall be clean, free from dirt, and injurious defects. The name and trade mark of the Manufacturer, country of origin and the mark indicative of the type shall be permanently marked on each tube.

Colours used are: GREEN for Type `K'
BLUE for Type `L' **AND:**
RED for Type `M' for straight length pipes.

JOINTS. FITTINGS:

Fittings used shall be soldered, flared or compression type, in accordance with these requirements. Annealed tube is suitable for use with flared or compression fittings, and with solder type fittings provided rounding and sizing of the tube ends is performed where needed.

Drawn temper tube is suitable for use with solder type fittings. Types-'K' and `L' tube, in drawn temper, are suitable for use with certain types and sizes of compression fittings.

Fittings for copper tubing shall be wrought copper, wrought bronze or cast brass suitable for the pressure and temperature application. Brass fittings shall be used for connecting copper pipes or fittings to iron pipes or fittings. Joints in copper tubing shall be soldered or brazed: except that **joints under a building or under**

any concrete slab resting on the ground shall be silver-brazed and fittings shall be wrought copper.

All solder joints shall be made with 95% tin - 5-percent antimony solder. The use of lead solders is prohibited. Surfaces to be joined by soldering shall be cleaned bright, properly fluxed and tubing reamed out to the full size of bore. Fluxes shall be a non-corrosive type and suitable for the use intended and shall be non-injurious to health.

INSTALLATION:

When installing copper pipes use the support spacings outlined in the Section of the Specifications titled `**PIPE HANGERS, SUPPORTS'.**

.03 **UNIONS:**

All equipment and fixtures shall be connected with the piping by unions accessible for easy removal of the equipment of fixture. Unions shall be suitable for the pressure and temperature to which they be subjected and for the type of pipe specified.

.04 **VALVES:**

Each item of equipment of fixture branch line shall be valved and valve location easily accessible. Valves shall also be installed where indicated on the drawings.

Valves shall comply with the requirements ASME and ASA Codes as to their dimensions, identifications, material and service for which they are required. All valves, unless noted otherwise, shall be of one Manufacturer and shall have the Manufacturer's name and pressure rating clearly marked on the outside of the body. All valves shall be rated at 125-psi or greater.

Unless otherwise noted valves 2" and smaller shall be ball valves made of brass or bronze and have screwed ends. All screwed ends shall observe the same system of threading as that established for all pipes and fittings in this Project. **All bronze valves shall be approved equal to CONBRACO Series 70-100 or 70-300 Bronze "Apollo" Ball Valves with Stainless Steel Balls and Stems.**

PVC Ball Valves may be used on PVC pipes up to and including 3" diameter for cold water services.

PVC Ball Valves shall be true union as **ASAHI/AMERICA DUO-BLOC PVC Ball Valves OR CHEMTROL (A DIVISION OF NIBCO INC).** True Union PVC Ball Valves. Where valves are installed in chrome-plated lines, they shall be chrome-plated to match.

SHUT-OFF/STOP VALVES:

Concealed shut-off valves for sinks and wash basins shall be first quality ¼ turn chrome stops by **Watts** or approved equal.

Shut-off valves in all visible location for toilets, bidet and vanity basins shall be **Duravit 003045** with **Duravit** flexible connecting hose or approved equal.

ACCESS TO VALVES IN WALLS:

MIFAB CADSS 12" x 12". Final size is to be confirmed by Contractor before order.

1.11.00 **BURIED PIPING**

(a) Pipe shall be laid accurately to line and grade. Joints shall not be `pulled' or cramped'. The Plumbing Contractor shall take all the necessary precautions to prevent flotation of the pipe from flooding.

(b) Trenches shall be excavated to such depth as will permit the pipe to be laid at the elevations, slopes or depths or cover indicated on the drawings and at uniform slopes between indicated elevations.

(c) Pipes shall be laid on a 3" sand bed and covered with minimum 6" sand above the top of the pipe before backfilling with selected backfilling material. Minimum burial depth for water mains shall be 18" and for branches 18". Burial depth for waste shall generally be below the water main.

(d) **General:** Backfill material shall be placed and compacted as specified below in so far as applicable Compaction shall be done by tamping.

(e) **Tamping:** The material to be tamped shall be deposited and spread in uniform layers parallel and not exceeding 12-inches thick before compaction. Before the next layer is placed, each layer shall be tamped as required so as to obtain a thoroughly compacted mass with power driven tampers, each weighing about twenty (20) pounds, for this purpose. Care shall be taken that the material in all portions of the trench is thoroughly compacted.

(f) Long lengths of cold water pipes may be snaked from one side of the trench to the other during laying to provide expansion relief.

(g) Under roadways or in heavy traffic areas pipe should be protected by oversize steel casings or encased in concrete at a minimum depth of two (2) feet

(h) Place concrete thrust blocks between valves, tees, plugs, caps, bend, changes in pipe diameter, reducers, hydrant and fitting and undisturbed ground as indicated or as directed by engineer. The joints and couplings are to be kept free of concrete. Do not back fill over concrete within 24 hours after placing.

1.12.00 **TESTING:**

On the satisfactory testing of the system or sections thereof the Contractor shall apply to the Engineer for issue of a Test Certificate of Approval for the test undertaken.

No Certificate of Practical Completion of the total Works can be issued prior to testing of the Works and its approval by the Engineer.

.01 **TESTS FOR WATER PIPES:**

The entire water supply shall be pressure tested before all such work is concealed and fixtures have been set.

The Contractor testing a potable water system or a section thereof shall:

(a) Conduct the test in the presence of the Engineer at a water pressure, not less than 125psi or 1 1/2 times the working pressure whichever is the greater. Solvent cement joints on PVC piping shall be permitted to set for the Manufacturer's recommended time prior to commencement of any Pressure Test. Ensure that all air is expelled from the system before the outlets are closed and that all outlets thereafter tightly closed.

(b) Subject the system to the Test Pressure for 4 hours and satisfy the Engineer by visual examination and gauge test that no water is leaking or seeping out from any pipe, joint, or fitting, otherwise than at an outlet.

(c) After all fixtures are set and connected the Contractor shall adjust the various supply valves, fixtures, fittings etc so that the proper delivery of water is obtained at all fixtures.

Retesting, if necessary, shall be undertaken until the system is watertight.

.02 **TESTS FOR SANITARY DRAINAGE AND VENT SYSTEM:**

The entire sanitary drainage and vent system shall be tested in sections or in its entirety before all such work is concealed and fixtures have been set. Testing shall commence only after solvent cement joints on PVC pipes have been allowed to set for the Manufacturer's recommended time.

If the system is tested in sections each section shall be tested with not less than 3m head of water. In testing successive sections, at least the upper 1.5m of the last preceding section shall be retested.

The water shall be kept in the system of the portion under test, for at least 24hours at the stated head before inspection, the system or portion shall then be tight at all points and free from leaks.

Retesting, if necessary, shall be undertaken until the system is watertight.

.03 **TEST FOR GAS PIPING:**

Gas installation shall be carried out only with the approval of the Company supplying the gas.

Before the system is finally put into service, it shall be carefully tested to assure it is gas tight.

To test, the system shall be filled with air or dry oil free inert gas. No other gas or liquid shall be used. **OXYGEN SHALL NEVER BE USED**. Test pressure shall be a minimum of 50-psi. Test pressure shall be maintained until each joint has been examined for leakage by means of soapy water or other approved means.

Matches, candles, flame or other sources of ignition shall not be used for this purpose. A 24-hour standing pressure test shall be made to check the completeness of previous joint tests on the system. Final testing before supply of gas must be done in the presence of a Representative of the Gas Company and to the Company's satisfaction.

1.13.00 **COLD WATER PIPING AND SYSTEMS:**

.01 **GENERAL:**

1. All fixtures and equipment requiring cold water shall be connected to the system as described herein and shown on the drawings.

2. The water supply systems supplied will be to the individual contractor's construction but will be capable of meeting or exceeding the specifications as generally described in this document, the attached schedules and drawings.

3. All products shall be first-line quality, of grade and type shown on drawings and specified, or equivalents accepted by the Architects or Engineer.

4. All products shall be in current production with no notice having been given that this product is to be drastically changed, modified, or discontinued from production.

5. The supplier, by submitting, certifies that the equipment being proposed is proper for the application intended and that it has the capacity called for.

6. All products, materials, and accessories shall be furnished and installed as required for a complete system ready for the owner's beneficial use.

7. Underground piping and piping within the building shall be galvanized steel schedule 40 to ASTM 1785. Final connection to cold water

appliances in floors or wall should be by 12" minimum of galvanised steel. Where the final connection has to be exposed and is not concealed in wall etc., then the final connection shall be in copper except above ground piping to fire hose reels, which shall be schedule 40 galvanised steel.

8. All piping shall be installed with proper pitch to ensure drainage and avoid air pockets.

.02 **EQUIPMENT:**

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1.14.00 **HOT WATER PIPING AND SYSTEMS:**

Hot Water Piping shall be copper with a 100 PSI pressure rating at 180°F. Installation should allow for thermal expansion. **Note that at least ten (10) feet of pipework on the supply side to the heater shall also be copper.**

.01 **PIPE INSULATION:**

This Sub-Contractor shall furnish and apply thermal insulation as indicated below on all hot water piping including all piping and connections to any Solar, Gas or Electric Water Heating Systems. Adhere to the Manufacturers recommendations in the application of insulation and coating.

(a) INTERNAL/EXTERNAL PIPING:

All hot water piping, in walls, floors, ceilings or exposed on roof shall be insulated with the flexible closed-cell elastomeric insulation in tubular form, to ASTM C534 specification, for preformed elastomeric cellular thermal insulation in sheet and tubular form. Insulation material shall have a maximum thermal conductivity of 0.27 Btu-in./h-ft^2-F^o, when tested in accordance with ASTM C177 OT ASTM 518. Insulation shall be **AP/Armaflex insulation or approved equal**. All joints should be sealed according to the manufacturers instructions.

Insulation should be ¾" (19mm) thick minimum.

1.15.00 **SANITARY DRAINAGE AND VENT SYSTEM:**

.01 **GENERAL:**

All fixtures, drains or any equipment requiring drainage shall be connected to the sanitary drainage and vent system as described herein and shown on the drawings.

Soil and waste piping shall be **PVC Class-200 SDR 21**. Vent piping may be same or of a lower grade approved use. Only approved D.W.V. fittings shall be used. Long radius bend shall be used at the base of all soil and waste stacks.
Cleanouts shall be installed at the base of stacks and at all changes in direction and at other points as indicated on plans or as directed.

Cleanouts shall be full size of pipe up to and including 4" and not less than 4" for larger sizes. "Y" and "T" branches shall be provided for cleanouts on house drains and branches.

Every fixture shall have a deep seal trap placed as near to this fixture as possible. Screw cleanout plugs shall be provided for all traps. Fixtures shall be vented as shown on the drawings and no vent shall be less than 1 1/4" diameter. All vents passing through the roof shall extend at least 6" and shall be properly flashed. Vent terminals shall be terminated with suitable PVC cowls (cages) at distances away from openable windows etc.

All branch vent lines shall be free from sag and so graded and connected to drip by gravity to the soil or waste line.

Where a vent pipe is connected to a nominally horizontal soil or waste pipe, the connection shall be above the horizontal centre-line of the soil or waste pipe and the vent pipe shall be extended directly to the nearest wall or vertical member.

Where a vent pipe is connected to another vent pipe the connection shall be located at least 3-inches above the flood level rim of every fixture that is served by either vent pipe.

.02 **CLEANOUTS:**

a. Cleanouts located in floors with a waterproof membrane shall be provided with flashing clamp device at membrane level.

b. Floor cleanouts shall be square heavy duty nickel bronze top, with bronze plug and speediset outlet as approved equal to **JR Smith 4052.**

c. Check on the type of floor finishes and verify type required with Architect/Engineer before ordering.

d. FLOORS:

All finished floors cleanouts shall be adjustable and shall have a round or

square nickel bronze frame and scoriated cover.

e. EXPOSED AREAS AND ACCESSIBLE PIPE CLEANOUTS:

Cleanouts at the end of lines, base of stacks or changes of direction shall be PVC with PVC screw plug.

f. ACCESS TO CLEANOUTS:

Where access to cleanouts (or valves) in walls is required, the cleanouts shall be of the extended type and shall be installed so that the cover is within 1" of the finished wall. Access door opening shall be 12" x 12" or larger where necessary, stainless steel with screw driver latch approved equal to **JR Smith 4762-SL.**

1.16.00 CONDENSATE DRAINS:

Where indicated on the Drawings, the Contractor is to supply and install PVC drains to accept the condensate from air-conditioning units. All horizontal sections of drains (other than underground pipes) shall be insulated with at least 1/2" thick flexible closed-cell elastomeric insulation in tubular form (see piping installation for hot water piping and systems). AP/Armaflex pipe insulation or approved equal, installed in accordance with the Manufacturers Instructions. This applies to above ground floor drain traps serving Air-Conditioning Equipment.

1.17.00 MANHOLE COVERS

Access covers to manholes shall be internally recessed for concrete filling on site and supplied complete with rubber seals and locking bolts. A double seal shall be included in the cover design. In areas where a high quality finish is desired the visible edges shall have a stainless steel trim. Approved equal to **PAM BROADSTEEL Single Unit X7369E.**

1.18.00 PIPES, HANGERS, SUPPORTS

All pipes throughout the Building both horizontal and vertical shall be adequately supported from the construction. Vertical pipes shall be supported from the floor lines with riser clamps sized to fit the pipes and to adequately support their weight.

At the bases of the pipes where required for proper support, furnish and install anchor base fittings or other approved supports. Horizontal pipes individually supported shall be provided with hangers, clamps or brackets.

Trapezes may be employed to provide a tidy installation where so specified or shown on the plans, or where required by particular conditions. In the latter case the hangers must be approved by the Engineer.

All hangers shall be so located as to properly support horizontal pipes without appreciable stress or sagging of these lines.

Perforated strap iron will under no circumstances be acceptable as hanger material. Each individual hanger shall be properly sized to fit the supported size.

Where pipes are supported under concrete construction threaded hanger rods shall be fitted to a suitable concrete insert. The Sub-Contractor shall supply and install all hangers and inserts at the appropriate time. Each hanger rod shall be properly sized to suit the supported pipe(s).

1.19.00 **FLOOR DRAINS:**

(a) Provide floor drains discharging into the drainage system as shown on the drawings. Floor shall be laid to falls in accordance with the Architect's Drawings and shall fall to floor drains.

Floor drains for washrooms shall be approved equal to **J R SMITH MODEL 2005L (B)** floor drains with adjustable, nickel bronze, square strainer head, 2" speedi-set outlet and 1/2" trap primer connection.

1.20.00 **REQUIRED CLOSEOUT SUBMITTALS:**

At the close of the job, prior to final review, five bound copies of the following shall be submitted by transmittal to the architect or engineer for review and acceptance.

1. Equipment warranties
2. Contractor's warranty
3. Parts list and manuals for all equipment
4. Balance and test readings
5. Operating instructions (in writing)
6. Written instructions on maintenance and care of the system.

1.21.00 **PROJECT CLOSEOUT:**

.01 **CLEANING:**

(1) This Contractor shall clean all exposed metal surfaces from grease, dirt or other foreign material.

Chrome fittings and trimmings shall be polished upon completion. Equipment shall be properly protected from damage during construction period, and shall be wiped or cleaned in accordance with manufacturer's instructions.

(2) On completion of the work, remove from the premises all surplus materials and all debris resulting from the operations and leave all in new clean condition and remove all labels, etc. Labels to be delivered to Engineer with instructions in care and operation of the fixtures are given.

.02 FLUSHING AND DISINFECTING:

(1) Flushing and disinfecting operations shall be witnessed by Engineer. Notify Engineer at least 4 days in advance of proposed date when disinfecting operations will commence.

(2) Flush water mains through available outlets with a sufficient flow to produce a velocity of 1.5 m/s, within pipe for 10 min, or until foreign materials have been removed and flushed water is clear.

(3) Provide connections and pumps as required.

(4) Open and close valves, hydrants and service connections to ensure thorough flushing.

(5) When flushing has been completed to satisfaction of Engineer, introduce a strong solution of chlorine into water main and ensure that it is distributed throughout entire system.

(6) Disinfect water mains to AWWA C601-68.

(7) Rate of chlorine application to be proportional to rate of water entering pipe.

(8) Chlorine application to be close to point of filling water main and to occur at same time.

