

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

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Name of the Factory	: AL-GHOUSIA TEXTILES LTD.
Address of the Factory	: 183, North Gazirchat, Alia Madrasha Road, Unique, Ashulia, Savar, Dhaka, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 2 <sup>nd</sup> March, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 2 <sup>nd</sup> March, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 2 <sup>nd</sup> March, 2015
BKMEA Membership No.	: 1616.

### **BASIC INFORMATION:**

The assessed factory building was a 7 storied RCC building. The structural system of the factory building was RCC beam column frame and beam slab floor system. The building is used by several RMG factories. The factory operates in the 1<sup>st</sup> floor of the building. The following general information were noted:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: RCC beam column frame.
iii. Floor System	: RCC beam slab.
iv. Floor Area	: Total floor area is 12,310 sft.
v. No. of Stories	: 7 Storey.
vi. Construction Year	: 2008-2009.
vii. Foundation Type	: Unknown.
viii. Design Drawings	: Available: Approval plan and machine layout plan. Not Available: Full set of structural design drawing, architectural design drawing and floor load plan.
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Brick aggregate.
xi. Generator	: Ground Floor.

### **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)	: None.
Mid Term (6-weeks)	: <ul style="list-style-type: none"><li>• Factory Engineer to review design, loads and columns stresses in the area identified above. Verify in situ concrete stresses either by 100mm dia. cores or existing cylinder strength data for [the identified columns] or [100mm dia. cores from 4 columns].</li><li>• Structural engineer to prepare full set of as built structural drawing, and prepare calculations showing the structural adequacy of the floor system.</li></ul>
Long Term (6-months)	:

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- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
- Develop set of as-built drawings showing structure details, loading, dimensions, levels, foundations and framing on Plan, Section and Elevation drawings.

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"> <li>• Factory needs to remove the entire cartoon from the escape route and means of escape should be unobstructed &amp; free.</li> </ul>
<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"> <li>• Factory needs to conduct fire drill quarterly (4 times a year) under the fire safety plan and needs to kept the written record of such drills for at least 3 years for the inspection of fire brigade whenever called for.</li> <li>• Factory need to have proper testing plan &amp; record of fire safety equipment.</li> <li>• 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.</li> <li>• Lights in storage area need to be installed with protective covers and conduits.</li> <li>• All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs.</li> </ul>
<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"> <li>• Fire manager/Director need to have safety training from proper authority &amp; worker of the factory should as far as possible be trained for use fire extinguisher.</li> <li>• 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.</li> <li>• Minimum width of door shall be at least 0.9 m &amp; height shall be 2 m.</li> <li>• Factory needs to provide handrail on both sides of all the stairways.</li> <li>• Factory needs to be installed with adequate illuminated emergency lighting in floors, exits &amp; stairs. (Escape</li> </ul>

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	<p>route).</p> <ul style="list-style-type: none"> <li>• Factory needs to have emergency backup power for critical fire safety system with sufficient capacity &amp; arrangement according to NTPA Guideline.</li> <li>• Factory needs to install suitable public address system having communication to all floors as well as facilities to receive messages from all floors.</li> </ul>
<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"> <li>• Fire department pre-plan needs to be developed.</li> <li>• The final exit-2 escape routes need to be protected by 4 hours fire rated construction with 2 hours fire rated door from the boiler room area of ground floor and have the protected route till to reach the safe refuge area.</li> <li>• Storages area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors.</li> <li>• Boiler: Boiler room need to be protected with 4 hours rated construction and 2 hours rated opening / door from the working floor (Kooltax Knitex Ltd) of ground floor of the building.</li> <li>• Transformer:</li> <li>• Transformer room need to be protected with 4 hours rated construction and 2 hours rated opening / door at ground floor.</li> <li>• All the stairs need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hour rated door)and provide a protected route from all through the stairway to the final exits.</li> <li>• Factory needs protect the lift with 2 hours rated enclosure &amp; 1hour rated auto closing fire door.</li> <li>• Factory needs to install centralized and automatic fire detection &amp; alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline.</li> <li>• 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.</li> <li>• Factory needs to install control panel for centralized</li> </ul>

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	<p>automatic smoke detection &amp; fire alarm system according to NTPA Guideline.</p> <ul style="list-style-type: none"> <li>• Factory needs to install proper standpipe system with having at least 100 mm dia of riser.</li> <li>• Factory need to be installed by 1 riser per 1000 sqm of floor area with at least 38 mm dia of hoses.</li> <li>• 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.</li> <li>• Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.</li> <li>• Factory needs to have dedicated fire pump with backup power system &amp; sufficient capacity for achieve required pressure in the remote place of the factory.</li> <li>• Factory needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least <math>1900 \times 75 = 142500</math> liters water storage tank.</li> </ul>
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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"> <li>• Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection, heat source etc.) of burning sign/insulation damage and take proper action including replacing cable or equipment where necessary.</li> </ul>
<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"> <li>• Provide two separate and distinct connections of earthing for each generator.</li> <li>• Ensure all distribution boards (including panel door) are earthed properly.</li> <li>• 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.</li> <li>• Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</li> <li>• Ensure proper earthing connections at all electrical equipment</li> <li>• Clean interior components from dust and debris and</li> </ul>

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	<p>seal all openings within the enclosure to prevent dust and debris from entering.</p> <ul style="list-style-type: none"> <li>• Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.</li> </ul>
<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"> <li>• 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 distribution boards.</li> <li>• Provide Instruction board for first aid and artificial respiration in the generator room.</li> <li>• Ensure distribution board is installed in compliant locations in terms of height, access and surrounding weather.</li> <li>• Ensure distribution boards have a minimum clearance of 1 m (39 in) in front.</li> <li>• Provide dedicated &amp; 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.</li> <li>• 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.</li> <li>• Replace wooden bases with metal clad construction for mounting the circuit breakers.</li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>• Provide adequate support or mechanical guards for electrical wiring where necessary.</li> <li>• Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</li> <li>• Connect all metal in the building to the building earthing system.</li> </ul>
<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"> <li>• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</li> <li>• Establish a periodical Insulation and earth Resistance</li> </ul>

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	<p>Measurement Program and record the related testing data.</p> <ul style="list-style-type: none"><li>• Inspect electrical switchgear and panel boards on an annual basis.</li><li>• Ensure overhead service connections to the building are led via adequate size and type of service masts.</li><li>• Ensure all high tension cables are laid following standard cable laying techniques.</li><li>• Ensure the generator room has adequate fire separation from the main building.</li><li>• Ensure distribution boards have no opening and all live internal components are concealed properly.</li><li>• Provide dedicated &amp; adequate size of neutral with proper identification for each applicable circuit.</li><li>• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</li><li>• Provide proper cable terminator/connector for stranded conductors at its point of termination.</li><li>• Install separate distribution boards for lighting and power circuits.</li><li>• Install lightning protection system on the building.</li></ul>
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