

Division 08: **OPENINGS - METHOD STATEMENT**
Section 08 41 00: **Entrance & Store Fronts**
Section 08 42 00: **Entrances**
Section 08 43 00: **Store Fronts**
Section 08 44 00: **Curtain Wall and Glazed Assemblies**

TECHNICAL METHOD STATEMENT COVER SHEET	REVISED SHEETS
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Abbreviations

First Draft	D1
Second Draft	D2
Design Review	DR
Technical Committee Review	TCR
Outline Specification	OS
Detailed Specifications	DS
Tender	TD
Construction	CS
Variation Order	VO

METHOD STATEMENT

FOR

**ALUMEG CURTAIN WALL AND
GLAZED ASSEMBLIES INSTALLATION**

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SCOPE

This works involves the supply and installation of aluminum curtain wall with its accessories. How to Store, handle, install, seal and finish to last touch (BY Contractor).

PURPOSE

The method of statement describes the responsibilities, activities and procedures to be implemented to ensure that the fixation of curtain wall in compliance with approved details in shop drawing, specified types and project specification requirements

REFERENCES

Project specification sections:

- 07 92 00 Joint Sealants
- 08 40 00 ENTRANCES, STOREFRONTS, AND CURTAIN WALLS
- 08 41 00 Entrances and Storefronts
- 08 42 00 Entrances
- 08 43 00 Storefronts
- 08 44 00 Curtain Wall and Glazed Assemblies
- 08 60 00 ROOF CURTAIN WALL AND SKYLIGHTS
- 08 70 00 HARDWARE
- 08 80 00 GLAZING
- 08 90 00 LOUVERS AND VENTS
- **Approved shop drawing for curtain wall and doors**
 - To be submitted after contract signature.
- **Approved material submittal for window and door system.**
 - To be submitted after contract signature.
- **Approved material for hardware.**
 - To be submitted after contract signature.

RESPONSIBILITIES

Project Manager:

Project manager is responsible for maintaining the safety and progress of the work. He shall ensure that he has the latest drawings of the project and have updated information from the Engineer regarding project.

Construction Manager:

The Construction Manager is responsible for the arrangement of the work.

HSSE Manager:

The HSSE Manager is responsible for reviewing this procedure method statement, ensuring that the method statement is carried out at the required time by the Safety Officer. Ensuring that all operatives are briefed on the method statement and operatives have signed to confirm receipt of briefing.

Safety Officer (reports directly to the HSSE Manager)

The Safety Officer is responsible for the following:

- Insure that all safety requirements to start the activity are provided by the construction group as per project HSSE manual and specification.
- To conduct daily inspection to ensure that safety requirements are being maintained up to the completion of this activity.
- Ensure operatives understand and briefed on the method statement
- Advise operatives on their responsibilities and safety requirements.

Site Engineer

Site Engineer and Survey team is to ensure that curtain wall fixation works is carried out as per required specifications and Method of Statement. To ensure that all parties required any kind of inspection or test are suitably informed as to the delivery program. Insure that the notification time to QC is sufficient to meet notification time to Engineer.

Site Foreman, Technicians, Fitters

Site Foreman team must work together to ensure that all activities regarding curtain wall fixation shall be carried out properly. Preparation of area and necessary requirements for the execution of this method of statement must be carried out carefully to ensure safety and on-time delivery of work.

Architectural QA/QC Engineer/Inspector

Under the close supervision and control of QC manager some of the responsibilities, but not limited to the following.

- Ensure that the material is approved, inspected, stored and protected in proper way.
- Type and size of curtain wall are as per approved shop drawing.
- Check the plumbness and alignment of the curtain wall before final touch.
- Ensure that all the screws are fixed properly following the spacing shown in approved shop drawings.
- Ensure that the safety requirements are met prior and during the installation process.
- Report to QC manger if any discrepancies or deficiency are noticed.

