

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

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Name of the Factory	: <b>Al Amin Garment Indes. Ltd</b>
Address of the Factory	: Wazadia, Pachlish Baized Bustami, Pachlish, Chittagong, Bangladesh.
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 7-May-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 7-May-14
BGMEA Membership No	: 361

### **BASIC INFORMATION:**

This factory is a two storied shared building. The following general information was noted:

i.	Building Usage Type	: Garments Factory
ii.	Structural System	: Concrete beam & monolithic RC slab system with beams spanning both directions between column
iii.	Floor System	: RCC Structure
iv.	Floor Area	: 22215 sf
v.	No. of Stories	: Two story RCC building
vi.	Construction Year	: 1984
vii.	Foundation Type	: Unknown.
viii.	Design Drawings	: Available.
ix.	Soil investigation Report	: Available.
x.	Construction Materials	: Reinforced Concrete
xi.	Generator	: Ground level

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

The recommendations of corrective action for Structural, Fire and Electrical Safety comprises of Short Term, Mid Term and Long Term basis are as follows:

#### **The recommendations for Structural Safety corrective actions are:**

Immediate : NA

Short Term: (3 Weeks) :

- i. Develop a program to ensure that all live loads for which a floor or roof has been designed for will not be exceeded. The designated Load Manager shall oversee this program and ensure it is enforced.
- ii. Designate a representative as the Factory Load Manager. The Factory Owner shall ensure that at least one individual, the Factory Load Manager who is located onsite full time at the factory, is trained in calculating operational load characteristics of the specific factory. The Factory Load Manager shall serve as an ongoing resource to RMG vendors and be responsible to ensure that the factory operational loads do not at any time exceed the factory floor load limits as described on the Floor Load Plans.

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- iii. "The compressive strength of columns, floor framing and shear walls using MCAC shall be investigated by an appropriate program of in-situ testing and representative destructive testing of core samples".

Mid Term (6 Weeks)

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- i. Retain qualified structural engineer to confirm that rebar has been exposed or otherwise impacted by the pipe penetrations. Rebar must have sufficient cover to prevent degradation.
- ii. Remove plaster in crack areas. Verify source of cracks is improper curing or smaller size ingredients (shrinkage problem), plaster the face of the walls and ceilings with specified material and follow proper curing procedure.
- iii. Have a qualified structural engineer provide further analysis and testing of the noted beam/slab separation. If required, a remediation plan shall also be provided by the qualified structural engineer.
- iv. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- v. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard. All elements must be evaluated and included in drawings.
- vi. Engage a qualified structural engineer to develop the required documents to confirm compliance with building code. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20
- vii. Engage a qualified structural engineer to confirm and document that provisions have been made to accommodate concentrated loads on the water tank. If provisions have not been made, have a qualified structural engineer develop a remediation plan.
- viii. Have a qualified structural engineer confirm that capacity to support the load is available. Load Plans complying with Alliance Standard Part 8 Section 8.20.4.3 should also be developed.
- ix. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading. Compliance may be waived if the Factory Owner provides satisfactory evidence of a cyclone operations plan that includes full evacuation of the factory in advance of any approaching cyclone.
- x. Remove damaged plaster in boiler room. Re-plaster and seal with water proofing materials.
- xi. Review the sanitary piping systems. Repair all leaks.
- xii. Adequately anchor and brace all non-structural elements such as the rack systems to resist earthquake forces to comply with the BNBC and Alliance Standard.
- xiii. "Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3"
- xiv. "Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard."
- xv. "Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan (noted elsewhere).
- xvi. Have a qualified structural engineer provide analysis of the identified cracks to determine the cause of the cracking. Repair as deemed necessary.
- xvii. Investigate the source of water intrusion in the needle room. Repair any leaks or other routes of water intrusion. Remove and replace damaged plaster.