(9) Operate valves, hydrants and appurtenances while main contains chlorine solution.

(10) Flush line to remove chlorine solution after 24 hours

.03 STERILIZATION OF POTABLE WATER STORAGE TANKS:

1. Associated fittings and materials shall be installed inside the tank before the commencement of any cleaning and sterilization work,

2. The entire tank (including the roof and sides of the tank walls above the overflow level) shall be thoroughly washed and flushed until it is clean and free from dirt, solids, chemicals or other foreign matter which may affect the quality of water stored and supplied to the end user.

3. Before the sterilisation procedure takes place, all outlet pipes are to be closed tightly.

4. After cleaning, potable water is fed into the cleaned tank up to overflow level. Sterilizing chemical in solution form containing free chlorine shall be gradually added while the tank is being filled to ensure thorough mixing. Introduction of the sterilizing chemical into the tank in powder form is not allowed.

5. The sterilization chemical concentration shall be 5.25% sodium hypochlorite solution.

Either: Add one gallon of sterilization solution to every one thousand gallons of water and let stand for at least 24 hours

Or: Add ten gallons of sterilization solution to every one thousand gallons of water and let stand for at least 2 hours.

The water in the tank is then drained off completely through the wash out pipe and the tank refilled with potable water through the inlet pipe

ELECTRICAL INSTALLATIONS

MATERIALS AND WORKMANSHIP

A Cutting, Patching, Repairing, etc.

The electrical sub-contractor shall furnish the Contractor with the sizes and locations of chases and openings in walls, partitions, etc. before they are built. The Contractor shall furnish and install, without delay in the execution of the work of other trades, the sleeves of boxes in the forms of floor slabs for all his cable before the floor slabs are poured.

The Contractor shall do all drilling required for the installation of hangers.

All cutting of walls, partitions, floors etc. required for the installation of work called for under this section will be done by the Contractor. Cutting of structural members shall not be done without the approval of the Engineer. All patching will be done by the Contractor. Any cutting or patching required in connection with the installation of this work, due to errors on the part of the electrical Sub-Contractor shall be paid for by him.

B Excavation and Backfilling

The Contractor shall do all excavating and backfilling necessary to the installation of the work, including the patching and repair of pavements; shall provide all sheeting and shoring required to perform and protect the excavations and to safeguard employees, and shall remove from the premises all rubbish and surplus earth occasioned thereby. Trenches shall not be backfilled until the facilities therein have been tested.

SERVICES SPECIFICATION

C Generally

All electrical work shall be carried out by an approved Sub-Contractor who will be employed by SOL Eastern Caribbean Ltd. All work shall be in strict conformity with local regulations and a certificate of test from the Government Electrical Inspection Department shall be handed to the Engineer/Supervising Officer on completion of the

work. The Sub-Contractor shall supply all equipment, hoist, off-load on site, place in position, erect, install, connect up, test and set to work the complete Electrical Installation as shown on the drawings. The approximate position of all points is indicated on the drawings, but the Sub-Contractor shall confirm such positions before proceeding with any work.

D **Conduit runs, etc.**

All wiring is to be completely concealed, run in conduit and flush plain white three-pin duplex socket outlets and matching light switches are to be installed.

ELECTRICAL INSTALLATIONS (Cont'd)

A Charges

The Sub-Contractor shall allow for all Power Company charges for mains connection, etc.

B Tests

The Sub-Contractor shall carry out all tests necessary in connection with the Electrical Installations.

MATERIALS AND WORKMANSHIP

FLOOR, WALL AND CEILING FINISHINGS

A Plugging

The term ‘plugging’ shall mean the provision and fixing of hardwood or approved proprietary plugs, or, at the Contractor’s; option, fixing by means of a cartridge operated rivet gun or other approved mechanical means.

B Cement

Cement shall be Portland and shall comply with BS 12 and shall be stored in dry conditions.

C Sand

Sand shall be naturally occurring grit sand and shall comply with BS 1199 unless otherwise stated in the measured items.

D Water

Water shall be obtained from the mains supply or shall otherwise be suitable for drinking.

E Nails

Nails shall comply with BS 1202 and shall be appropriate to the purpose for which they are to be used.

F Beds and Backings

The proportions of cement and sand stated in the measured items shall be measured by volume with the minimum of water added to permit spreading and compaction.

G Workmanship Generally

Where proprietary systems are specified in the measured items for wall, floor and ceiling finishings the work shall be carried out in accordance with the manufacturer's instructions.

H **Preparation of Bases**

Immediately before floor beds and finishings are laid bases shall be swept clean of all dust and foreign matter. Concrete bases shall have a coat of neat cement applied before the laying of beds or in-situ finishings, alternatively a coat of an approved bonding compound may be used.

I **Cement Finishings**

Cement finishings shall be laid with a mix of cement and sand 1:3 with the addition of 'Cementone Nr. 8' 'Lithurin' or other approved hardening compound.

FLOOR, WALL AND CEILING FINISHINGS (Cont'd)

A **Ceramic Floor Tiling**

Ceramic floor tiling shall be accurately laid in a 3/8 inch thick bed of mortar or alternatively fixed with an approved adhesive to a trowelled bed. Joints between tiles shall not exceed 1/8 inch in width and grouting shall be with white or coloured cement. Tiles bedded in mortar shall be well soaked in clean water immediately prior to laying.

B **Curing and Protection**

In-situ floor finishings shall be cured and protected by coverings with Polythene sheet or other impervious material for at least five days after final trowelling or grinding. Floor tiling shall be similar covered until practical completion of the Works.

C **General Rendering**

The mix for general rendering shall be 1:4 cement and sand with the addition of an approved mortar plasticiser, or alternatively 1:1:6 cement, hydrated lime and sand, or alternatively an approved premixed composition.

General rendering shall be carried out in the mix described, and in the number of coats specified. Single-coat work shall be 1/2 inch thick and two-coat work 3/4 inch thick. In two-coat work the first coat shall be well scored to assist adhesion of the second coat. Unless otherwise described all internal work

shall be finished with a steel trowel and all external work with a wood float. The rendering shall be finished with surfaces perfectly flat and flush to stand the straight-edge everywhere. All work shall be free from cracks, blisters or other defects and be left perfectly clean. The Contractor shall complete each section of the work in one operation. External angles shall be true and slightly rounded.

An approved filler shall be applied to the surface of internal rendering to obtain a smooth face suitable for decoration.

Solid bases shall be thoroughly brushed to remove dust, efflorescent salts and loose particles. High suction bases shall be thoroughly wetted immediately before plastering.

D **Wall Tiling**

Wall tiles shall comply with the provisions of BS 1281 and be fixed in accordance with CP 212.

E **Beds and Backings**

Beds and backings shall be screeded, floated or trowelled as described. The materials for beds shall be mixed with a minimum of water so that no water appears on the surface when screeded, floated or trowelled. Screeded backings for wall tiling may be lightly scored to assist adhesion.

DIAMITE PRIMER

Water or Solvent-Based Epoxy Primer

1. Product Description

a. Basic Use: Diamite Primer is designed to be used as a primer for other Metalcrete epoxy and urethane flooring systems. Diamite Primer is available in both a water and solvent-based formulation. The water-based formulation should be used where VOC compliant materials are required or where good ventilation is not possible. Diamite Primer Conductive formulation is available for Lexite Conductive epoxy flooring applications.

b. Features/Benefits:

- May be applied to virtually any sound, clean and dry substrate including concrete, wood, metal, brick, and stone.
- Provides positive penetration with excellent adhesive properties.
- Long pot life with quick drying characteristic allows Metalcrete flooring system application in short time after application of Diamite Primer.
- Proportioned for easy mixing.
- Helps provide additional protection against chemical attack.

c. Typical Facilities: Laboratories, manufacturing plants, sewage and water treatment plants, airline maintenance hangars, and chemical processing plants.

d. Limitations: Diamite Primer should be applied on only sound, clean and dry surfaces. Do not apply when surface and ambient temperature are below 50°F (10°C) and when temperatures exceed 100°F (38°C). Do not use Diamite Primer Conductive as a wearing surface.

e. Composition: Diamite Primer is a two-component liquid epoxy compound having the viscosity of conventional paint. Diamite Primer is available in a water-based or a solvent -based formulation.

f. Color/Appearance: Diamite Primer after thorough mixing is clear with a slight amber tint. Diamite Primer Conductive is available only in black.

2. Packaging

Diamite Primer is supplied in units, each containing the proper proportions of liquid components. Standard packaging information is as follows:

Diamite Water-Based Primer

Unit Size	*Binder*	*Activator*	*Shipping Wt.*
3 gal. (11.4 liter)	*2 gal. (7.6 liter)*	*1 gal. (3.7 liter)*	*26 lbs. (11.8 Kg)*
15 gal. (56.8 liter)	*10 gal. (37.9 liter)*	*5 gal. (18.9 liter)*	*130 lbs. (59.0 Kg)*

Diamite Solvent-Based Primer

Unit Size	*Binder*	*Activator*	*Shipping Wt.*
2 gal. (7.6 liter)	*1 gal. (3.7 liter)*	*1 gal. (3.7 liter)*	*23 lbs. (10.4 Kg)*
10 gal. (37.9 liter)	*5 gal. (18.9 liter)*	*5 gal. (18.9 liter)*	*118 lbs. (53.5. Kg)*

3. Estimating/Coverage

The recommended coverage rate for both Diamite Water-Based Primer and Diamite Solvent-Based Primer is 200-300 sq. ft./gal. (4.9-7.4 sq.m/liter).

4. Technical Data

Diamite Primer is highly resistant to chemical attack including harsh cleaning compounds, most acids and caustics, lubricating oils and greases, vegetable oil and animal fat.

5 Directions for Use

a. Preparation: The surface to be treated must be physically sound, thoroughly clean, free of oil, wax, loose paint, rust, scale, and completely dry. New concrete must be thoroughly cured for at least 28 days before starting surface preparation. Base concrete must be acid-etched with Bitesin or shotblasted. All acid-etched concrete surfaces must be rinsed and neutralized with potable water and allowed to completely dry.**b. Mixing:** Thorough blending of all components is essential. Use a power drill with a Metco Jiffy mixing paddle. First, mix the binder separately; then mix the activator separately. Next, add the mixed activator to the mixed binder and thoroughly blend for at least two minutes at revolution speeds that will not entrap air bubbles into the freshly mixed Diamite Primer. Let stand for two minutes and blend again for two additional minutes.

Metalcrete Industries

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DIAMITE SL EPOXY FLOORING

Self-Leveling, Heavy-Duty Industrial Flooring

1. Product Description

a. Basic Use: Diamite SL Epoxy Flooring is an epoxy system used to restore worn and eroded floors to their original condition and protect them from future deterioration. Diamite SL Epoxy Flooring may be applied on any physically sound, clean, and dry substrate including concrete, brick, terrazzo, marble, metal or wood. It may also be used to improve floor tolerances and reduce surface imperfections. It is completely immune to the corrosive action of acids and alkalis in concentrations normally found in contact with floor surfaces.

b. Features/Benefits:

- Contains no volatile solvents permitting interior applications with virtually no fire hazard or toxic odor.
- USDA approved as an acceptable floor resurfacing compound in processing and storage areas for meat and poultry food products.
- 100% solids epoxy system complies with VOC regulations.
- Pourable self-leveling consistency is easy-to-place without requiring special tools or equipment.
- Rapid cure time drastically reduces operational downtime and allows for exposure to light traffic in less than 16 hours at 75°F (21°C).
- Varying application thicknesses save labor installation costs by eliminating the need for workmen to return to the job site for multiple applications.
- Dense surface is easy-to-clean and resists mildew and bacteria growth.
- Epoxy and natural aggregate system is highly resistant to impact. Does not chip, flake or peel when exposed to heavy traffic.
- Produces a seamless and slip-resistant flooring surface while offering excellent protection against chemical attack.

c. Typical Applications: Food processing plants, bakeries, cafeterias, kitchens, slaughterhouses, supermarkets, penitentiaries, schools, universities, hospitals, manufacturing plants, chemical processing plants, laboratories, morgues, poultry plants, breweries and bottling plants.

d. Limitations: Should not be used outside or where exposure to frequent freezing and thawing is possible. It is not recommended for areas at service temperatures above 140°F (60°C).

e. Composition: Diamite SL Epoxy Flooring is a multi-component system consisting of 100% solids epoxy and specially graded natural aggregate.

f. Color/Appearance: Diamite SL Epoxy Flooring is available in five standard colors including: black, red, medium gray, concrete-tone gray and clear. Custom colors are available on special request.

2. Packaging

Diamite SL Epoxy Flooring is supplied in units, each containing the proper proportions of liquid components and natural aggregate. Standard packaging information is shown below:

Unit Size	*Binder*	*Activator*	*Filler Aggregate*	*Seeding Aggregate*	*Shipping Wt.*
1 gal. (3.8 liter)	*1/2 gal. (1.9 liter)*	*1/2 gal. (1.9 liter)*	*12 lbs. (5.4 Kg)*	*18 lbs. (8.2 Kg)*	*42 lbs. (19.1 Kg)*
2 gal. (7.6 liter)	*1 gal. (3.8 liter)*	*1 gal. (3.8 liter)*	*24 lbs. (10.9 Kg)*	*36 lbs. (16.3 Kg)*	*84 lbs. (38.1 Kg)*
10 gal. (37.9 liter)	*5 gal. (18.9 liter)*	*5 gal. (18.9 liter)*	*120 lbs. (54.4 Kg)*	*180 lbs. (81.6 Kg)*	*408 lbs. (185.1 Kg)*

3. Estimating/Coverage

The recommended coverage rate for each unit is shown below:

Unit Size	*Coverage at 1/8 in. (3.2 mm)*
1 gal. (3.8 liter)	*30 sq. ft. (2.8 sq. m)*
2 gal. (7.6 liter)	*60 sq. ft. (5.6 sq. m)*
10 gal. (37.9 liter)	*300 sq. ft. (27.9 sq. m)*

For best color uniformity, top coat with Diamite Brushkote, Diamite Brushkote VOC or Diathane of the same color.

Metalcrete Industries

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MATERIALS AND WORKMANSHIP

PAINTING AND DECORATING

A Cutting Out and Repairing Cracks etc

Materials compatible with the existing surfaces shall be used for facing up and for repairing cracks and such terms shall be deemed to include rubbing down the repaired surface and sizing, priming or sealing as appropriate having regard to the subsequent treatment.

B Brand

All brands of painting materials will be nominated by the Engineer. Where oil colour is referred to it shall mean best quality enamel or equivalent grade and not general purpose ‘house and roof paint’. The Contractor will only be allowed to use materials which are delivered to site in the manufacturer's scaled containers properly labeled with the manufacturer’s name, brand and quality.

C Colours and Tints

All colours and tints shall be selected by the Engineer and such selection shall be recorded on a specimen colour board which shall be kept on the site and maintained until completion of the Works.

D Linseed Oil

Linseed oil for general purposes shall comply with BS 242, where boiled it shall comply with BS 259.

E Stopping

Stopping shall be a mixture of one third white lead to two thirds ordinary whiting and linseed oil putty with a small quantity of gold size added or shall be of an approved proprietary make.

F Knotting

The knotting on wood which is to receive a paint finish shall be aluminum leafing primer, and shall comply with BS 388 Type 11.

The knotting on wood which is to receive a clear finish shall be Shellac in methylated spirits and shall comply with BS 1336.

G **Paints Generally**

Priming paints shall be those recommended by the manufacturer for the particular surface to be treated. Undercoat paints shall be those recommended by the manufacturer for use with the finishing coats described. No thinning or other dilution shall be carried out except in strict accordance with the paint manufacturer's Instructions.

PAINTING AND DECORATING (Cont'd)

A Manufacturers Specification

The preambles and measured items in this Bill of Quantities are only a guide to the full specifications and recommendations of the manufacturers and the Contractor shall obtain and allow in his prices for complying with the full specifications and recommendations of the particular manufacturer.

B Preparation of New Surfaces

All new surfaces shall be properly prepared to receive decorations and preparation shall include:-

On brickwork and plaster surfaces, clean down surfaces, remove all projections and make good and fill all holes.

On asbestos cement sheet, and fibre insulation board, clean down surfaces and fill all holes.

On woodwork to be painted, rub down with glass-paper to a smooth surface and apply two coats of knotting before the application of priming coat, fill all holes with stopping and smooth off.