MANPOWER

- (01)Project Manager
- Construction Manager
- (00)Site Engineer
- Site Forman
- Architectural Engineer
- QC inspector
- Safety Engineer/ Inspector
- Installation team (Sub-contractor)

HSSE

- 1- Prior to commencement of the works, health and safety engineer will ensure that technical specifications of each product were carefully carried out to avoid any problem at site.
- 2- Personal Protective Equipment
 - All required PPE such as helmet, safety vest, gloves, and safety shoes shall be provided and maintained for all workers doing the repair works.
 - For protecting workers eye injury and flying particles, eye protector such as spatula temple, face shield and goggles shall be provided engaged in the related work.
 - Mask and rubber gloves are required to workers involved in mixing and application as per project requirements.
 - All persons working in the site shall wear proper mandatory PPE.
- 3- Barricades, signs and Materials to be used:
 - Safety and warning signboards in dual language shall be installed.
 - Barricades shall be erected to isolate the working area with suitable and sufficient access.
 - Materials required for this work shall be properly stored and identified at designated locations.
- 4- Only green tagged scaffolding to be used, which shall be inspected prior to use.

SITE PLANNING & PREPARATION FOR INSTALLATION

- The relevant work permits and certificates shall be obtained prior to commencement of the work after all technical documents are approved such as (but not limited) shop drawings, calculations, materials etc...
- Sub-Contractor will notify and coordinate with other Sub-Contractors affected by the traffic route of materials and equipment, all coordination to be done through main contractor.
- Temporary lighting and power to be provided by main contractor following a plan by Sub-Contractor
- Adequate power (220 V) and sufficient power distribution boxes required for power tools to be provided by main contractor following a plan by Sub-Contractor
- A storage area will be required as per approved sub-contractor logistics plan
- Main contractor surveyor shall establish offset lines from facade, benchmarks & center lines as required by sub-contractor to execute the work.
- Concrete dimensions and slab edge profile shall be examined for compliance with the requirements for curtain wall installation tolerances before proceeding with the installation.

MATERIAL & EQUIPMENT'S

Required tools for installation of aluminum glazed curtain wall:

- 1- Suitable surveying instruments (such as total station)
- 2- Hand tools
- 3- Drill machine
- 4- Circular saw

- 5- Glass suckers
- 6- Cutters
- 7- Ladders
- 8- Sealant gun
- 9- Try square
- 10- Digital measuring tape
- 11- Trowels
- 12- Laser Level
- 13- Screw drivers
- 14- Chalk line
- 15- Permanent marker
- 16- Pliers
- 17- Cutting disk
- 18- Grinders and polishers
- 19- Lifting belt
- 20- blower
- 21- Cradle/scaffolds
- 22- Tower/mobile crane
- 23- Electric Hoist for glass installation (if required)
- 24- Source of electricity & distribution boxes provided by main contractor.

MATERIALS

The material for the curtain walling consists of:

- Aluminum profiles mullions, transoms, door frames, door vents & top hung curtain wall (if required)
- Gaskets
- Accessories such as transom cleats, expansion sleeves, glass holders etc...
- Hardware for doors.
- Hardware for top hung curtain wall (if required).
- Wall mounted & shoe brackets.
- Expansion anchors for concrete.
- Double glazed panels for vision areas.
- Single glazed panels for spandrel areas.
- Galvanized sheet for back pan at spandrel panels.
- Rock wool panels (density 110 kg/m³) for thermal insulation
- Rock wool panels (density 70 kg/m³) for fire stop compressed by min. 30%.
- Sprayed fire/smoke sealant.
- External weather sealant between glass panels & Aluminum composite cladding.
- Internal weather seal.
- Backing rods (closed cell, open cell as per sealant manufacturer recommendation and mock-up applied on site).
- Silicon sealants (weather, structural, smoke, fire, or acoustic as called by detail).

All above materials should be submitted for approval prior to work commencement.

SITE STORAGE & HANDLING

- After mullions & transoms are fabricated according to approved shop drawings & site survey, they will be tagged by elevation, packed & delivered to site for inspection.
- Delivery shall be on stages that will follow the approved & coordinated time schedule.
- The material shall be stored in covered areas as close as possible to the installation area of each elevation.
- Temporary storage will be coordinated with other trades and main contractor.
- After issuance of approval of material on site by the Consultant, Sub-Contractor shall be able to move the goods to the appropriate elevation for installation.
- Moving the goods shall be using hoist, mobile crane, tower crane, or manually as per site condition.

For all other items such as glass, doors & windows, same steps shall be followed.

