

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Ali Garments Ltd.
Address of the Factory	: 8, Dagerchala, National University, Gazipur-1704, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 16 th February, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 16 th February, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 16 th February, 2015
BGMEA Membership No.	: 95

BASIC INFORMATION:

The assessed factory building is seven (07) storied with RCC beam column and flat plate (6th floor only) dual system structure and there is an undocumented non-engineered corrugated iron (CI) shed which covers 75% of roof top. The Ali Garments Ltd is located on the 4th to 6th floor of the building. The roof shed is also used by Ali Garments Ltd. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : RCC beam column and flat plate dual system structure.
- iii. Floor System : RCC Beam-slab and flat slab floor system.
- iv. Floor Area : Ali Garments used 24041 sft floor out of 56096 sft floor area.
- v. No. of Stories : 7 Storey.
- vi. Construction Year : Building was built in two phases (2006-2007 and 2008-2009).
- vii. Foundation Type : Isolated Footing foundation.
- viii. Design Drawings : Available – approval plan, structural drawing, machine layout plan.
Not Available-, floor load plan, material test report.
- ix. Soil Investigation Report : Available.
- x. Construction Materials : Brick Aggregated in columns.
- xi. Generator : At ground floor of the building.

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for both Structural and Fire & Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for **Structural Safety** corrective action are:

- Short Term (Immediate) :
- All Storage loading to be reduced to less than 2kN/m² until completion of a Detail Engineering assessment.
 - Areas of overstress should not to be used for storage.
 - A Detail Engineering Assessment (DEA) of Factory to be commenced.
- Mid Term (6-weeks) :
- A Detail Engineering Assessment (DEA) of Factory to be completed.

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- Building engineer to verify the integrity of additional floor and billboard on entire structure and prepare as built drawings accordingly.
- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.

Long Term (6-months) :

- Leakage of water supply system should be repaired properly and maintain proper sloping for discharging stored water.

The recommendations for **Fire & Electrical Safety** corrective action are:

(A): Recommendations for Fire Safety corrective actions:

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • None.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for. • All the firefighting equipment's need to test with proper documents. • Factory needs to have marked aisles in all working floor according to 0.9m for one side seat and 1.0m for both side seat. Factory needs to reduce the occupant loads from the above mentioned floor to keep within allowable limit. • Lights in storage area needed to be installed with protective covers and conduits. • Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9m and when used as a storage facility there shall be a minimum clearance of one third the floor height from the ceiling to the top of the storage stack. • Factory needs to ensure adequate numbers of exit signs which need to be visible from any positions and comply with the following conditions: (a) The color and design of lettering, arrows and other symbols on exit signs needs to be in high contrast with their background; (b) Words on the signs needs to be at least 150 mm with a stroke of not less 20 mm; (c) The source of illumination, contrast, intensity and luminance needs to

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	<p>be at least 50 lux, 0.5, 5.0 foot-candles and 0.2 cd/m² respectively.</p>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension. • Factory needs to have a valid fire license for the full occupied area. • Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher. • All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key. • Factory needs to provide handrail on both sides of all the stairways. • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs. (Escape route). • Factory need to have emergency backup power for critical fire safety system with sufficient capacity & arrangement according to NTPA Guideline. • Install suitable public address system having communication to all floors as well as facilities to receive messages from all floors.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Factory needs to have a proper pre-plan for fire service & civil department. • Factory needs to ensure minimum width of stair either 0.9 m or 8 mm per occupant, the largest one of those or need reduce the occupant load from the above mention floors. • Final exit route-2(Srari-2 route) need to be protected by 4 hours rated construction lobby with 2 hours fire rated door/opening at each floor level entrance including ground floor and need to be protected from generator room at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area. • Storage area need to be protected with 2 hours rated

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	<p>construction & 1.5 hours rated opening or doors.</p> <ul style="list-style-type: none">• Boiler room needs to be separated with prayer room by 4 hours fire rated enclosure and 2 hours rated door/opening. <p>Generator room needs to be fire separated with (with final exit route-2) 4 hours fire rated enclosure and 2 hr rated opening having direct access from outside.</p> <ul style="list-style-type: none">• All the stairs(Stair-1 & 2) need to be protected with fire and smoke proof lobby (4 hours rated enclosure with 2 hour rated door) and provide a protected route from all through the stairway to the final exits.• Factory need to constructed fire separated lobby with 4 hours rated wall and 2 hours rated fire door and smoke proof lobby near to exit leading to staircase.• Factory need to install centralized and automatic fire detection & alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline.• The factory need to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple call boxes on all occupied floors, including other tenanted floors of the building.• Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline• Factory needs to install proper standpipe system with having at least 100mm dia of riser.• Factory needs to install 1 riser per 1000 m² of floor area and 38 mm diameter fabric hoses with variable nozzle.• Factory needs to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 Kpa. For standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200 Kpa.• Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.• Factory needs to have dedicated fire pump with backup
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	<p>power system & sufficient capacity for achieve required pressure in the remote place of the factory.</p> <ul style="list-style-type: none"> • Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least $1900 \times 75 = 142500$ liters water storage tank. • Factory needs to establish command station on the entrance lobby and equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor. It needs to be manned with properly trained personnel having responsibility of maintenance and operating firefighting facilities within the building.
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(B): Recommendations for Electrical Safety corrective actions:

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating ($> \text{ambient} + 40^{\circ}\text{C}$) and take proper action.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Ensure all distribution boards (including panel door) are earthed properly. • Remove all unused cables from distribution boards and make sure all necessary cables are properly terminated at its point of termination using appropriate size and type of lug. • Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit. • Ensure proper earthing connections at all electrical equipment. • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering. • Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.
<p>Mid Term</p> <p><i>(The remedial works indicated must be</i></p>	<ul style="list-style-type: none"> • Install appropriate number and type of safety signage and fire-fighting equipment at generator room. Also ensure graded rubber mats are provided in front of all

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<p><i>carried out within a period of 6 weeks)</i></p>	<p>distribution boards.</p> <ul style="list-style-type: none"> • Provide Instruction boards for first aid and artificial respiration in the generator room. • Provide two separate and distinct connections of earthing for each generator. • Ensure distribution boards have a minimum clearance of 1 m (39 in) in front. • Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth bus bar of distribution boards and ensure continuous earth path is back to main building intake. • Rewire to ensure each incoming supply to an MCB has a dedicated supply from bus bar. Avoid the use of multiple cables on outgoing side of MCB's. • Replace wooden base with metal clad construction for circuit breakers inside the distribution boards. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Connect all metal in the building to the building earthing system. • Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating { ambient+(20⁰C-40⁰C)} and take proper action.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system. • Establish a periodical Insulation and earth Resistance Measurement • Program and record the related testing data. • Inspect electrical panel boards on an annual basis. • Ensure the generator room has adequate fire separation from the production building.

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	<ul style="list-style-type: none">• Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.• Ensure distribution boards have no opening and all live internal components are concealed properly.• Provide dedicated & adequate size of neutral with proper identification for each circuit.• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.• Use non-combustible material to make cable channel and provide adequate covers on cable channel.• Provide proper cable terminator/connector for stranded conductors at its point of termination.• Run cable in a designated route with mechanical protection and fire sealing of floor slab and wall penetrations.• Install separate distribution boards for lighting and power circuits.• Install lightning protection system on the building.
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