Long Term (6 Months)

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- i. Remove damaged RCC at the expansion joint. Seal the joint with appropriate materials

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### The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Install bus bar covers/shrouds to prevent contact with busbar in DB.
Short Term (3 Weeks)	
Mid Term (6 Weeks)	<p>All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system. The required marking can be by color code, the words “emergency system,” or any other method that identifies the box or enclosure as a component of the emergency system.</p> <p>Provide lighting suitable for maintenance tasks to be efficiently undertaken in the substation room. Generally substation lighting in substation should be 22 lux on horizontal and vertical surfaces. Additional lighting should be provided for detail tasks.</p> <p>Label all switchboards and/or distribution boards in the factory with capacity information. The permanent label should identify the maximum voltage present in an item of equipment or within the enclosure.</p> <p>Replace cover of circular junction box at west side of factory.</p> <p>Clean dust from cable trays and install fitted covers.</p> <p>Light fixtures without protective covers (otherwise known as naked lights) shall not be allowed in storage areas or in any area where the Inspector of the Factories Rules (1.6.3.7) Part 53 disallows these fixtures. Install signs posted in Bengali and English, indicating this prohibition at all entrances to these areas.</p>
Long Term (6 Months)	<p>Develop and implement an electrical safety program. Include key topics such as lock out tag out procedures, personal protective equipment requirements, etc. Reference NFPA 70e for example program requirements. Workers should be trained against electrical hazards.</p> <p>Generator sets shall be separated from all other occupancy areas by a minimum 2 hour construction. Penetrations must have fire rated assemblies.</p> <p>Oil filled transformers for non high-rise buildings shall be separated by a minimum 2 hour fire resistive rated construction. Retain a qualified fire engineer to design enclosures or install fire rated assemblies.</p> <p>Switchboards should be moved at least 2.5 m (8 ft) away from sink.</p> <p>Have a qualified electrical engineer develop grounding layout plan and power distribution schedule to supplement</p>

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	<p>electrical layout and single line diagrams</p> <p>Develop an Insulation Resistance Measurement Program that ensures deterioration of insulation resistance will be identified quickly. Testing should be in compliance with InterNational Electrical Testing Association (NETA). All transformers, switchgears etc. shall be subject to an insulation resistance measurement test to ground after installation but before any wiring is connected. Insulation tests shall be made between open contacts of circuit breakers, switches etc. and between each phase and earth.</p> <p>Complete thermographic scans at least on a three year cycle. Thermographic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems &amp; Rotating Equipment and NFPA 70B or a comparable standard.</p> <p>Indoor electrical installations that are accessible to unqualified persons shall be made with metal-enclosed equipment. Switchgear, unit substations, transformers, pull boxes, connection boxes, and other similar associated equipment shall be marked with appropriate caution signs.</p> <p>Entrances to rooms and other guarded locations that contain exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter.</p> <p>Caution, warning, danger signs or labels should meet the following requirements:</p> <p>(1) The marking shall adequately warn of the hazard using effective words and/or colors and/or symbols. American National Standards Institute ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for suitable font sizes, words, colors, symbols, and location requirements for labels.</p> <p>(2) Shall be permanently affixed to the equipment or wiring method and shall not be hand written. Exception, portions of labels or markings that are variable, or that could be subject to changes, shall be permitted to be hand written and shall be legible.</p> <p>(3) The label shall be of sufficient durability to withstand the environment involved. ANSI Z535.4-2011, Product Safety Signs and Labels, provides guidelines for the design and durability of safety signs and labels for application to electrical equipment</p> <p>Establish an inspection testing, and maintenance program for the Uninterruptable Power Supply (UPS) and associated components. The program must based on the following:</p> <ol style="list-style-type: none"><li>(1) Manufacturer's recommendations</li><li>(2) Manufacturer's instruction manuals</li><li>(3) Minimum Requirements of NFPA 111 Chapter 8</li><li>(4) Minimum Requirements of NFPA 70B Chapter 28</li></ol> <p>All testing should be documented and available for review.</p>
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### The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Remove all combustibles stored underneath the cutting tables at the noted locations.
Short Term (3 Weeks)	Remove all hasps, locks, slide bolts, or other locking devices at the noted locations. Remove all existing gates and doors in the means of egress including all locking devices. Install fire doors with approved panic hardware that cannot be locked in the direction of egress under any conditions.
Mid Term (6 Weeks)	<p>Post the occupant load for every assembly and production floor in the facility in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Develop a testing and maintenance program that ensures the emergency power for exit signs is tested at least once per year. If battery operated signs are used, these lights are tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum 90 min once per year.</p>
Long Term (6 Months)	<p>Install approved fire rated doors at the stairs that are listed, permanently labeled, automatic-closing, in compatible fire rated frames with latching hardware.</p> <p>Install automatic fire alarm system with sufficient smoke/heat detectors as per Alliance standard. Automatic detectors should be tied into the fire alarm system. Alarm system should initiate occupant notification upon activation of detectors in addition to the manual fire alarm stations. All fire alarm installations shall be submitted for review by the Alliance for review prior to commencement of installation.</p>