PROTECTION:

- 1- The major surfaces of all metal works shall have low tack tape applied at factory. This remains in place until the glass has been installed and all sealing is applied.
- 2- At the time of removal, the curtain wall will be cleaned and offered for handover inspection.
- 3- Splashing of slurry liquids should be avoided as it will adhere to the surface of glass and damage painted surfaces.
- 4- All wet trades must be finished prior to curtain wall, windows and doors installation.
- 5- Installed work will be kept clean as work progress and handed over to main contractor.
- 6- Proper protection from damage or deterioration -to suit site condition-will be done later if required by site condition- by main contractor until time of substantial completion.

FREQUENCY OF INSPECTION

- The QC inspector shall invite the engineer to inspect installed works submitted via the IRs (Inspection Requests).
- An IR will be offered to the Engineer after work is completed and approved by contractor QC team. Once the Engineer approves, the work is ready next stage Subcontractor can proceed.
- Frequency of inspection requests shall be as per the approved ITP (Inspection Test Plan).

QUALITY ASSURANCE

- The QA/QC Manager will monitor and ensure that this Method Statement shall be observed so that smooth work flow will be attained. Furthermore, the QA/QC Team shall ensure that each individual elements of the work shall be completed substantially in compliance with the approved plans and project specifications to meet client's expectation. The following activities shall be observed:
 - Single Source Responsibility: Provide data sheets of manufacturer, and use only within recommended limits if needed.
 - Coordination of Work: Review other Sections of these Specifications.

ACCESS & LOGISTICS:

- General access for vehicles to the working area is the existing site roads within the construction area and temporary access ramps.
- The site needs to arrange sufficient space for maneuvering of trucks & forklift.

EMERGENCY PROCEDURES:

In case of any emergency, the following will be applied:

- The supervisor will determine the nature of the emergency.
- A message will be reported to the site office outlining the details.
- A specific procedure is established and issued for dealing with fire on site. This forms part of the Safety Plan.
- All emergency duty personnel will be adequately trained to fill the emergency response role. Emergency procedures form part of the induction training so that all concerned are clear as to the action required of them in an emergency.
- Emergency Assembly Points will be established and updated as per site requirements.

PROCEDURE OF WORKS

A- Installation Procedure for Curtain Wall:

- 1- **Substrate structural checking on site**, Concrete/steel work substrate must be sufficient to withstand the transferred loads and within agreed tolerance. Pull out test is recommended to ensure selecting the proper fixation type.
- 2- **Fixing wall bracket**, Bracket type and anchor type and size must be strictly selected according to structural calculation.
Wall bracket must be installed in position and lined out to allow for mullion movement freely.
- 3- **Punched curtain wall**, one dead load bracket should transfer the wind/dead load and the other (restraint bracket) must allow for vertical movement due to thermal expansion and slab deflection.
According to the position of bracket type, hanging or standing construction is defined. Hanged installation is recommended to minimize mullion deflection.
- 4- **Two story curtain wall**, one dead load bracket should transfer the wind/dead load and the middle and top (restraint bracket) must allow for vertical movement due to thermal expansion and slab deflection.

During lining-out mullions, the mullion will be temporary fixed to bracket using self-drilling screws which will be removed later on after mullions are lined-out and central bolt hole is drilled and central bolt is fixed using lock-nut or spring washer. Refer to structural calculation for central bolt size and material.

B- Coupling of Mullions

- For multi-story curtain wall installation, mullion coupling will be provided at each floor at spandrel panels.
- Sleeve length depends on position of mullion coupling and wall bracket (Minimum length should be 300mm).

- Mullion sleeve should be fixed to one (bottom) mullion only to allow for vertical mullion.
- Screw fixing shear block (T cleat) to mullion side's length must be carefully selected not to fix that expansion sleeve
- Apply sealant at both mullion sides and drainage channels and fix the drainage aluminum bridge at top mullion end and clean off excess sealant.

C- Mullion-Transom connection

- i. Mark transom location at site if the mullion is not predrilled in the factory.
- ii. Cut 35 mm from the hinged mullion gasket and maintain the continuity of the inserted part of the gasket.
- iii. Fix the notched transom to the mullion using the correct type of screws.
- iv. Transom notching is 13 mm for conventional (Fully Captured) curtain wall system, and 15 mm for other systems.
- v. Set torque to fix transom screws at a turning moment of 3.5 – 4.5 Nm.
- vi. Allow for a minimum of 0.5 mm space for expansion at both sides of transom. For transom length exceeding 1.5 meter length slot length should be lengthened to allow for calculated movement.