On woodwork to receive clear finish, rub down with glass-paper to a smooth surface before the application of lacquer or varnish, fill all holes with stopping and smooth off.

On galvanized or zinc sprayed surfaces, clean free from grease and dirt.

On copper, iron and steel surfaces, clean free from grease and dirt and provide key by rubbing down with abrasive paper.

On pre-primed surfaces, clean down surfaces, fill all holes and touch up primer with a similar primer where damaged.

C Painting Generally

All floors shall be cleaned before painting is commenced. No painting shall be carried out whilst dust is present.

D **Colour of Successive Coats**

Each coat of paint is to be of a different tint from that preceding it.

E **Application of paint**

Paint shall be applied by brush except for emulsion or flat paint on walls and ceilings which may be applied by roller. Spray painting will only be permitted with the express permission of the architect. All coats must be dry before subsequent coats are applied.

PAINTING AND DECORATING (Cont'd)

A **Painting Next to Glass**

The Contractor shall allow for cutting back the painting of window frames, mullions, transoms, and glazing bars from the surface of the glass to the edge of compounds or beads.

B **Priming, etc., off Site**

Woodwork to receive paint shall be prepared, knotted and primed on all surfaces including end grain before delivery to site.

Woodwork to receive clear finish shall be prepared and given the first coat of lacquer or varnish on all surfaces including end grain before delivery site.

Prices for joinery (see carpentry and joinery preambles) include printing, lacquering or varnishing (as appropriate) any surfaces exposed by cutting and fitting.

C **Removal of Ironmongery**

Ironmongery furniture shall be removed by other trades before painting is commenced.

MATERIALS AND WORKMANSHIP

DRAINAGE

A **Beds, Coverings and Surrounds**

Covering shall be deemed to enclose the pipes above beds. Surrounds shall be deemed to totally enclose the pipes.

B **Width of Trenches**

For the purpose of variations in the cubic content of trench excavation, the following widths of trenches will be allowed on re-measurement and the contractor must take this into account when pricing.

Trench for one 4 inch pipe:

18 inches wide

Trench for one 6 inch pipe:

24 inches wide

C **Drains to Conform to Local Requirements**

The whole of the Drainage works shall comply with the requirements of the Local Authority, and the Contractor shall serve all notices and pay all fees legally demandable.

D **Notice**

The Contractor shall give notice to the Quantity Surveyor when the excavations are ready to receive concrete or pipes and when it is intended to cover up any of the permanent work with backfilling.

E **Excavated Material Filling**

Excavated material filing in trenches shall be deposited in 6 inch layers and thoroughly compacted to the density of the undisturbed soil in the trench sides.

F **Selected Excavated Material**

Selected excavated material filling in trenches shall be free from stones over 1 inch across in any direction, clay or vegetable matter. Backfilling with selected excavated material around pipes shall be carefully compacted by hand in layers not exceeding 3 inches.

G **UPVC Pipes**

UPVC pipes and fitting shall comply with the provisions of BS 4660 and shall be jointed with couplings.

H **Cast Iron Drain Pipes**

Cast iron pipes shall comply with the provisions of BS 437 or BS 1211 and shall be jointed with lead well caulked. Fittings shall comply with the provisions of BS 437 or BS 1130 where applicable.

I **Concrete Pipes**

Concrete pipes and fittings shall comply with the provisions of BS 556 with spigot and socket ends and be jointed with gaskin and cement and sand (1:1).

DRAINAGE (Cont'd)

A **Pipe Laying**

The drains are to be laid in straight lines from point to point and each pipe is to be properly boned in so that the invert is to a true and even gradient. As each pipe is laid it is to be drawn clean and left free from all obstructions.

Pipes shall rest upon a firm base throughout their length and hollows shall be cut under all collars.

The pipes are to be covered up only after the drains have been approved, great care being taken not to displace any pipe during the operation.

A **Beds, Benchings, Coverings and Surrounds**

Concrete beds under drain pipes are to be minimum of 6 inches wider each side than the outside diameters of the pipe barrels. Concrete surrounds are to be a minimum thickness of 6 inches from the outside face of the pipe barrels.

The concrete for beds shall be spread over the floors of the trenches to half the thickness of the bed finally required and this concrete shall be allowed to set before pipe laying is commenced. The concrete shall be kept clean and as each pipe is laid the barrel shall be tamped into a dumpling of plastic concrete the correct line and level. After the dumplings have set,

the joints have been made and tested, the remainder of the concrete shall be placed and tamped solid.

Concrete beds and surrounds to gullies shall be a minimum of 4 inches thick.

B **Benchings to Manholes**

Concrete benchings to manholes shall be trowelled smooth and shall slope towards the main channel at an angle of 2O degrees. The depth of the main channel shall be not less than the diameter of the outgoing pipe.

Spaces between branch bends shall be completely filled with concrete and the faces above the main and branch channel inverts shall be trowelled smooth.

C **Pipes Through Manhole Walls**

Pipes passing through manhole walls shall be solidly built in and the walls made watertight throughout.

D **Existing Drains and Manholes**

The prices for work in connection with existing drains and manholes are to be included for maintaining the flow and providing temporary diversions if necessary.

PRODUCTS SPECIFICATIONS

Fibermesh 150 micro-synthetic fiber Cut Sheet

FIBERMESH GUIDE SPECIFICATION

Available in The Construction Specifications Institute format, both as printed hardcopy and as IBM-PC/DOS, MS/DOS computer software. Call your local Fibermesh representative.

MINI-SPEC:

Use only 100 percent virgin polypropylene fibers containing no reprocessed olefin materials and specifically manufactured to an optimum gradation for use as concrete secondary reinforcement. Minimum application rate shall equal 0.1% by volume, 1.5 lb/yd³ (0.9 Kg/m³). Fibers are for the control of cracking due to drying shrinkage and thermal expansion/contraction, reduction of permeability, increased impact capacity, shatter resistance, abrasion resistance and added toughness. Fiber manufacturer must document evidence of 5 year satisfactory performance history, compliance with applicable building codes and ASTM C-1116, Type III 4.1.3 and ASTM C-1116 (Ref: ASTM C-1018) Performance Level 1 I_5 outlined in Section 21, Note 17 and Residual Strength. Fibrous concrete reinforcement shall be manufactured by Fibermesh, 4019 Industry Drive, Chattanooga, Tennessee, USA, 37416. (615) 892-7243.

APPLICATION GUIDELINES

Do specify Fibermesh for:

- The reduction of concrete cracking as a result of intrinsic stresses.
- A superior method and cost-effective alternate to welded wire fabric for secondary and/or temperature reinforcement.
- A reduction in the permeability of concrete.
- Greater impact, abrasion, shatter and fatigue resistance in concrete.
- Support and cohesiveness in the concrete on steep inclines and/or slipformed placements.
- Residual Strength.
- Placements where all materials must be non-metallic.
- Areas requiring materials which are both alkali-proof and chemical resistant.
- Improved durability.
- Fibrillated toughness.

Don't specify Fibermesh for:

- The control of cracking as a result of external stresses.
- Increasing the structural number of PC concrete in pavement or slabs on grade.
- Higher structural strength development.
- The elimination or reduction in curling and/or creep.
- The justification for a reduction in the size of the support columns.
- The replacement of any moment or structural steel reinforcement.
- Increasing of ACI and/or PCA control joint guidelines.
- The thinning-out of bonded or unbonded overlay sections.
- Decreasing the thickness of slabs on grade.

ACRYL 60 Cut Sheet.

To improve bonding and durability of cement-based materials.

ACRYL® 60
LIQUID ADMIXTURE

CONSUMER PRODUCTS

Acryl® 60 significantly improves adhesion, cohesion, tensile, compressive, and flexural strengths of cement-based materials. Will not re-emulsify when exposed to water. Excellent chemical and UV resistance. Improves freeze/thaw stability of Portland cement-based materials. Acryl® 60 can be used straight or be diluted with water. Coverage will vary depending on application and use.

Surface Preparation
Surface must be clean and sound. Remove all loose and disintegrated material. Remove any and all traces of oil, grease, dirt, dust, efflorescence, biological, mold or mildew, release and curing agents. Vacuum, sweep or blow out the areas to be patched with clean, oil free air.

Mixing
The normal ratio of Acryl® 60 to clean potable water is 1 part Acryl® 60 to 3 parts water (1:3). Where increased physical and chemical resistance requirements are more stringent, increase the Acryl® 60 content in the mixing liquid to a 1:2 or 1:1 Acryl® 60 to water ratio. Always mechanically mix. Do not overmix or mix at a high speed.

Application
Sand/Cement Mortar
Thoroughly mix all cement and sand first. The sand must be clean, free of clay, and dry. Make up mixing liquid from a 1:3 or 1:2 Acryl® 60 water ratio depending upon requirements. Slowly add the mixing liquid to the cement sand mixture, and mix for a short time (1-2 minutes) to avoid entrapping air. After preparing, cleaning, and predampening the surface, brush apply a bond coat (not diluted) of Acryl® 60 modified cement sand. Mix vigorously into the surface to displace any air pockets. Place the mix into the bond coated repair area while the bond coat is still wet or tacky. Maximum time for placement should not exceed 20 minutes. Higher air and surface temperatures will decrease working/placement time. Place the mix and avoid overtroweling. The trowel should be cleaned frequently, kept wet, and used with minimal pressure. When drying is rapid, due to high temperature or breeze, cover surface with wet burlap. For normal use, allow a 24-hour curing period. For heavy wheeled traffic, allow a 4-day curing period.

Limitations
- Do not use with air entrained cement.
- Do not use Acryl® 60 where air circulation is limited.
- Do not use Acryl® 60 modified mixes when the ambient air or surface temperature is below 40°F (4°C) or expected to fall below there within 48 hours.
- Make certain the most current version of the data guide is being used; call 1 (216) 839-7171 to verify.

Protect From Freezing
Prolonged freezing may damage contents. Frozen material should be placed immediately in a warm spot to thaw, but direct heat should not be applied. If Acryl® 60 can be stirred after thawing, bonding qualities have not been impaired.

BASF The Chemical Company

Thoro Consumer Products • BASF Construction Chemicals, LLC • 23700 Chagrin Blvd. • Cleveland, Ohio 44122
phone 216-839-7171 or 866-518-7171 • fx 216-839-8833 or 866-494-8833 • ThoroProducts.com

SPECIFICATION FOR GHOSTSHIELD LITHI-TEK® 9500

SECTION 071900

WATER-REPELLENT CONCRETE SEALER

Specifier Notes: This specification is written according to the Construction Specifications Institute (CSI) Master Format'04. The section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project. Coordinate this section with other specification sections and the drawings.

Specifier Notes: Ghostshield Lithi-Tek® 9500 an industrial-grade, water-based, proprietary sealer designed to densify, strengthen and waterproof concrete: increasing abrasion resistance while reducing moisture and vapor intrusion.

Ghostshield Lithi-Tek® 9500 meets maximum VOC content limits of 0 g/L for Concrete Protective Coatings as required by the U.S. EPA Architectural Coatings Rule. Concrete properly treated with Lithi-Tek® 9500 is USDA-accepted.

Ghostshield Lithi-Tek® 9500 is recommended for use wherever a water repellent surface is required. Ideal applications include floors in industrial plants and warehouses, driveways, basements and garages.

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. Surface Preparation

B. Application of clear, water-based water repellent sealer for concrete.

1.02 RELATED SECTIONS

Specifier Notes: Edit the list of related sections as required for the project. List other sections dealing with work directly related to this section.

A. Section 03 35 00 – Concrete Floor Finishes

1.03 SUBMITTALS

A. Submit the following specific items in time to allow for review by the Architect and resubmittals, if needed, without delaying the work.

1. Manufacturer' literature for all materials specified for use on this project, each properly labeled and referenced to appropriate Specification Section, in time to prevent delay of the project.

2. Safety Data Sheets (SDS) for all materials to be used.

3. Manufacturer's requirements and testing procedures for moisture conditions (moisture

vapor emission rate, relative humidity, etc.) of the concrete at time of installation necessary to ensure proper bond.

1.04 REFERENCE STANDARDS

A. In general, follow all requirements, recommendations and procedures of the following standards and publications:

1. ASTM International (ASTM) standards as specified or referenced herein.

2. Manufacturer's product data, written instructions and recommendations.

B. The contractor shall follow the material standards included in the manufacturer's technical literature.

1.05 DELIVERY, STORAGE, AND HANDLING

A. All materials to be new. Handle all materials to prevent damage. Place materials on pallets. Use waterproof and fire-retardant tarpaulins to cover all stored materials top to bottom.

B. Store all materials in original, unopened, labeled containers and packaging an in compliance with manufacturer's directions. Comply with manufacturer's recommendations for minimum and maximum time and temperature limits for storage.

C. Store unopened and sealed containers in a dry place and protect from direct sunlight or frost and any sources of fire or ignition. Do not store containers once they are opened or when the seal has been broken. Unopened and sealed containers can be stored up to twelve months in a dry location at a temperature between 45°F and 90°F.

D. Promptly remove from the site all materials rejected by the Architect or exposed to any moisture anywhere, at any time, during transportation, storage, handling and installation.

E. Materials shall be marked with the date of manufacture and shelf life. Do not use products beyond the expiration of their shelf life. Store flammable materials in a cool, dry, protected area away from sparks and open flames.

1.06 PROJECT CONDITIONS

A. Do not install water-repellent sealer if:

1. Ambient or substrate temperatures are less than 45°F or more than 90°F or if the substrate temperature is less than 5°F above the dew point at the time of application.

2. Rain is forecasted within 24 hours.

B. The primary concrete surface must be cured a minimum of twenty-eight days before the application of the water-repellent sealer.

C. Prior to and during application of the water-repellent sealer, the concrete surface must be completely dry with a minimum moisture content of 4%, as tested with a moisture meter.

D. Protect adjacent building surfaces (e.g.; window frames, glass) and landscaping by masking to protect from overspray. Any product spilled or dripped on an unwanted surface should be immediately removed by wiping with a clean cloth dipped in detergent solution and rinsed with clean water.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Water-Repellent Sealer: Thin coat, liquid applied, hydrophobic, water-repellent clear sealer consisting of an aqueous emulsion designed for use on concrete substrates with 0.5% maximum water absorption with 48 hrs exposure as tested in accordance with ASTM C642; Ghostshield Lithi-Tek® 9500 as manufactured by KreteTek Industries, Inc.

2.02 MANUFACTURER

B. KreteTek Industries, Inc. 1000 N West St Wilmington, DE 19801 (855) 573-8383 Website: http://ghostshield.com

PART 3 – EXECUTION

3.01 GENERAL WORKMANSHIP FOR WATER-REPELLENT SEALER

A. Comply with all recommendations of the manufacturer of the water-repellent sealer for surface preparation and installation of the sealer.

B. Perform a test application on each type of surface prior to full-scale application to determine suitability and final appearance.

C. Measure and record site conditions immediately before (as applicable) and periodically during the installation of the water-repellent sealer. Measurements must include air and substrate temperatures, air and substrate relative humilities, application rate, and record general notes on product uptake and performance.

3.02 PREPARATION OF CONCRETE SURFACES FOR WATER REPELLENT

A. Check concrete surfaces to ensure that they are suitable for application of water-repellent sealer. Treat unsuitable surfaces (too smooth, too rough, not dry, or contaminated by dirt, oil or any coating or other impurities) as required to make them suitable for application of sealer.

1. Remove all dirt, dust, or other foreign matter from the surface of the concrete or masonry prior to the application of the water-repellent sealer using methods described in this section and approved by Architect based on surface preparation mockups.

2. After cleaning, if a wet method such as power washing is used, the concrete surface must be allowed to dry for not less than 24 hrs before the application of the water-repellent sealer. If good weather conditions conductive to drying are not present, a longer drying time should be allowed and the sealer should not be applied until the concrete is completely dry as described in this section. Use a moisture meter if necessary to monitor drying of the concrete.

B. Concrete substrates must be structurally sound, thoroughly dry, clean, and cured at least twenty-eight days.

C. If acid or chemical cleaning agent is used to clean the concrete, make sure to neutralize before sealing.

3.03WATER-REPELLENT SEALER APPLICATION

A. Apply water-repellent sealer to prepared substrates within three days after completion of the surface preparation.

B. Stir and mix materials thoroughly to ensure uniformity and in accordance with the manufacturer's recommendations.

C. Lithi-Tek® 9500 is concentrated. Mix 1 gallon of Litih-Tek® 9500 with 4 gallons of distilled water.

D. Apply water-repellent sealer with a sprayer or roller.

1. Application rate depends on the density of the concrete and the depth of penetration required. Apply the sealer, liberally to the surface of the concrete to achieve high penetration depth but no more than what can stay on the surface without run off.