There are several installation methods such as:

Mullion-Transom Mullion Transom installation methods

The mullion is fixed then the transom is fixed then the next mullion is fixed, which considered the most common installation process.

Mullion-Mullion Transom installation methods

The mullions will fixed first spaced according to transom length which will be later on using sliding transom

Fixing pre-fabricated ladders installation methods

Two mullions will be fixed with transom at factory and shipped to site. The unit will be fixed at site and then sliding transom will be inserted in-between the two adjacent ladders.

Installation method depends on project size, duration, preferred working method of the fabricator/ installer, site accessibility, and available installation equipment at site.

Different mullion-transom cleats and connection types are available, either for making ladders or for conventional installation.

Spring loaded cleats, are also available for sliding transom installation.

D- EPDM Transition membrane

Install EPDM transition membrane as per details to seal the cavity between curtain framing and the adjacent substrates. Rock wool filling is required to avoid thermal short circuiting and to maintain façade thermal conductivity required performance.

E- Spandrel Panel Varies details

There are several installation methods for spandrel panel:

- 1- **Back-painted**, ALUMEG has special designed profile for back-painted glazing spandrel configuration which integrates a frame supporting thermal insulation of thickness up to 50 mm and allowing for 25 mm ventilation gap between glazing and insulation.
- 2- **Shadow box**, is used to decrease the difference in appearance between vision and spandrel panel for that a special adaptor will be used to allow for single glazing at spandrel panel, the galvanized back pan will be fixed flush with back side of the mullion and required thickness and density of black veiled thermal insulation will be fixed to the back pan. Double glazing could be used at spandrel panel also for better colour matching and optimum thermal performance.

Apply sealant at the end of the adaptor and apply sealant at edges of the horizontal glazing adaptor to seal against the vertical glazing adaptor.

When the vertical glazing adaptor is bridging a coupling of 2 mullions it is advisable to cut the vertical glazing adaptor approximate 3 mm shorter to allow for mullion expansion.

F- Gasketing

There are two types of gasketing, internal and external gaskets. Both should be longer than the required length by 5% to ensure gasket compression and to allow for shrink back.

External gasketing:

- Conventional fully captured curtain wall:

A continuous gasketing bridging between the two adjacent panes is pressed firmly with the pressure plate to ensure system tightness and then covered by cover cap.

- Fully structural sealant curtain wall:

Two types of gasketing is used.

- An umbrella EPDM gasket is used as backing for weather silicone sealant, sealing the joint between glass panes.
- An H type gasketing sealing the joints between the glass panes. This type of installation requires higher glass joint accuracy to ensure maintaining the gasket pressed.

Internal gasketing:

The inner seal gasket is the most important seal avoiding air infiltration and water entering the building, the system is designed to allow small amounts of water entering the system which will be drained out by the system in two different methods:

- **Mullion drainage**, the water will be drained through mullion channel using the drainage deflector with the assist of four side's ventilation and internal pressure equalization.
- **Zone drainage**, each transom will drain separately using top and bottom drainage slots in the pressure plates and cover caps. Top slots is used to drain the water while bottom slots is used for ventilation and pressure equalization.

Cover cap slots must be shifted from pressure plate slot to reduce air speed inside the system.

Mullion gasketing should be installed shifted by 15-20 cm (i.e. shorter that top side and longer that bottom sides).

At transom connection the hinged part underneath the transom will be cutted and the other part inside mullion gasket groove will continue.

Transom gaskets will be 2% longer than transom length and fixed at both ends by 50 mm length silicon lines filling transom gasket groove

G- Thermal break

For thermal break size selection, refer to glazing charts at fabrication manual.

Thermal break application detail differ from conventional to structural sealant curtain wall

- **Conventional fully captured curtain wall**, the thermal break bars has the same length of the mullion and transoms and interrupted only at the glass supports.
- **Structural sealant curtain wall**, the thermal break fill the cavities between the toggles and the glass support.

H- Drainage systems & drainage deflectors

- Select the correct drainage deflector for mullion drainage as per our glazing tables and cut the excessive length of the spout accordingly.
- Install drainage deflector and inject silicon sealant and make sure that silicone sealant will cover all edges assuring water tightness.
- Apply silicone sealant to seal drainage deflector connection to thermal break.
- Although the system in mullion drained additional transom drainage is required when transom exceed 1200mm in length.

I- Glass setting blocks and glazing

- Clean out debris from the glazing rebates using blower or vacuum cleaner ensuring that the drainage channel is clean and free from any obstacles.
- Clip-fit proprietary glass setting blocks into position on the transom making sure that they do not interfere with the drainage grooves. (Approx. 50 mm from corner edge)
- Position 2mm PA shims for curtain wall types: FSS, VCC,& HCC or 4 mm thick PA shims for curtain wall type: FCC on top of glass setting block, ensuring that it is positioned centrally in accordance with ALUMEG glazing table and outer pan is rested on shims .
- Using proprietary glass suckers lift the glass unit, having regard for all current relevant Health and Safety requirements, onto the PA shims and fit into glazing rebate.
- Ensure that there is a minimum of 5 mm ventilation gap between the edge of the glass pane and the curtain wall frame for curtain wall types: FSS, VCC,& HCC and 7 mm ventilation gap between the edge of the glass pane and the curtain wall frame for curtain wall type: FCC,, for the full perimeter of the glass unit.
- Check that the internal glazing gasket fits against the glass face correctly with no tucks in the gasket leg.
- Fix glazing toggles to hold the glass unit into its position spaced as shown in fabrication manual.
 - 4 mm glass block (7mm gap) for FCC and HCC
 - 2 mm glass block (5mm gap) for FSS and VCC

J- Glazing method of windows and doors:

Windows and doors for Curtain wall typically comes glazed from the factory. If due to size or weight limitations required to be glazed at site, glazing process will be according to the following procedure:

- 1- Glazing to be secured in sash by bead and EPDM wedge gasket.
- 2- Inserting the glass setting blocks, insuring that it is placed in correct locations.
- 3- Cleaning the glass unit thoroughly.
- 4- Fix the outer gasket vertical and horizontal.
- 5- Corners of gasket at joints will be sealed with approved silicone sealant.
- 6- Inserting the glass unit into the aperture and set properly onto the setting locks.
- 7- Direct contact between glazing and any metal parts are not allowed.
- 8- Apply two lines of sealants 50 mm length each side of sash stile to fix glass in position.
- 9- Fixing the glazing beads at top and bottom of the shutter.
- 10- Fixing the side glazing beads insuring that the bead retention clips are located in place and tightly fixed.
- 11- Inserting the internal wedge gasket.
- 12- Steps from 9 to 11 might not be required for 45° assembled non-bead system.
- 13- All fastenings are made of stainless steel grade A2 as minimum and anchors shall be concealed whenever possible unless otherwise shown in approved shop drawings.
- 14- Hardware installation for the remaining parts of the locks, handles and the like.
- 15- Align the striking plate on the frame matching to locks of window and doors.
- 16- Adjust window and door panels for tight fit, weather tight closure and for smooth operation.
- 17- Keys for aluminum doors, 3 keys for each door lock cylinder. If master key is required, then the cylinder will be provided by main contractor and installed by contractor according to the approved chart.
- 18- Keys shall be handed over with plastic tag labeling door type and location.
- 19- Any construction mark to the finished works shall be rectified as per the Engineer's instruction.
- 20- All units must be marked showing building, floor, apartment/ section, & room number for easy allocation and material logistics.
- 21- Clean all marks and remove all labels from glass and leaving the glass cleans.
- 22- Application of silicone sealant around the window/door perimeter according to approved color and location.

K- Pressure-plate gasket.

The pressure-plate outer gasket is the first line of defence against water penetration and air infiltration into the system.

- The glass will be temporary supported with patches of pressure plate and gasket as structurally required and rested on glass holder using correct thickness of PA shims.
- Remove the vertically installed patches to allow for vertical gasket installation.
- Fix vertical pressure-plate gasket with minimum of butt joints as far as practical and seal butt joint when exist.
- Cut gasket straight, length plus approx. 2 % to ensure compression of the gaskets and allow for shrink back, make sure that gasket is not stretched.