2. For typical first coat applications, apply one coat of sealer at a rate of approximately 1000 sq ft per gallon; application rate specific to the project determined by the mockup.

3. Apply a second coat wet-on-wet, or immediately after the first coat. Take care to avoid the product running or dripping off the substrate. Broom out puddles until they soak in. Do not over apply.

E. It may take up to 2 or more hours for the sealer to completely penetrate if the substrate is of high density. The treated surface may remain dark for up to twenty-four hours before it returns to normal appearance.

F. Do NOT apply the sealer to concrete surfaces:

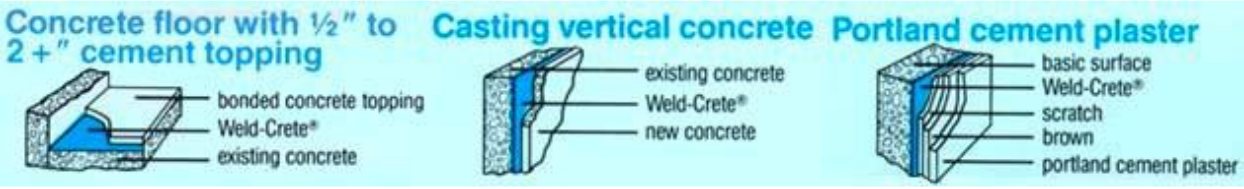
1. That are damp or have damp repairs. If rain suddenly begins during installation, immediately stop application of sealer and cover the newly impregnated areas.

2. If the conditions (e.g.; weather or surface conditions) do not meet the requirements of Para. 1.06 above or are not expected to meet the requirements for any time within a 24 hr period after installation.

3. Only apply the Lithi-Tek® 9500 product to concrete; not for use on bricks, masonry, stone or concrete blocks.

G. Do not disturb sealed surfaces for a minimum of 6 hrs after the application of the product. Early water repellence with be developed after 24 hrs; however, full curing of the sealer may take up to seven days or longer. Do not install concrete repairs for a minimum of 72 hrs after application of the sealer.

WELD-CRETE® CONCRETE BONDING AGENT



GUIDE SPECIFICATIONS (DIVISIONS 3 AND 9)

1. General

1.1 Product Handling

a. Deliver Weld-CreteR to job in original container with seals unbroken and use without reducing.
b. Materials Storage: Protect Weld-CreteR from freezing.

1.2 Environmental Conditions

a. Air and surface temperatures must be above freezing during application of Weld-CreteR.

2. PRODUCTS

2.1 Materials

a. Bonding Agent: Weld-CreteR, Larsen Products Corp., Jessup, Maryland.

3. EXECUTION

3.1 Surface Preparation

a. Surfaces to receive Weld-CreteR **MUST BE CLEAN**, free from loose material, dust, dirt, oil, grease, wax, loose paint, mildew, rust, laitance or efflorescence. If preparing an old concrete floor surface (steel trowel finish), mechanically scarify the surface and follow with an acid wash and thoroughly rinse with clean water. An economical method for cleaning concrete floor surfaces is to use a 10% muriatic acid solution followed by a thorough washing. Degreasing solvents such as Varsol are also effective.

b. Surfaces to receive Weld-CreteR **MUST BE STRUCTURALLY SOUND**. On newly placed concrete floors to receive a bonded topping, give the surface a rake or broom finish. Surfaces with form-releasing agents, curing compounds, hardeners and sealers must be compatible with Weld-CreteR. Glossy painted surfaces should be dulled with an abrasive. New paint should cure 7 days before applying

Weld-CreteR. Paints must be firmly adhered to the substrate. Do not apply over paints or materials that are soluble in water. Do not apply over frozen concrete or plastic surfaces. Weld-CreteR may be placed over dry or damp surfaces (eliminate all water puddles). Do not apply where hydrostatic pressure is present in the substrate. Surfaces should be inspected for excessive cracking and properly prepared prior to application of the bonding agent.

3.2 Installation

a. Application of bonding agent: Apply Weld-CreteR uniformly, using brush, roller or spray, to from a continuous blue film over the entire surface. Allow one hour to dry. **EXCEPTION: FAST SET PATCHING CEMENTS AND GROUTS MUST BE APPLIED WHILE THE WELD-CRETE® FILM IS STILL TACKY.**
b. Inspection of bonding agent: Prior to placement of cementitious topping, inspect bonding agent application for continuity of blue film over the entire bonding surface. Do not apply new concrete to frozen Weld-CreteR. Reapply Weld-CreteR over **areas not satisfactorily covered. Protect the applied film from dirt and debris until the fresh concrete overlay is in place**.

3.2.1 Application of Concrete Overlays

1. Delayed toppings shall be over Weld-CreteR in a minimum 1/2 inch thickness on surfaces shown and specified. Provide for a butt joint at adjacent edges. All joints must duplicate the joints in the substrate and all joints must be sealed against water penetration. Form isolation joints or cut with a dry vacuum saw. Cut control joints not more than one half the depth of
the concrete overlay. Remove standing water from newly bonded concrete surfaces. Concrete toppings can be applied as soon as the film is dry, or delayed a week to 10 days, with no effect on the bond. Follow same application for overlays on precast hollow core floor systems. Follow Portland Cement Association Standards.

2. Follow accepted industry standards for protection of newly bonded concrete. Do not use a "wet" type saw to cut isolation. joints on newly bonded concrete overlays. Seal all joints against water penetration.

3.2.2 Bonded Concrete Shear Wall

1. Prior to application of Weld-CreteR, set all anchors on existing wall as shown and specified. Apply Weld-CreteR as directed, then proceed with placement of reinforcing steel, erection of forms and placement of concrete. Seal all joints against water penetration.

3.2.3 Application of Portland Cement Terrazzo

1. Apply Portland Cement Terrazzo over Weld-CreteR to surfaces as shown and specified.

2. One-half inch Portland Cement Terrazzo Flooring: Install terrazzo dividing strips prior to application of Weld-CreteR. Follow NTMA specification for monolithic terrazzo. Do not allow standing water or wet materials to remain on newly bonded terrazzo surfaces. Seal all joints against water penetration.

3.2.4 Application of Portland Cement Plaster

1. Apply Portland Cement Plaster over Weld-CreteR on surfaces as shown and specified. NOTE: Portland Cement Plaster can be applied as soon as film is dry, or delayed a week to 10 days, with no effect on the bond. Seal all joints against water penetration.

2. Two and Three Coat Applied: Apply scratch coat a minimum of 3/8 inch over Weld-CreteR on surfaces as shown and specified. NOTE: Do not scratch through to the Weld-CreteR film. Allow to dry 24 hours. Follow with second and third coat applications. Seal all joints against water penetration.

3. Two Coat Spray Applied: Apply a thin dash coat by hand or spray over Weld-CreteR and allow dash to firm up and become hard. Apply finish coat 3/8 inch thick. Seal all joints against water penetration. NOTE: Weld-CreteR helps equalize suction on vertical applications, which produces a more uniform finish coat. For less than 3/8 inch thickness.

3.2.5 Application of Mortar Setting Beds

1. To receive ceramic tile, precast terrazzo, etc., application of mortar setting beds shall be a minimum of 3/8 inch thickness over Weld-CreteRon surfaces as shown and specified. Seal all joints against water penetration.

3.2.6 Application of Non-Shrink Fast-Set Mortars and Grouts.

1. Applications of non-shrink fast-set mortars and grouts shall be over Weld-creteR while Weld-CreteR is still tacky. Seal all joints against water penetration.

3.2.7 Application of Bedcoat

1. Applications of bedcoat for Simulated Stone Finish (Marblecrete) shall be a minimum of 3/8" thickness over Weld-creteR on surfaces as shown and specified. Seal all joints against water penetration.

EXPANSION JOINT SPECIFCATION

PROFLEX®

Vinyl Expansion Joint

DATA AND SPECIFICATIONS

1. PRODUCT NAME

- PROFLEX® Vinyl Expansion Joint

2. PRODUCT DESCRIPTION

PROFLEX Vinyl Expansion Joints are manufactured from 100% recycled vinyl.

Thickness	¼", ½"
Width	3", 3 ½", 4", 6", 8"
Length	5', 10'

- Special order sizes require a two pallet minimum purchase.

3. ADVANTAGES

PROFLEX is easy to handle, extremely durable and flexible. PROFLEX does not use adhesive binders in the manufacturing process, and can be stored outside.

4. USE

PROFLEX Vinyl Expansion Joints are suitable for use with a wide variety of concrete construction projects. They are also ideal for concrete slab work and other flatwork applications. Due to its flexibility, PROFLEX can be used as radius filler as well as a concrete form.

5. APPLICATIONS

- Sidewalks
- Driveways
- Parking Lots
- Curbs
- Gutters
- Swimming Pools
- Sill Plate for homes, garages, industrial

6. PACKAGING

Ten strips per bundle*

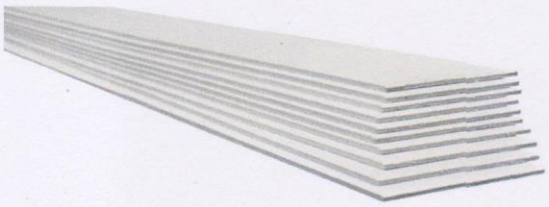
Contact Oscoda Plastics® or your local distributor for ordering requirements and sizes not listed.

*Ten foot lengths are packaged ***five*** strips per bundle.

7. PHYSICAL PROPERTIES

PROFLEX has been subject to the tests required by ASTM D1752-04a, *Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Filler for Concrete Paving and Structural Construction.* The results of each test are listed below.

Physical Property	Requirement – ASTM D1752-04a	Result
Recovery	≥ 90% of initial thickness	96%
Compression	≥ 50 psi but ≤ 1,500 psi	1,300 psi
Extrusion	≤ 0.250 in.	0.081 in.
Density	≥ 50 lb/ft^3	50 lb/ft^3



Created: 8-25-16

www.proflexexpansionjoints.com
800-544-9538

Elongated Two-Piece Toilet Bowl

Water Surface Area: 8.78" x 6.22" X 55mm

OR EQUIVALENT

Description:
White 1.6-GPF (6.06-LPF) 12-in Rough-In Elongated 2-Piece Chair Height Toilet

- Industry leading 4-in accelerator flush tower and 2-3/8-in trapway can flush a bucket of golf balls in a single flush
- EverClean antimicrobial surface inhibits the growth of stain and odor causing bacteria on the surface
- PowerWash® rim scrubs bowl with pressurized water every flush
- Features No Tools Installation with everything needed for toilet installation included and can be hand tightened
- High efficiency, ultra-low consumption, certified in EPA WaterSense program
- Includes seat, wax ring and flange bolts
- Complete Toilet with ADA Elongated Bowl
- Lifetime warranty on chinaware, 10 year warranty on all mechanical parts, and 1 year warranty on seat

Details:

Type	2-piece
Toilet Kit	Yes
Components Included	Seat; wax ring; mounting bolts
Toilet Bowl Shape	Elongated
Bowl Height	Chair height
Bowl Height with Seat	17-1/2-in

Fire Extinguisher – 1

SPECIFICATIONS Dry Chemical Extinguishers	5 lb				10 lb		
	 008110		 008112		 008402		 008678
Model	PC5ABC+2/ PC5VBABC+2	PC5ABC-1/ PC5VBABC-1	PC5PK-1	PC5BC-1	PC10SABC+1	PC10SPK-1	PC10SBC-1
Extinguisher Part No. (except Canada)[1]	553339/ 553342	552925/ 552924	552927	552928	553501	553555	553549
Extinguisher Part No. (Canada)[2]	553345/ 553348	552923/ 552922	552926	—	553507	553558	553552
Bracket Part No.	429146	429146	429146	429146	435793	435793	435793
Agent Capacity	5 lb (2.27 kg) ABC	5 lb (2.27 kg) ABC	5 lb (2.27 kg) PK	5 lb (2.27 kg) BC	10 lb (4.54 kg) ABC	10 lb (4.54 kg) PK	10 lb (4.54 kg) BC
UL/ULC Rating	3-A:40-B:C	3-A:10-B:C	60-B:C	40-B:C	4-A:80-B:C	80-B:C	60-B:C
Coast Guard Classification	Type A, Size II Type B, C, Size I	Type A, Size II Type B, C, Size I	Type B, C, Size I	Type B, C, Size I	Type A, Size II Type B, C, Size II	Type B, C Size II	Type B, C Size II
Discharge Time	14 seconds	14 seconds	17 seconds	14 seconds	21 seconds	22 seconds	19 seconds
Maximum Effective Range	14 ft (4.3 m)	14 ft (4.3 m)	16 ft (4.9 m)	16 ft (4.9 m)	20 ft (6.1 m)	20 ft (6.1 m)	16 ft (4.9 m)
Operating Temperature Range	–65 °F to 120 °F (–54 °C to 49 °C)				– 65 °F to 120 °F (–54 °C to 49 °C)		
Agent Flow Rate	0.40 lb/sec (0.18 kg/sec)	0.36 lb/sec (0.16 kg/sec)	0.30 lb/sec (0.14 kg/sec)	0.35 lb/sec (0.16 kg/sec)	0.52 lb/sec (0.24 kg/sec)	0.46 lb/sec (0.21 kg/sec)	0.59 lb/sec (0.27 kg/sec)
Charged Weight (with agent)	9 lb, 14 oz (4.15 kg)	9 lb, 14 oz (4.15 kg)	9 lb, 14 oz (4.15 kg)	9 lb, 14 oz (4.15 kg)	17 lb, 0 oz (7.73 kg)	17 lb, 14 oz (8.13 kg)	17 lb, 14 oz (8.13 kg)
Dimensions: Height	17 in. (432 mm)				20 1/2 in. (520 mm)		
Width	8 1/2 in. (216 mm)				8 1/4 in. (210 mm)		
Depth	4 7/16 in. (113 mm)				5 1/4 in. (135 mm)		
Fire Suppression Capability[3]							
Operator: Novice	40 ft² (3.7 m²)	10 ft² (0.93 m²)	60 ft² (5.6 m²)	40 ft² (3.7 m²)	80 ft² (7.4 m²)	80 ft² (7.4 m²)	60 ft² (5.6 m²)
Experienced	100 ft² (9.3 m²)	25 ft² (2.3 m²)	150 ft² (13.9 m²)	100 ft² (9.3 m²)	200 ft² (18.6 m²)	200 ft² (18.6 m²)	150 ft² (13.9 m²)

DISABILITY BARS

30 Inches Long; 1 1/4 Inch Diameter 18 Gauge Tube With Peened, Non-Slip Gripping Surface; 1/4 Inch Wall Mounting Plate Is Drilled With 6 X 1/3 Inch Bolt Holes; ADA Compliant When Properly Installed Into Wall Studs; Ships With Stainless Steel Mounting Bolts; Fabricated With Stainless Steel; Satin Stainless Steel Finish.

BOBRICK

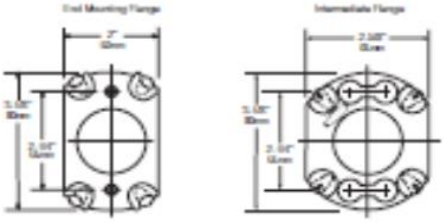
Technical Data

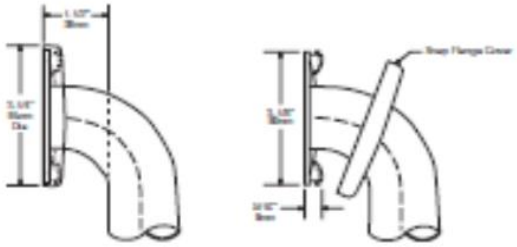
1½" (38mm) DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE

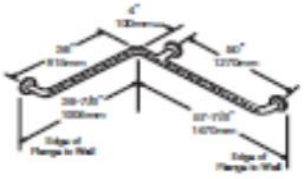
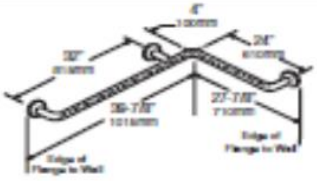
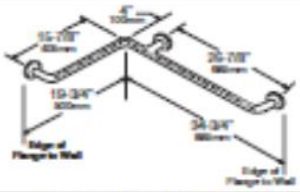
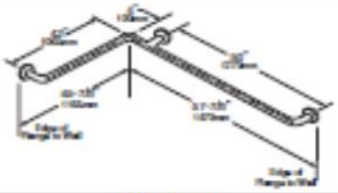
B-6806 SERIES

Specify Finish Required:

- ☐ Satin finish
- ☐ Satin finish with peened gripping surface; add suffix .99 to model number





		
HORIZONTAL	VERTICAL	TWO-WALL WHEELCHAIR TOILET COMPARTMENT
B-6806 x 12, 18, 24, 30, 36, 42, 48		B-68137
		
HORIZONTAL TUB / SHOWER / TOILET COMPARTMENT BAR 24 x 36	HORIZONTAL TWO-WALL BAR for Shower Stall	TWO-WALL TOILET COMPARTMENT BAR 42 x 54
B-68616	B-6861	B-6897

continued . . .

K0904V1 2/06 Rev. A

Honeywell

ADEMCO 6160RF
Keypad/Transceiver

User Guide

KEYPAD DISPLAYS AND LEDS

The 6160RF has the following features:

- Large backlit, 2-line, 32-character alphanumeric LCD.
- 16 large telephone-style backlit keys located behind a decorative door that swings down to provide access to the keys.
- System numerals, imprinted in large type on the keys for easy identification. System functions appear below the keys on the keypad.

The following table shows the LEDs and their functions:

LED	Function
ARMED (Red)	Lights when the system is armed in any mode.
READY (Green)	Lights when the system is ready to be armed (no zone faults are present).

FUNCTION KEYS AND LABELS

The function keys are continuously backlit for ease in use. *(Check the User's Guide that accompanies the control panel for detailed instructions on the use of these keys.)*

Function Keys - The function keys include keys for panic alarm activation. The panic alarms are activated by pressing key pairs [1] & [*], [3] & [#], or [*] & [#], or a Special Function Key.

Whether these panic keys function and the type of panic alarms they produce is determined by the control panel's capability and programming. *(Check with your installer for the availability and type of alarm of these panic keys.)*

Special Function Keys - These are the four keys located to the left of the numeric keys (see *below*). The keys may be programmed by your installer for panic alarms or other special functions such as single-button arming *(Check with your installer to see which options are available with your system.)*

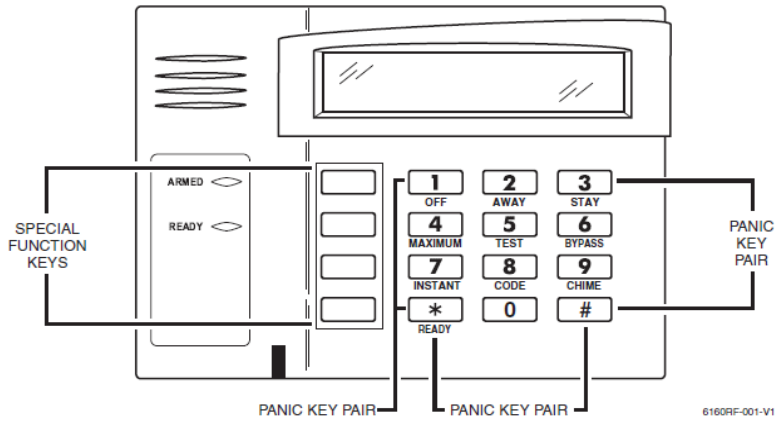
Special function keys and function key pairs must be held down for at least 2 seconds to activate an alarm.

A set of adhesive labels with typical panic symbols is provided. Place the appropriate label in the indented area on each key, so that the user can easily identify each key's function.

SOUNDER

The built-in speaker has the following functions:

- Produces warning sounds during alarm and trouble conditions, and also during entry/exit delay periods. Provides acknowledgment tones when keys are pressed, and confirmation tones for successful command entries.



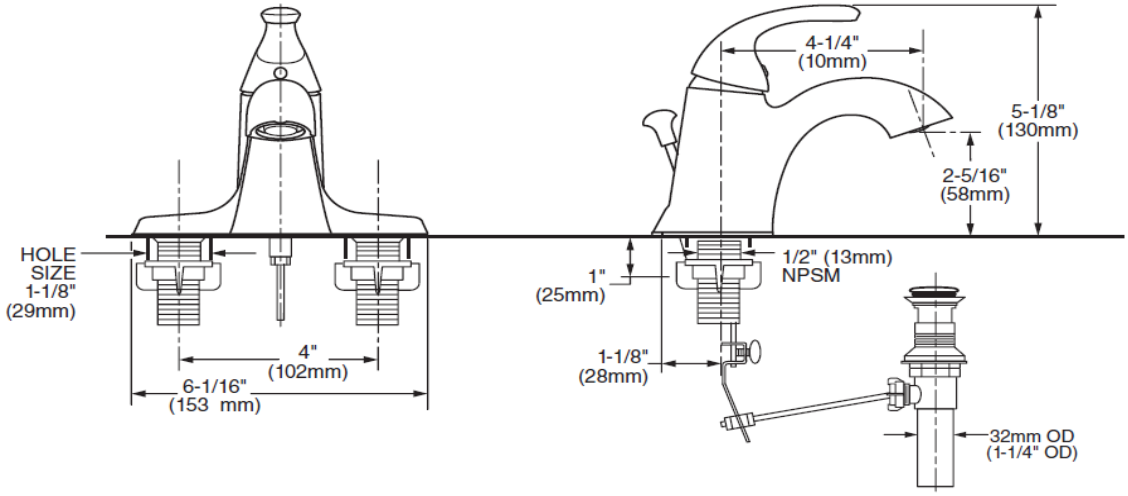
6160RF Keypad/Transceiver (front door removed)

American Standard
Style That Works Better

COVINA™
SINGLE CONTROL CENTERSET BATH FAUCET

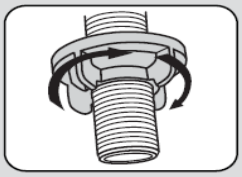
MODEL NUMBER:

❑ **9090.110.002 Centerset Lavatory Faucet**
Pop-up drain. Metal lever handle. Polished Chrome finish.
SKU #40065.



GENERAL DESCRIPTION:

Centerset lavatory faucet on 4" centers. Washerless ceramic disc valve cartridge. Flex inlet supplies with 3/8" compression thread. Durable waterway with male inlet shanks. Metal body. Metal lever handle. Pop-up drain body with 1-1/4 inch (32mm) tail piece. 1.5 gpm/5.7L/min. maximum flow rate.



Quick Spin™ Nuts:
- Hand tighten
- No tools required

PRODUCT FEATURES:

Simple Installation: Fast and easy one person installation. Faucet drops in from top. Quick Spin™ Nuts hand tighten.

Ceramic Disc Valve Cartridge: Assures a lifetime of drip-free performance.

Lead Free: Faucet contains ≤ 0.25% total lead content by weighted average.

Longer Spout: Provides extended reach into lavatory.

SUGGESTED SPECIFICATION:

Single control lavatory fitting shall feature a durable waterway with flexible inlet hoses and 1/2" male inlet shanks. Shall also feature washerless ceramic disc valve cartridge. Shall also feature a pop-up drain. Fitting shall be American Standard Model #9090.110.002, SKU #40065.

DuraLineSeries – Compact Laminate (CL phenolic) 1080/1180

Color shown FUNDERMAX Brushed Aluminum 0328 FH

DESIGN
DURABLE
PRIVACY
HYGIENIC

Features

Durable phenolic solid-core construction

Ultra-hard Graffiti-Off surfaces

Scratch, dent, moisture and impact-resistant

3/4" Doors/stiles and 1/2" panels

Concealed stainless steel hardware

Class A (1180 Series) and Class B (1080 Series) ASTM E 84 Interior Wall and Ceiling Finish Classification

Wide selection of colors and patterns

Emergency access doors

Single panel width up to 72" creating deeper stalls*

Material Specifications

Solidly fused plastic laminate with matte-finish melamine surfaces; integrally bonded colored face sheets and black phenolic-resin core.

Notes	Options	Price Index	
Rapid Response: 10-days or less, 18 standard colors / patterns, up to 25 compartments. 25-Year Warranty *FUNDERMAX single panel widths up to 72"	Gap-Free Privacy Design Maximum-Height Privacy Heavy-Duty Continuous Stainless Steel Hardware	SCRC CL HDPE	2.7 2.4 1.9

Note: 10-Day Program excludes Class A fire-rated 1180 Series and Maximum Height Options.

GRADE 1

DEADBOLTS G1

SINGLE DEADBOLT GR1

U/M: each

Backset: 2-3/4" (2-3/8" Sold Separately)

Door Thickness: 1-3/8"~ 2"

Handing: Universal

Keyway: Schlage "C" type

Strike: No-lip square corner 1-1/8"x 2-3/4" with frame reinforcer & dust box

Material: Steel / Zinc

Case Qty: 12 pcs

US3

PART NUMBER	FINISH	DESCRIPTION
CL200LM-3	US3	Polished Brass
CL200LM-26D	US26D	Brushed Chrome

LED Two Head Emergency Light with Battery Back-up White

Illumination:
Long lasting, efficient ultra-bright white LEDs.
High-performance chrome-plated metalized reflector and polycarbonate lens for optimal light distribution.
Adjustable LED lamp heads provides optimal center-to-center spacing. Optional high-lumen heads are available for increased center-to-center spacing.

Electrical:
Dual 120V/277V voltage.
Charge rate/power "ON" LED indicator light and push to test switch for mandated code compliance testing.
Long-life, maintenance-free, rechargeable NiCd battery.
Internal solid-state transfer switch automatically connects the internal battery to LED lamp heads for minimum 90-minute emergency illumination.
Fully automatic solid-state, two-rate charger initiates battery charging to recharge a discharged battery in 24 hours.

Mounting:
Surface mount via quick-connect back plate; fits most standard size junction boxes and snaps into place to make internal electrical connections.
Conduit mount knockout on top of housing.
Suitable for wall or ceiling mount.

Housing:
Injection-molded, engineering-grade, 5VA flame retardant, high-impact, thermoplastic in white or black finish.

Warranty/Listing:
Five year warranty on all electronics and housing. Batteries pro-rated for five years.
UL listed for damp locations (0°-50°C/32°F-122°F standard).
Meets UL924, NFPA101 Life Safety Code, NEC, OSHA, Local and State Codes.

FIRE·LITE ALARMS
by Honeywell

Fire Alarm Control Panels

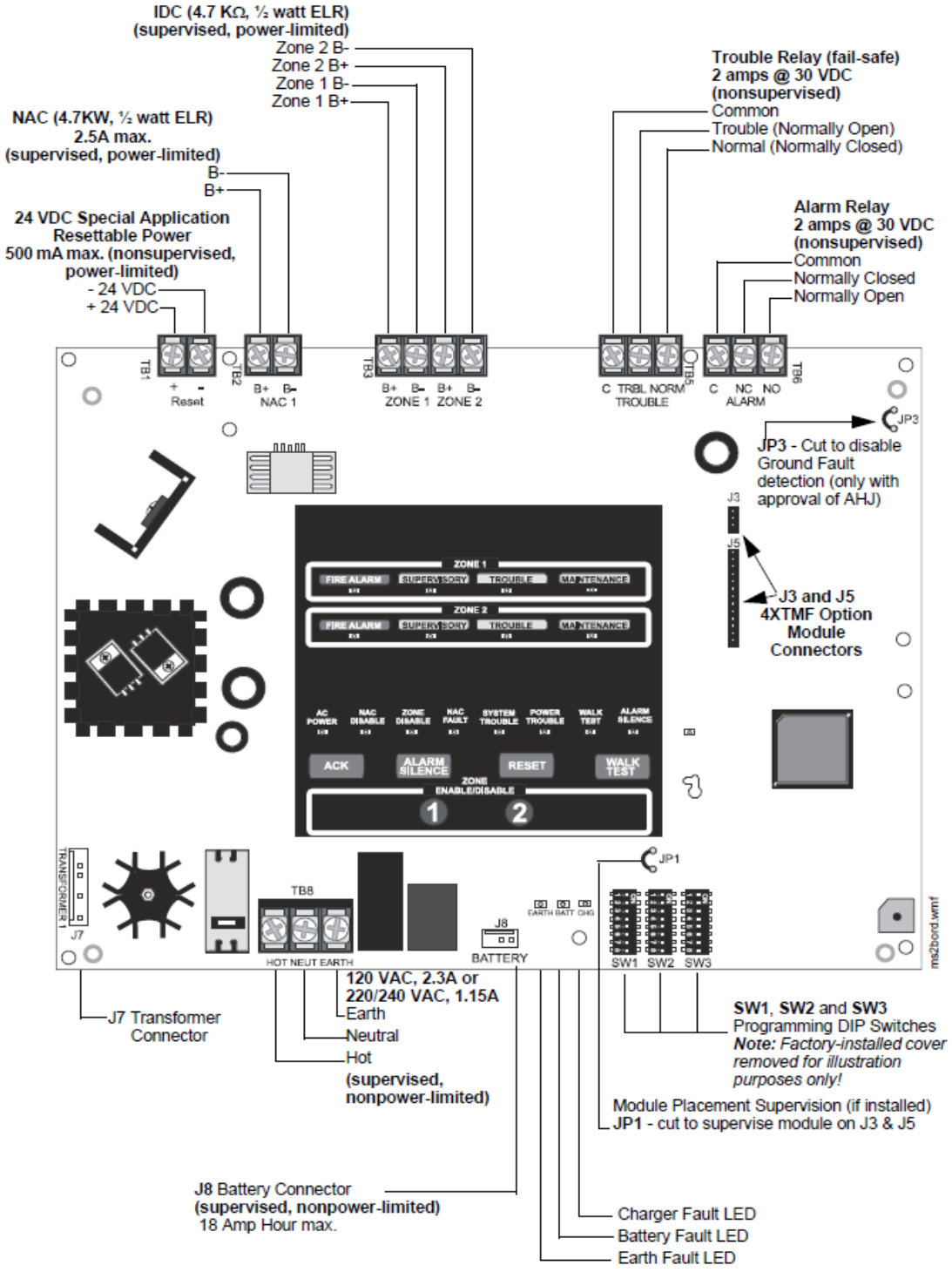
MS-2 & MS-4

MS-2E & MS-4E

Instruction Manual

Document 51512
8/6/2014
Rev: G3
P/N 51512:G3 ECN 14-523

MS-2 Two Zone Main Circuit Board



MS-4(E)

Fire Alarm Control Panel

FIRE·LITE ALARMS by Honeywell

Conventional Fire Alarm Control Panels

General

The Fire•Lite MS-4 and MS-4E Fire Alarm Control Panels (FACPs) bring the latest in microprocessor technology to conventional fire controls. The MS-4 is compatible with the ***i³™*** smoke detectors from System Sensor, with drift compensation, maintenance alert, and freeze warning. Automatic synchronization of audio/visual devices with three selections for manufacturer protocol. The Notification Appliance Circuit (NAC) protocol can silence audible devices while strobes continue to flash, using a single pair of wires.

The MS-4 is compatible with conventional input devices such as two- and four-wire smoke detectors, pull stations, waterflow devices, tamper switches and other *normally*-open contact devices. Refer to the *Fire•Lite Device Compatibility Document* for a complete list of compatible devices.