- Make sure that the slot for drainage or pressure equalisation is correctly positioned.
- Fix vertical pressure-plate, for screw size and spacing refer to manufacturing manual.
- Remove temporary horizontal glazing patches.
- Fix horizontal pressure-plate-gasket and cut this gasket straight. (Plus approx. 2 %)
- Apply sealant against vertical pressure-plate-gasket and slide horizontal gasket against vertical gasket in its position.

L- Pressure plates

- Pressure plate screw connections should be spaced at intervals of 250 – 300 mm.
- First and last screw should be fixed at 25mm of the ends of the pressure-plate and 50 mm around the centre of mullion or transom cruciform.
- Use correct screw-type and length in accordance with ALUMEG glazing table.
- Install vertical pressure plates first followed by horizontal pressure plate.
- Check both the outer gasket and pressure plate and check, there should be no protrusion in the outer pressure plate gasket and no depression in the pressure plate, it is advisable to set the torque moment of 3,5 – 4,5 Nm, (specific project requirements might require a different value)
- Ensure that mullion drainage deflector & pressure equalisation slots are positioned correctly.
- When coupling is required (at least every 6.5 meter length), leave sufficient space between the pressure plates to allow for expansion. (common used rule, but is depending on location of the curtain wall and colour of cover-cap, to allow for 1mm expansion per meter profile)
- Install horizontal pressure-plate and leave a minimum of 2 mm space between vertical cover cap and horizontal pressure-plate to allow for expansion.

M-Cover caps

Vertical cover caps project by 20 mm from glazing surface while transom cover cap project 17mm for glazing surface allowing for 3mm step back from mullion cover cap.

Cover caps have a typical edge radius of 1 mm to allow for even distribution of applied powder coating layer.

Vertical cover-caps

- Install correct vertical cover-cap first.
- When coupling is required (at least every 6.0 meter length), leave sufficient space between the cover caps to allow for expansion. (common used rule, but is depending on location of the curtain wall and colour of cover-cap, to allow for 1mm expansion per meter profile).
- For cover caps projection larger than 75mm, counter sunk self tapping stainless steel screw should be provided at top and allow for slotted hole at bottom edge to securely fix the cover cap to the pressure plate while allowing the cover cap to expand freely in one direction.
- Higher cover caps need to be fixed at each cruciform location, preferable concealed, underneath the transom cover and if span exceed 1.5 meter length it needs to be fixed more often.

- Drainage deflector spout is typically 2 mm projecting from glazing surface which is hidden by the cover cap.
- Drainage deflector should be installed each floor/second floor above the coupler joint to allow for proper ventilation and pressure equalization to the system. As well as at top of mullion and fixed upside down to allow for air penetration.

N- Structural Sealant curtain wall types FSS, HCC, VCC:

- 1- An umbrella gasket is fixed to the thermal isolator and toggle cavity acting as backing for weather sealant application.
- 2- One source of sealant manufacturer should be used for IGU manufacturing and weather sealant to ensure full compatibility.

O- Sealant Application:

- 3- Clean joints and surfaces free from grease, dust and other contaminants by using blower, brush and cloth.
- 4- Application of approved silicone sealant will be done using gun.
- 5- Adhesion test must be done to ensure proper adhesion. Primer might be used whenever required to improve adhesion based on sealant manufacturer recommendation.
- 6- Tooling all sealant surfaces to produce smooth surfaces.
- 7- Dropping and excess sealant will be tooled as work progresses and before material sets.
- 8- Sealing of joints will commence prior to final coat of painting in coordination with main contractor.
- 9- Masking tape will be used where necessary to prevent contamination of adjacent surfaces.
- 10- Tape will be removed immediately after completion of the joint.

THIRD PART TESTING:

If required by project specification, field water hose test according to **AAMA 502, Voluntary Specification for Field Testing of Newly Installed Curtain wall Products**, which is the proper test method for verifying field air leakage and water penetration resistance of newly installed operable curtain wall and doors; which shall be conducted and submitted as per specifications.

Otherwise, candle flame movement could be used to test air leakage for windows.

CLEANING:

Frame surfaces will be cleaned promptly after installation using mild diluted detergents according to methods recommended by frame manufacturer and powder coating paint supplier.

APPENDICES

- HSSE Risk Assessment.
- Inspection and Test Plan.
- Checklists.
- Submittal for approval.