***Note:** Unless indicated otherwise, the term "MS-4" refers to both MS-4 and MS-4E models.*

Features

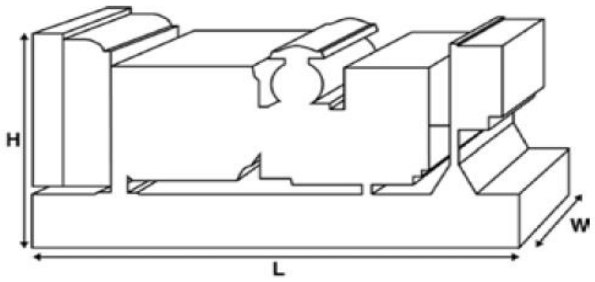
- Four Style B (Class B) Initiating Device Circuits (IDCs).
- Two Style Y (Class B) NACs.
- Optional module that converts all four IDCs and two NACs to Class A operation.
- 24 VDC.
- ***i³™ Technology features*:**
  - Drift compensation automatically adjusts detector sensitivity and increases resistance to false alarms caused by dust accumulation.
  - Maintenance Alert LEDs (per zone) warn of excessive dirt accumulation, preventing false alarms (meets NFPA 72 requirements).
  - Detector sensitivity is automatically measured by the detector, which automatically adjusts its sensitivity back to the factory settings when it becomes more sensitive due to contaminants settling in the chamber.
  - Wireless handheld sensitivity meter eliminates the need for voltmeters, magnets, and a physical connection to the detector. The reader displays sensitivity in terms of percent per foot obscuration and provides text status indication.
  - Supervisory LED (per zone) provides warning if a detector senses temperature approaching freezing.
  - Special test protocol and LED indication allows quick test of all detectors without need for a ladder.
- ***NAC synchronization features:***
  - Synchronization of standard ANSI audible signals as required by NFPA 72.
  - Synchronization of ADA compliant strobes per NFPA 72.
  - Selectable for System Sensor, Wheelock, and Gentex protocols.
  - Selective Silence feature for manual silence of horns while strobes continue to flash on the same NAC.
  - Alarm verification selectable for each zone.
  - Disable switches provided per zone.
- ***NACs programmable for:***
  - Silence Inhibit
  - Auto Silence
  - Strobe Synchronization
  - Selective Silence (horn-strobe mute)
  - Temporal or Steady signal
  - Silenceable or Nonsilenceable
- Silent or audible Walk Test operation mode commanded from the front keypad, with automatic return-to-normal after one hour of inactivity.
- Each zone may be programmed for supervisory or fire; each zone has separate red and yellow LEDs.
- Zone 4 is programmable for combination of tamper supervisory monitoring and waterflow alarm.
- Form-C Alarm, Trouble, and Supervisory relays.
- 3.0 A total usable current.
- 6.0 A total usable current available with optional second transformer.
- ***Control buttons:***
  - ACK (Acknowledge)
  - Alarm Silence
  - Reset
  - Walk Test
  - Zone Enable/Disable (one per zone)
- ***LED indicators:***
  - Fire Alarm (one per zone)
  - Supervisory (one per zone)
  - Trouble (one per zone)
  - Maintenance (one per zone)
  - AC Power
  - NAC Disable
  - Zone Disable
  - NAC Fault
  - System Trouble
  - Power Trouble
  - Walk Test
  - Alarm Silence
  - Earth Fault (on circuit board)
  - Battery Fault (on circuit board)
  - Charger Fault (on circuit board)
- Piezo sounder for alarm, trouble, supervisory and maintenance.
- Optional plug-in 4XTMF transmitter module.
- Optional plug-in 4XZMF zone relay module.
- Optional 4XLMF transmitter module for RZA-4XF remote LED annunciator.
- Optional dress panel.

P16-1(Skid)

Output Ratings

Voltage, Frequency		Prime	Standby
400/230 V, 50 Hz	kVA	14.5	15.9
	kW	11.6	12.72
	kVA		
	kW		

Ratings at 0.8 power factor.
Please refer to the output ratings technical data section for specific generator set outputs per voltage.



Dimensions and Weights

Length	mm	1550 (61)
Width	mm	620 (24.4)
Height	mm	1020 (40.2)
Weight (Dry)	kg	329 (725)
Weight (Wet)	kg	335 (739)

Ratings in accordance with ISO 8528, ISO 3046, IEC 60034, BS5000 and NEMA MG-1.22.
Generator set pictured may include optional accessories.

Prime Rating

These ratings are applicable for supplying continuous electrical power (at variable load) in lieu of commercially purchased power. There is no limitation to the annual hours of operation and this model can supply 10% overload power for 1 hour in 12 hours.

Standby Rating

These ratings are applicable for supplying continuous electrical power (at variable load) in the event of a utility power failure. No overload is permitted on these ratings. The alternator on this model is peak continuous rated (as defined in ISO 8528-3).

Standard Reference Conditions

Note: Standard reference conditions 25°C (77°F) Air Inlet Temp, 100m (328 ft) A.S.L. 30% relative humidity.
Fuel consumption data at full load with diesel fuel with specific gravity of 0.85 and conforming to BS2869: 1998, Class A2.

FG Wilson offer a range of optional features to allow you to tailor our generator sets to meet your power needs.
Options available include:

- Upgrade to CE Certification
- A wide range of Sound Attenuated Enclosures
- A variety of generator set control and synchronising panels
- Additional alarms and shutdowns
- A selection of exhaust silencer noise levels

For further information on all of the standard and optional features accompanying this product please contact your local Dealer or visit:

www.fgwilson.com

GLACIER BAY

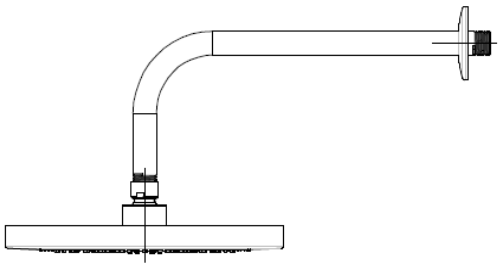
specifications

FEATURES

- ABS Single Function Round Showerhead with 12" S.S arm & flange
- Rub-Clean Nozzles
- 9.65" spray face
- Plated shower face
- 1/2-14NPSM Connection
- 2.5 GPM Flow Rate
- Easy Installation

CODE COMPLIANCE

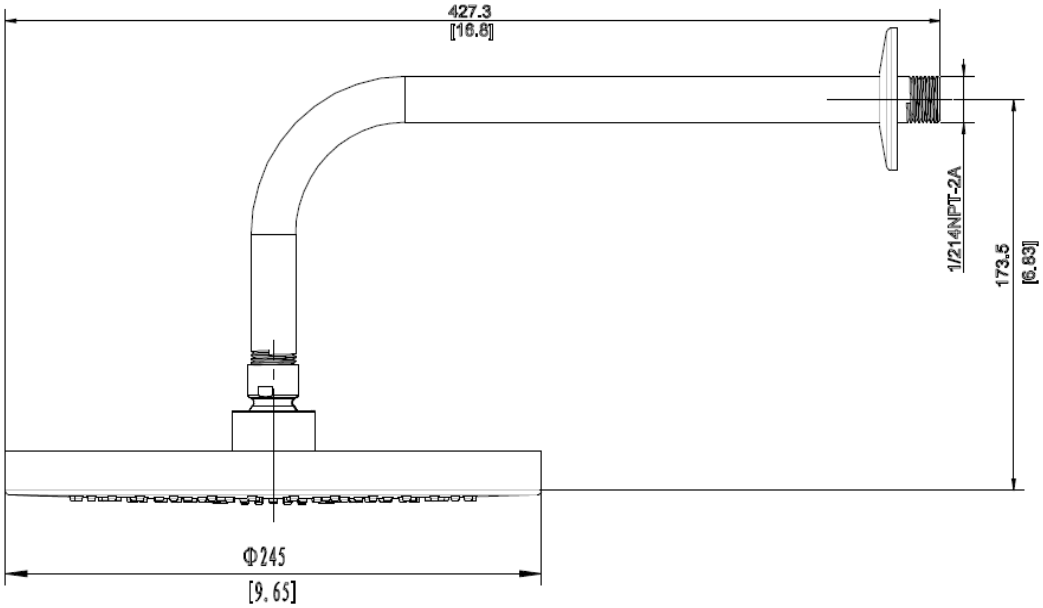
- ASME A112.18.1/CSA B125.1
- IAPMO Certified



ABS Single Function Round
Showerhead with 12" S.S arm & flange

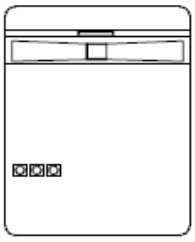
MODEL	FINISH
58008-0401	Chrome

Available for purchase or special order at Home Depot stores.



INSTALLATION DIMENSIONS

IntelliSense™



FlexGuard™

Dual Technology Glass-Break Detector
INSTALLATION INSTRUCTIONS

Models

FG-715 15' range
FG-730 30' range

The FG-715 and FG-730 from IntelliSense are **dual technology** glass-break detectors that use flex detection and audio discrimination to detect breaking glass.

The flex and audio technologies are sensitive to different frequencies. The flex technology is sensitive to ultra low frequencies, the type generated by a blow to a glass window. The audio technology detects the frequency of breaking glass.

The audio technology remains off until the flex technology detects a blow to the glass. For an alarm condition to occur, the audio must detect the frequency of breaking glass within a defined time-window *after* the flex detects a blow to the glass. Because both technologies must detect and verify glass breakage, **false alarms are virtually eliminated**.

FEATURES

- Dual flex/audio technology
- Low 10 - 14 VDC operation
- Low 25 mA at 12 VDC current draw
- No adjustment on audio
- Adjustment on flex detection to fit characteristics of each location (FG-730 only)
- Alarm memory
- Indicator LEDs
- Energized form C alarm relay
- Circuit protection
- Cover tamper switch
- Noise burst rejection circuit
- RFI immunity
- UL listed

MOUNTING LOCATION

The FG-715 and FG-730 can be mounted on walls, in corners, even on false or suspended ceilings. Refer to the guidelines below when selecting a mounting location.

- The unit must have a direct line of sight to, and a clear view of, the protected glass.
- Locate the FG-715 **within 15'** (4.5 m) of the glass to be protected. Locate the FG-730 **within 30'** (9 m) of the glass to be protected.
- Curtains, blinds, and other window coverings will absorb energy from breaking glass. Heavy curtains, for example, will effectively block the sound signal. In these cases, mount the unit on the window frame behind the window covering, or above the window. **Make sure to test the unit thoroughly for proper detection**.
- Do not mount the unit in front of air ducts or forced air fans, or close to bells measuring 2" (or larger) in diameter.

MOUNTING PROCEDURE

Orient the unit as shown in Figure 1. Remove the screw located at its top. While depressing the latch near the top of the unit, swing the front cover forward. Use the back cover as a template to mark holes for the mounting screws and wiring, then drill the holes.

- **Note:** If you plan to corner-mount the unit, remove the printed circuit board *before* marking and drilling holes for the mounting screws.

Pull the wiring into the unit through the back cover. Using the two mounting screws, mount the rear housing at the desired location.

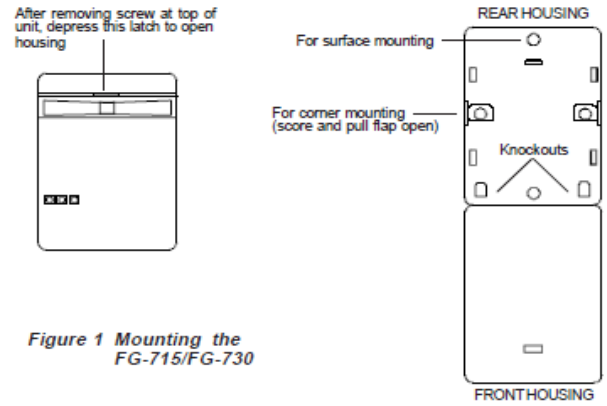


Figure 1 Mounting the FG-715/FG-730

WIRING

Observing the proper polarity, wire the unit as shown in Figure 2 (use 22 to 14 AWG). Reverse-polarity connections will not damage the unit.

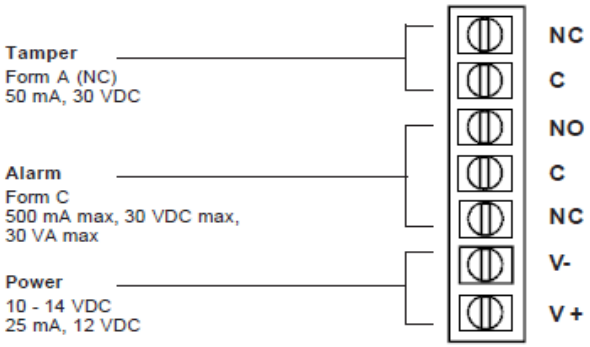


Figure 2 FG-715/FG-730 Terminal Strip

FLEX ADJUSTMENT

The flex technology of the FG-715 cannot be adjusted.

To adjust the flex technology of the FG-730: Use a screwdriver to set the flex sensitivity control (R5) at MAXIMUM by turning it all the way clockwise. Refer to Figure 3 on the back side of this page.

Turn on any heating/air conditioning system in the vicinity and observe the yellow flex LED (DS2) for approximately one minute. Excessive subsonic (inaudible) noise typically produced by air handling systems may cause the flex LED to flash randomly.

If it flashes randomly, turn the R5 control counterclockwise just until the flashing stops.

TESTING THE FG-715/FG-730

Use the FG-700 Glass-Break Simulator to test the FG-715/FG-730 detector.

Activate the simulator in MANual mode at the farthest point of the glass to be protected (15' maximum for FG-715, 30' maximum for the FG-730). If the green LED (DS1) on the detector flashes, the audio technology will detect breaking glass at that distance.

Test the flex technology by carefully striking the glass with your hand or a cushioned tool. If the yellow LED on the detector flashes, the flex technology will be sensitive enough to detect a blow to the glass at that distance.

BOBRICK

Technical Data

InstaDry™ SURFACE-MOUNTED AUTOMATIC HAND DRYER

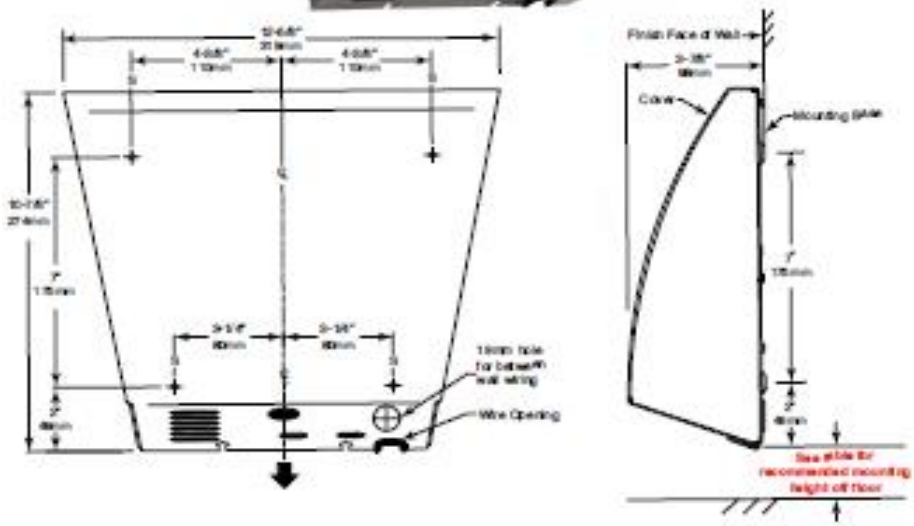
B-7125

Universal Voltage:

- 110V–240V, 0.8–1.9 AMP, 50/60 Hz, 202–213 Watts, cULus Listed and CE marked.

*RECOMMENDED MOUNTING HEIGHTS		
Children's Washrooms, ages 3-4	36"	(915mm)
Children's Washrooms, ages 5-8	40"	(1015mm)
Children's Washrooms, ages 9-12	44"	(1120mm)
Universal Design	40" - 48"	(1015 x 1219mm)

*Bottom screw hole of mounting base to face floor



MATERIALS:

Cover — 18-8, Type-304 stainless steel 1.2mm thick with #4 satin-finish vertical grain. Air-inlet is vandal-resistant. Cover projects no more than 4" (100mm) from wall and is secured to mounting base with two recessed socket button head cap screws.

Mounting Base — 1.5mm SECC punched and formed.

Motor — Brushless 24Vdc with built in thermal protection. Ball bearings. Operates at 40,000 RPM.

Blower — Backward curved radial bladed impeller in polycarbonate housing.

Electronic Control — Infrared sensor automatically turns dryer on when hands are held under air-outlet opening and across path of sensor. Remove hands from path of sensor and dryer stops. Electronic sensor has automatic shutoff approximately 85 seconds after dryer turns on if an inanimate object is placed across air-outlet opening. After inanimate object is removed, electronic sensor automatically resets itself and dryer operates normally.

continued . . .

Issued 10/2017 Printed in U.S.A.

BOBRICK

Technical Data

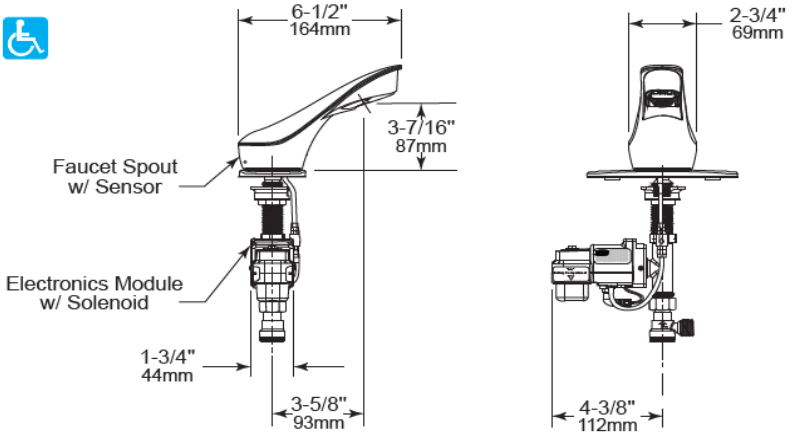
COUNTER-MOUNTED DESIGNER SERIES AUTOMATIC FAUCET

B-887_

Specify Finish Required:

- ❑ B-8870 Polished Brass
- ❑ B-8872 Matte Black
- ❑ B-8875 Brushed Nickel
- ❑ B-8876 Polished Nickel
- ❑ B-8878 Polished Chrome

Patented



MATERIALS:

Spout Assembly — Spout is made of one-piece heavy-duty cast brass available in five different finishes. Built in IR sensor with sophisticated automatic user detection and self-calibration ensures the user does not need to touch the faucet and helps deliver optimum water savings. See Finishes below.

Finish Type	Model No.
Polished Brass	B-8870
Matte Black	B-8872
Brushed Nickel	B-8875
Polished Nickel	B-8876
Polished Chrome	B-8878

Aerator and Key — Use key to install aerator into spout.

Shank Mounting Kit — Below the sink, plastic shank and gasket secures spout assembly to counter.

Electronics Box with Solenoid — Controlled by IR sensor, opens and closes the flow of water to the unit. 4 "AA" Battery Pack comes standard with unit and is housed in the Electronics Box.

Filter — Installed to bottom of electronics box and connects to water line to help prevent debris and other materials from clogging unit or causing a malfunction.

Optional — 6V AC Adapter. For AC adapter option, must order both parts, part no. 8878-72 AC Power Converter and 8878-73 Inline Connector.

OPERATION:

To activate faucet, place hand under spout near the sensor for approximately 1 second. Water will flow from spout at a rate of 0.5 gallons per minute (GPM) for a specified length of time determined by the mode in which the device is set to. The default mode is Sensing Mode where water will flow from spout until hands are removed from sensor or after automatic shut off time of 30 seconds.

continued . . .

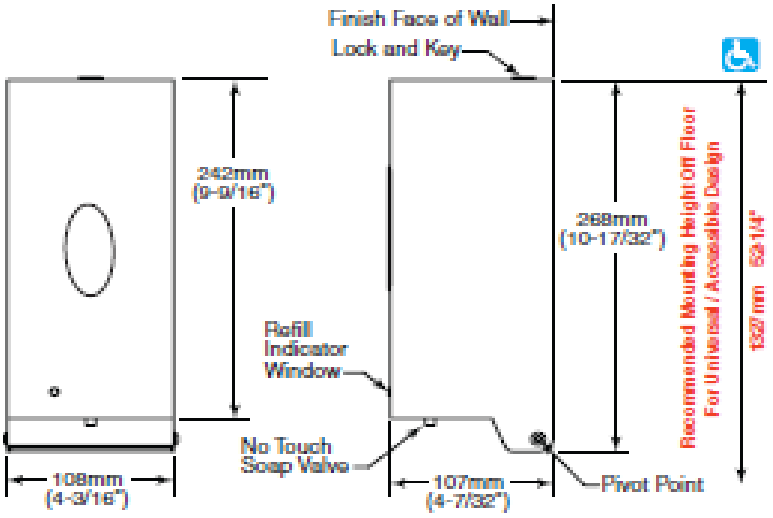
Issued 1/26/21

BOBRICK

Technical Data

AUTOMATIC WALL-MOUNTED SOAP DISPENSER

B-2012



MATERIALS:

Housing — Welded 18-8, Type-304, 18-gauge (1.0 mm) stainless steel with satin-finish. Plastic back plate incorporates mounting screw holes and mounting tape. Equipped with concealed mounting, clear acrylic refill-indicator window and key lock. Refillable, plastic container. Capacity: 850 ml (30-fl oz).

Valve — No-touch, sensor-activated valve suitable for liquid soap, alcohol gel, liquid alcohol, hand sanitizers and iodine.

Spare Part — Replace 2012-18-S silicone tube pump every three to six months, depending on usage, if using the dispenser with alcohol-based solutions.

OPERATION:

To fill the dispenser, remove the lid and fill with liquid hand soap. Dispenses liquid hand soaps of viscosities ranging from 1-3,000 cps. After filling soap container, DO NOT TIGHTEN lid. Air flow is necessary inside the container for dispensing. To activate the dispenser, place hand under spout for approximately one second. Sensing range comes at factory setting of 60mm (2-1/2"). The sensing range set by the factory is recommended for optimal performance. Window indicates when refill is required. The locked, hinged housing opens for re-filling only with special key provided. Requires three (3) Alkaline "C" Cell Batteries, 1.5V (not included). Blue indicator light signals "IN USE". Flashing blue light signals "LOW BATTERY." CE Certified.

INSTALLATION:

Install dispenser at least 200 mm (8") from any projection or horizontal surface which may interfere with the operation of the automatic sensor. Mount the dispenser to the wall by using the enclosed screws and wall plugs. The prepared mounting tape may also be used. Make sure the wall surface is cleaned and in good condition to ensure proper mating of the dispenser to the wall. Install three (3) Alkaline "C" Cell Batteries, 1.5V and replace battery cover. After filling soap container, DO NOT TIGHTEN lid. Air flow is necessary inside the container for dispensing. Remove and discard plastic cap from nozzle tip. Plastic dispensing tube may require massaging to prime the unit. Housing must be closed for dispenser to function.

SPECIFICATION:

Automatic wall-mounted soap dispenser shall be Type-304 stainless steel with satin-finish. Corrosion-resistant valve shall dispense a variety of liquid soaps, iodine based soaps, and alcohol based liquid or gel hand sanitizers. Valve shall be sensor-activated and not require contact with the dispenser to function. Lockable housing shall be equipped with a clear acrylic refill-indicator window and be hinged for refilling and maintenance. Container shall have a capacity of 850 ml (30-fl oz). Unit shall have CE Certification.

Surface-Mounted Sensor-Operated Soap Dispenser shall be Model B-2012 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Form No. 2012-200 Revised 7/7/20

BG-12 Series

Manual Fire Alarm Pull Stations

FIRE·LITE ALARMS by Honeywell

Conventional Initiating Devices

General

The Fire·Lite **BG-12 Series** is a cost-effective, feature-packed series of non-coded manual fire alarm pull stations. It was designed to meet multiple applications with the installer and end-user in mind. The BG-12 Series features a variety of models including single- and dual-action versions.

The BG-12 Series provides Fire·Lite Alarm Control Panels (FACPs), as well as other manufacturers' controls, with a manual alarm initiating input signal. Its innovative design, durable construction, and multiple mounting options make the BG-12 Series simple to install, maintain, and operate.

Features

- Aesthetically pleasing, highly visible design and color.
- Attractive contoured shape and light textured finish.
- Meets ADA 5 lb. maximum pull-force.
- Meets UL 38, Standard for Manually Actuated Signaling Boxes.
- Easily operated(single- or dual-action), yet designed to prevent false alarms when bumped, shaken, or jarred.
- PUSH IN/PULL DOWN handle latches in the down position to clearly indicate the station has been operated.
- The word "ACTIVATED" appears on top of the handle in bright yellow, further indicating operation of the station.
- Operation handle features white arrows showing basic operation direction for non-English-speaking persons.
- Braille text included on finger-hold area of operation handle and across top of handle.
- Multiple hex- and key-lock models available.
- U.S. patented hex-lock needs only a quarter-turn to lock/unlock.
- Station can be opened for inspection and maintenance without initiating an alarm.
- Product ID label viewable by simply opening the cover; label is made of a durable long-life material.
- The words "NORMAL" and "ACTIVATED" are molded into the plastic adjacent to the alarm switch (located inside).
- Four-position terminal strip molded into backplate.
- Terminal strip includes Phillips combination-head captive 8/32 screws for easy connection to Initiating Device Circuit (IDC).
- Terminal screws backed-out at factory and shipped ready to accept field wiring (up to 12 AWG/3.1 mm²).
- Terminal numbers are molded into the backplate, eliminating the need for labels.
- Switch contacts are normally open.
- Can be surface-mounted (with **SB-10** or **SB-I/O**) or semi-flush mounted. Semi-flush mount to a standard single-gang, double-gang, or 4" (10.16 cm) square electrical box.
- Backplate is large enough to overlap a single-gang backbox cutout by 1/2" (1.27 cm).
- Optional trim ring (**BG12TR**).
- Spanish versions *(FUEGO)* available (**BG-12LSP**, **BG-12LPSP**).
- Designed to replace the Fire·Lite legacy **BG-10** Series.
- Models packaged in attractive, clear plastic (PVC), clam-shell-style, Point-of-Purchase packages. Packaging includes a cutaway dust/paint cover in shape of pull station.

Construction

- Cover, backplate and operation handle are all molded of durable polycarbonate material.
- Cover features white lettering and trim.
- Red color matches System Sensor's popular SpectrAlert® Advance horn/strobe series.

Operation

The BG-12 manual pull stations provide a textured finger-hold area that includes Braille text. In addition to PUSH IN and PULL DOWN text, there are arrows indicating how to operate the station, provided for non-English-speaking people.

Pushing in and then pulling down on the handle activates the normally-open alarm switch. Once latched in the down position, the word "ACTIVATED" appears at the top in bright yellow, with a portion of the handle protruding at the bottom as a visible flag. Resetting the station is simple: insert the key, twist one quarter-turn, then open the station's front cover, causing the spring-loaded operation handle to return to its original position. The alarm switch can then be reset to its normal (non-alarm) position manually (by hand) or by closing the station's front cover, which automatically resets the switch.

Honeywell

IS25100TC

Microcontroller Based PIR long range sensor

Honeywell's new IS2500 series consists of a complete range of easy-to-install motion sensors featuring reliable detection.
We further improved the catch performance and false alarm immunity to maximise reliability. This fully featured IS25100TC offers a few features more compared to the IS2500T series.
First of all it has a remote LED enable input so you can activate the LED with a simple command from the control panel.

Furthermore, it offers alarm memory which, in combination with the arm/disarm input offer the possibility to indicate an alarm after the system was disarmed. And last but not least: This sensor conforms to European standards EN 50131-1 and TS 50141-2-2 Grade 2 Environmental Class II. Sleek and attractive, all IS2500 sensors share the same family look.

Features:

- Range: 30 x 6m (25 x 5 m) in TS50131-2-2 and T014 installations)
- Global compliance: meets many of the world motion sensor standards Including the European TS 50131-2-2 Grade 2, Class II
- Fully featured version: include remote LED enable and an alarm memory
- Easy installation: 45˚ terminal blocks, EOL terminals
- Automatic walktest
- Selectable sensitivity: 4 settings to adapt to the environment
- Flexible mountings: wall and corner mount breakout holes available. Or use the SMB10 bracket range (swivel, ceiling, tampered)
- False alarm immunity: designed to meet tough false alarm standards. A microprocessor helps to separate false alarms from real alarms
- Advanced Dual slope temperature compensation
- Large wiring channel on back to allow surface wiring
- Sabotage-resistant lens design
- Patented look-down mirror provides optimum detection directly beneath the sensor
- Tamper switch: Is activated before access is possible
- White Light Immunity of minimum 6500 Lux reduces the chance of false activation
- Bug guard prevents insects to access the sensor optics which reduces the chance of false activation
- Silent relay allows if to be used in quiet environments

Indoor Selectable-Output Horns, Strobes, and Horn Strobes for Wall Applications

SPECTRAlert ADVANCE from System Sensor

SpectrAlert® Advance audible visible notification products are rich with features guaranteed to cut installation times and maximize profits.

Features

- Plug-in design with minimal intrusion into the back box
- Tamper-resistant construction
- Automatic selection of 12- or 24-volt operation at 15 and 15/75 candela
- Field-selectable candela settings on wall units: 15, 15/75, 30, 75, 95, 110, 115, 135, 150, 177, and 185
- Horn rated at 88+ dBA at 16 volts
- Rotary switch for horn tone and three volume selections
- Universal mounting plate for wall units
- Mounting plate shorting spring checks wiring continuity before device installation
- Electrically Compatible with legacy SpectrAlert devices
- Compatible with MDL3 sync module
- Listed for ceiling or wall mounting

The SpectrAlert Advance series offers the most versatile and easy-to-use line of horns, strobes, and horn strobes in the industry. With white and red plastic housings, wall and ceiling mounting options, and plain and FIRE-printed devices, SpectrAlert Advance can meet virtually any application requirement.

Like the entire SpectrAlert Advance product line, wall-mount horns, strobes, and horn strobes include a variety of features that increase their application versatility while simplifying installation. All devices feature plug-in designs with minimal intrusion into the back box, making installations fast and foolproof while virtually eliminating costly and time-consuming ground faults.

To further simplify installation and protect devices from construction damage, SpectrAlert Advance utilizes a universal mounting plate with an onboard shorting spring, so installers can test wiring continuity before the device is installed.

Installers can also easily adapt devices to a suit a wide range of application requirements using field-selectable candela settings, automatic selection of 12- or 24-volt operation, and a rotary switch for horn tones with three volume selections.

Agency Listings

SIGNALING UL LISTED
S4011 (chimes, horn strobes, horns)
S5512 (strobes)

FM APPROVED
3023572

MEA approved
MEA452-05-E

7125-1653:186 (indoor strobes)
7125-1653:188 (horn strobes, chime strobes)
7135-1653:189 (horns, chimes)

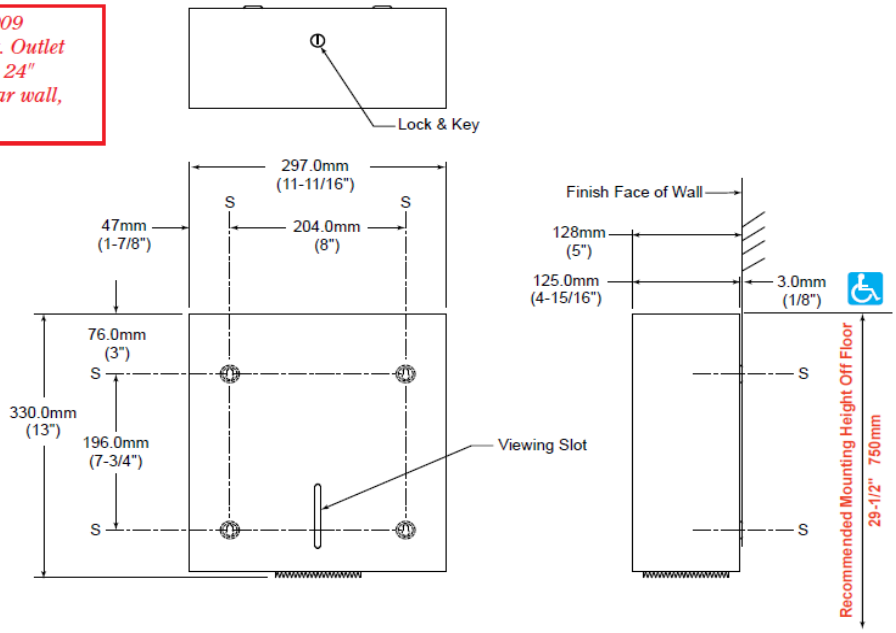
BOBRICK

Technical Data

fino collection
SURFACE-MOUNTED SINGLE JUMBO-TOILET ROLL HOLDER

B-9890

Note: *Dispenser is ICC A117.1 - 2009 Standard for Accessibility compliant. Outlet of dispenser shall be located, in area 24" minimum to 42" maximum from rear wall, 18" minimum above floor.*



MATERIAL:

Cabinet — Unit is of type 304, 18 gauge (1,2mm) stainless steel satin finish. All seam-welded construction with well defined edges and corners. Cabinet is connected to backplate via a hinge at the unit's rear bottom. Cabinet-swing-limiter allows cabinet to open down to a horizontal position, which eases refill of toilet roll and prevents cabinet from harming the wall when opening. Slot reveals toilet tissue supply inside cabinet. Equipped with a lock keyed like other Bobrick Washroom Equipment accessories. Lock is on top of unit flush with the surface - no protrusion.

Spindle — fixed inner spindle, 18 gauge (1,2mm), stainless steel, seam welded against backplate. Adapters for different toilet-roll-core diameters are furnished (cap and o-rings).

OPERATION:

Door unlocks with key provided and swings down for loading dispenser. Spindle adapter accommodates one toilet tissue roll up to 10" (255mm) diameter with a 1-5/8" (40mm) diameter core roll; convertible for 3" (75mm) diameter core rolls. Rubber o-rings (2) (furnished by manufacturer) may be added to the steel inner spindle to accommodate a 2-1/8" (55mm) diameter core roll. Viewing slot in door reveals the amount of toilet tissue on roll. Unit is designed for quick reloading.

INSTALLATION:

Mount unit on wall or toilet partition with sheet-metal screws at points indicated by an *S*. Rear edge of unit should be 20" (510mm) from back wall. This locates toilet tissue within 7"-9" (180-230mm) of front of standard toilet that projects 30" (305mm) from back wall.

For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure with sheet-metal screws (not furnished). For other wall surfaces, provide fiber plugs or expansion shields for use with sheet-metal screws (not furnished), or provide 6mm (1/4") toggle bolts or expansion bolts.

For partitions with particle-board or other solid core, secure with sheet-metal screws (not furnished), or provide through-bolts, nuts, and washers. For hollow-core metal partitions, provide solid backing into which the sheet-metal screws can be secured. If two units are installed back-to-back, then provide threaded sleeves and machine screws for the full thickness of partition.

SPECIFICATION:

Surface-Mounted Single Jumbo-Toilet Roll Holder door shall be 18 gauge (1,2mm) stainless steel with satin-finish. Cabinet shall be equipped with a lock keyed like other Bobrick washroom accessories. Lock is on top of unit flush with the surface - no protrusion. Cabinet shall have a slot to reveal toilet tissue supply inside cabinet. Spindle shall accommodate one toilet tissue roll up to 10" (255mm) diameter with a 1-5/8" (40mm) diameter core roll convertible for 3" (75mm) diameter core rolls or 2-1/8" (55mm) diameter core roll by adding rubber o-rings (2) furnished.

Surface-Mounted Single Jumbo-Toilet Roll Holder shall be Model B-9890 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Issued 5/19/21 Printed in U.S.A.

OlideSmart

The wave to open switch is a contactless active infrared induction smart switch. Its main feature is to realize the switch control of the circuit by waving at a certain distance from the switch panel.
It's an active infrared sensor switch, which is mainly used in Hospitals, laboratories, offices, public washrooms, kitchens, toilets and other areas to achieve simple and convenient door control in contactless mode.

The product can be used for the sensing control of touchless access control at entrance and exit, such operation is convenient, avoiding hand contact pollution.
Wave your hand near the switch , the door will open automatically without pressing.

FEATURES FOR WIRELESS WAVE TO OPEN SWITCH M512

- Adopts infrared modulation and demodulation, which is not easy to be misjudged by interference.
- Non - contact induction with hands or reflective objects, clean and hygienic.

BOBRICK

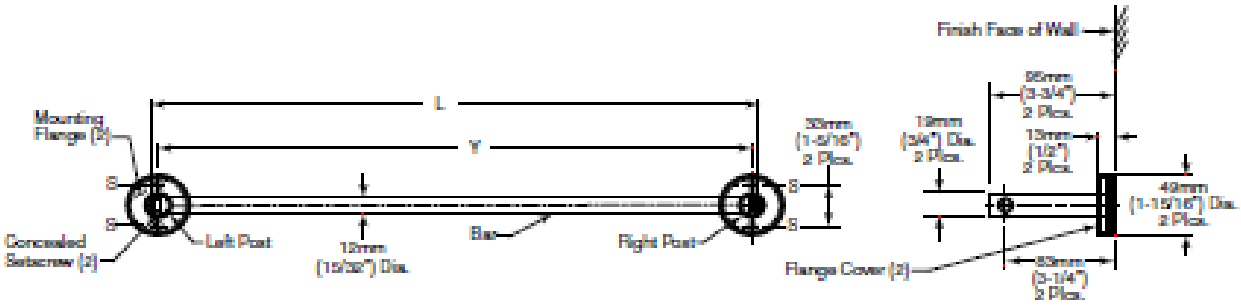
Technical Data

TOWEL BAR

B-545
B-5456

Specify Model Required:

- ☐ B-545 Satin-finish stainless steel
- ☐ B-5456 Bright Polished stainless steel



STANDARD STOCK SIZES

Model No.	Bar Length L	Centerline-to-Centerline Y
B-545 x 18	460mm (18")	450mm (17-5/8")
B-545 x 24	610mm (24")	600mm (23-5/8")
B-5456 x 18	460mm (18")	450mm (17-5/8")
B-5456 x 24	610mm (24")	600mm (23-5/8")

MATERIALS:

Post — 18-8, Type-304, 19mm (3/4") diameter, solid stainless steel rod. Post and Concealed Mounting Threaded Flange are machined as one piece.

Bar — 18-8, Type-304, 12mm (15/32") diameter, solid stainless steel rod. Secured to Posts with two(2) concealed set screws.

Concealed Mounting Threaded Flange — 18-8, Type-304, 6mm (7/32") thick, stainless steel plate with thread on outside edge for fastening cover. 46mm (1-13/16") outside diameter with two holes for attachment to wall.

Threaded Flange Cover — 18-8, Type-304, 1mm (17-gauge), machined stainless steel. 49mm (1-15/16") diameter 13mm (1/2") deep. Cover fastens over mounting flange to conceal mounting screws.

INSTALLATION:

For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with sheet-metal screws (not furnished). For other wall surfaces, provide fiber plugs or expansion shields for use with sheet-metal screws (not furnished), or provide 3mm (1/8") toggle bolts or expansion bolts. For partitions with particle-board or other solid core, secure with sheet-metal screws (not furnished), or provide through-bolts, nuts, and washers. For hollow-core metal partitions, provides a solid backing into which the sheet-metal screws (not furnished) can be secured. NOTE: centerline-to-centerline of mounting flanges must be within 2mm (1/16") of the Y dimension given.

SPECIFICATION:

Towel bar shall be Type-304 stainless steel with _____ (insert one satin finish or bright polished) finish. Towel bar shall have two (2) 19mm (3/4") diameter posts. Bar shall be 12mm (15/32") diameter secured to post with two (2) concealed set screws. Concealed mounting flange shall be 6mm (7/32") thick stainless steel plate, 46mm (1-13/16") outside diameter and equipped with two screw holes for attachment and thread on outside edge to fasten cover. Threaded flange cover shall be 1mm (17-gauge) stainless steel, 49mm (1-15/16") diameter and shall fasten over mounting flange to conceal mounting screws. Post and mounting flange are to be machined as one piece.

Towel Bar shall be Model _____ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Form No. B-545-200 r10/2018

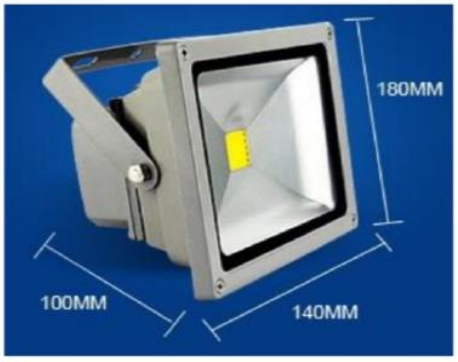
HomeSelects

2-Lamp 32-Watt T8 Grey Fluorescent Vapor Outdoor Tight Fixture

Home Selects vapor tight fluorescent fixture is engineered for performance down to the smallest detail. The casketed enclosure is designed for damp or wet locations indoors and outdoors. The clear impact-resistant polycarbonate lens can withstand most harsh environments. The low profile makes it ideal for tight areas and low ceilings. This rugged fixture operates 2 lamps and as a standard feature comes with a Light Wave instant start electronic fluorescent ballast. Price is for fixture and does not include lamps.

- Weatherproof fixture
- 2 stainless steel mounting brackets included
- Diffuser secured in position with 10 polycarbonate snap latches
- Diffuser is one piece molded high-impact polycarbonate
- Light wave ballast
- RoHS compliant
- UL listed
- Bulbs not included
  - Commercial Light Type
  - Strip
  - Connection Type
  - Hardwired
  - Dimmable
  - No
  - Fixture Color/Finish
  - Grey
  - Fixture Color/Finish Family

TYPE D LAMP

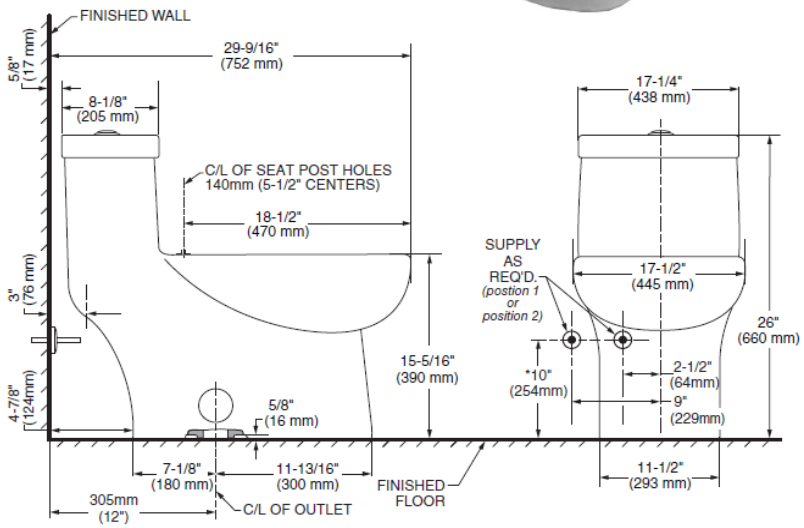


Item No.	GL-F20W
Power	**20W**
Led Chip	Epistar Mil33
Voltage	AC85-265V
Size	see picture
CCT	2700-6500K
Lumen	500LM
CRI	⩾75

TOFINO CONCEALED TRAPWAY DUAL FLUSH ELONGATED ONE PIECE TOILET WITH SEAT
VITREOUS CHINA

TOFINO CONCEALED TRAPWAY DUAL FLUSH ELONGATED ONE PIECE TOILET WITH SEAT

❑ **2996C.203** Elongated Bowl
- One piece toilet with seat
- 12" (305mm) rough-in
- Siphon action jetted bowl with smooth-sided, concealed trapway
- High efficiency, low consumption Full Flush 1.6gpf/6.0Lpf Conserving Flush 1.1 gpf/4.1Lpf,
- **Meets EPA WaterSense® Criteria**
- PowerWash® rim scrubs bowl with each flush
- 15-1/4" (387mm) rim height
- Fully-glazed 2" trapway
- Oversized 3" flush valve
- Generous 9" x 7-3/4" water surface area
- Includes slow close seat and cover
- Chrome-plated top mounted push button actuator
- 2 color matched bolt hole covers
- 1 year warranty on entire toilet
- Supply line included



IMPORTANT: Water supply on the wall is required at 2-1/2" (64mm) or 9" (229mm) from centerline of the toilet (see rough-in). First suggested position is hidden behind the toilet. The geometry of the toilet gives space for this installation. The second suggested position is next to the toilet. Between these two positions, the space for the supply between wall and toilet is limited to 4-7/8" (124mm). In this case, check your supply and hose dimensions.

Compliance Certifications -
Meets or Exceeds the Following Specifications:
- ASME A112.19.2-2008/CSA B45.1-08 for Vitreous China Fixtures

NOTES:
THIS TOILET IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET.
* DIMENSION SHOWN FOR LOCATION OF SUPPLY IS SUGGESTED.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2.
These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

To Be Specified
❑ Color: ❑ White

Four Post Cargo Lift Specifications

MORN LIFT

Address: Xinlonghai Industrial Park, Jinan, China

Tel: +86 531 88692337

After-Sales Service Hotline: +86 133 6106 4776

Mobile Phone/Whatsapp/Viber/Wechat: +8618660129317

Skype: mc.sinicmech.com

Email: contact@mornlift.com

Four Post Cargo Lift Specifications

MODEL	LOAD CAPACITY	PLATFORM SIZE	TRAVEL HEIGHT	PIT DEPTH	DIMENSIO
LRL3-2.4	3000kg	2*2m	2.4m	350mm	2.8*2.16*4.9m
LRL2-5	2000kg	2.1*1.2m	5m	350mm	2.85*1.36*7.5r
LRL1-4.5	1000kg	2.1*1.5m	4.5m	350mm	2.75*1.65*7m
LRL5-6.5	5000kg	2.2*1.6m	6.5m	350mm	3*1.75*9m
LRL3-6.5	3000kg	2.2*1.9m	6.5m	350mm	2.95*2.05*9m

Morn Lift Four Post Cargo Lift

Description

Morn Lift Four Post Cargo Lift

LRL1-4.5

- **Lifting height** 4.5m (14.8ft)
- **Loading capacity** 1000kg (2204 lbs.)
- **Platform size** 2.1* 1.5m (6.89*4.92ft)

HIGH GRADE PARTS ENSURE HIGH QUALITY OF FOUR POST CARGO LIFT

All the parts we use are first-class quality and well-known brands. The parts are a standard model with item code, which are very convenient to be replaced. Delivery is also fast for parts.

Specifications

MODEL	LOAD CAPACITY	PLATFORM SIZE	TRAVEL HEIGHT	PIT DEPTH	DIMENSION
LRL3-2.4	3000kg	2*2m	2.4m	350mm	2.8*2.16*4.9m
LRL2-5	2000kg	2.1*1.2m	5m	350mm	2.85*1.36*7.5m
LRL1-4.5	1000kg	2.1*1.5m	4.5m	350mm	2.75*1.65*7m
LRL5-6.5	5000kg	2.2*1.6m	6.5m	350mm	3*1.75*9m
LRL3-6.5	3000kg	2.2*1.9m	6.5m	350mm	2.95*2.05*9m
Four-post Cargo Lift is customizable in loading capacity, platform size and travel height.					

Roof Ventilator Wind Powered

1, Model 300,Roof Ventilator Wind Powered made from stainless steel,

Blades: 20 blades

Total height: 350mm

Turbine out diameter: 340mm

Ventilation neck diameter: 300mm

Including bottom steel plate.

Package size for a assembled product: 420x420x350mm (1 unit)

Package size for unassembled product:430x430x250mm(10 units)

Features:

1. No electricity,powered by natural wind,saving costing and no noise;

2. Easy to install;

Description Roof Ventilator Wind Powered

Usual Model:300mm,500mm,600mm

Material :Stainless Steel

Warranty 10 years

Advatage High revolving speed,clean and easy to maintenance,saving costing and no noise ,light weight,high air exhausting efficiency.

Packing Carton

•Engineered long life design as precision bearings have enhanced protection against dust, fumes, smoke, etc.

This feature is extremely useful in foundry & castingindustry.

•All stainless steel construction.

•Higher thickness of material used.

•Wind driven turbo ventilators are always rotating as they start rotating at even low wind speeds of 1 kph.

•Guaranteed vertical installation of air extractors on roof sheet by incorporating unique variable angle elbow / variable angle elbow / varipitch.

•Regular exporter to many countries

•Experience of large installations of roof extractors.

•Largest Range of sizes (300mm to 880mm) and designs (Vertical Vane Ventilator, Spherical Vane Ventilator, Motorised Roof Extractors)

PV Panel Specifications

a) Renewable Energy Micro Generator (REMG)

- REMG shall be a Grid Tied Photovoltaic System 6kW /230V/50HZ including the installation of inverter(s), panels, cables, disconnects, optimizers (if necessary), rails and installation accessories.
- Photovoltaic Systems shall comply with the performance standards as follows:
- The PV system modules shall be UL 1703 listed
    i. International ElectroTechnical Commission (IEC) 61215 standard for monocrystalline and polycrystalline photovoltaic modules
    ii. Module efficiency shall be ≥ 20%.
    iii. Power output shall be ≥ 80% the rated power after 25 years
- The Inverter shall comply with the performance standards as follows:
    i. G99 & G98 Compliance
    ii. Inverter shall be pure sine wave
    iii. Inverter should have internet based monitoring
    iv. Inverter efficiency shall be ≥ 97%
- The Roof Mount System shall comply with the performance standards as follows:
    i. UL 2703 listed
    ii. Data sheet should include wind load capacity