

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

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Name of the Factory	: Air Apparels Ltd.
Address of the Factory	: Yarpur, Zirabo, Ashulia, Dhaka, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 12 <sup>th</sup> March, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 12 <sup>th</sup> March, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 12 <sup>th</sup> March, 2015
BGMEA Membership No.	: 4731.

### **BASIC INFORMATION:**

The assessed factory building is a Single Storey steel shed with RCC columns and a 2-storey masonry structure in the factory premises. Shed building and 2 storied masonry building is denoted as Building-1 and Building-2 respectively. The factory operates in the building on an ownership basis. The following information was noted:

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|-------------------------------|---|
| i. Building Usage Type        | : Knitting Garment Factory.   |
| ii. Structural System         | : Steel shed with RCC Columns for Building-1 and masonry building for Building-2.   |
| iii. Floor System             | : Building 1: Steel shed with RCC Columns.<br>Building 2: RCC slab on masonry wall. |
| iv. Floor Area                | : The typical plinth area and total production floor is 13,460 sft. (approx.)       |
| v. No. of Stories             | : A single storey shed and a 2 storied masonry wall building.                       |
| vi. Construction Year         | : 2007-2009.  |
| vii. Foundation Type          | : Unknown.  |
| viii. Design Drawings         | : Unavailable.  |
| ix. Soil Investigation Report | : Unavailable.  |
| x. Construction Materials     | : Brick aggregate (For RCC portion).  |
| xi. Generator                 | : At ground floor of the building-2.  |

### **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:

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|------------------------|--|
| Short Term (Immediate) | : None.  |
| Mid Term (6-weeks)     | : <ul style="list-style-type: none"><li>• As-built architectural and structural drawings of the building to be prepared and submitted for approval by appropriate authority. As part of this process the building engineer will be required to make a number of checks on the inconsistencies between the structural design and the as-built construction.</li><li>• Factory management to relocate overhead water tank from utility building rooftop.</li></ul> |
| Long Term (6-months)   | :  |

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- Sections of plaster finish of slab to be removed to investigate if cracks penetrate the building structure or wall. Carry out any remedial actions as directed by the Building Engineer for cracks on slab.
- The connection of steel stair needs to be checked by building engineer and the bracing system is required to ensure the stability of the structure. Carry out any remedial actions as directed by the Building Engineer for steel stairs.

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>	<p>None.</p>
<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>• Remove all temporary items from all escape routes, aisles and passageway.</li> <li>• Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. <ul style="list-style-type: none"> <li>- Illuminated exit sign should be posted above the exit door, - It should be clearly visible at all time,</li> <li>- Provide directional signs wherever necessary.</li> <li>- All exit doors should be clearly marked for easy identification.</li> <li>-Signage should be uniform</li> </ul> </li> <li>• Provide sufficient number of fire extinguisher at ground floor production area and to keep the record for re filling &amp; properly tagged.</li> <li>• Provide additional firefighting equipment like sand &amp; water buckets near exit or easily accessible area for first phase firefighting.</li> <li>• Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan &amp; should kept record properly.</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>• Prepare proper plan and design for side hinged type door, which swing outward of the room / in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter.</li> </ul>

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	<ul style="list-style-type: none"> <li>Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key.</li> <li>Exit door should have minimum clear width 0.9 meter.</li> <li>Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor substation room, which located at the adjacent to final exit.</li> <li>The egress paths should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for all corridors &amp; exit doors. Aisles should be provided with a minimum 2 lux.</li> <li>Design and plan to provide automatic detection system with automatic fire alarm.</li> <li>Design and plan to install dedicated fire pump with alternate backup power supply.</li> <li>Plan and design to provide dedicated water storage tank for firefighting operation.</li> <li>Obtain building approval from issuing authority.</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>Provide fire 4 hours rated barriers with 2 hours fire rated doors at ground floor substation room, which located at the adjacent to final exit.</li> <li>Install automatic detection system with automatic fire alarm.</li> <li>Install dedicated fire pump with alternate backup power supply.</li> <li>Provide sufficient number of hose pipe with respect to area and travel distance as per RMG guideline.</li> <li>Provide dedicated storage tank for firefighting operation.</li> </ul>

### ***(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>None.</li> </ul>
<p>Short Term</p> <p><i>(Actions that must be incorporated into</i></p>	<ul style="list-style-type: none"> <li>All strands cables at exposed ends should be properly soldered / crimped and insulated.</li> </ul>

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<p><i>a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></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"> <li>• 1. Provide updated SLD matching the existing installation at the factory.</li> <li>2. SLD to indicate exact positions of all points of switch boxes and other outlets.</li> <li>3. SLD to be approved by the engineer-in-charge.</li> <li>• 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc.</li> <li>2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation.</li> <li>3. As built drawing to be approved by the engineer-in-charge.</li> <li>• Provide rubber mats of adequate size in front of all distribution panels.</li> <li>• Install smoke detection and provide firefighting equipment in the substation and generator room.</li> <li>• Adequate number of caution boards should be kept in the substation/ transformer room.</li> <li>• 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign.</li> <li>2. The source of illumination should be providing not less than 50 lux.</li> <li>• 1. Remove all the inflammable materials from surrounding of electrical circuitry at MDBs/SDBs.</li> <li>2. Ensure that all electric circuitry clean of inflammable materials.</li> <li>3. Conduct periodic maintenance and maintain the records.</li> <li>• 1. Overhead service connections should be covered and meet the requirements mentioned in RMG Guidelines.</li> <li>2. Provide supports for main service line complete with</li> </ul>

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	<p>adequate insulation.</p> <ul style="list-style-type: none"> <li>• The electrical panels to be of metal case and should be marked with “Danger 415 Volts” and identified with proper phase marking and danger signage.</li> <li>• Provide cable connections with properly soldered / welded lugs at (LT/MDB/DB/SDB)'s. Ensure that all the electrical connections are properly secured with lugs and glands.</li> <li>• Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation.</li> <li>• Avoid looping and bunch of cable at MCCB/MCB or bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards.</li> <li>• Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases.</li> <li>• Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box.</li> <li>• Seal the cable penetrations through walls adequately with fire resistive elements.</li> <li>• Provide adequate earthing to body and doors to all MDBs / DBs. Ensure that all electrical panels provided with proper and separate earth potential.</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>• Make suitable arrangements to prevent storm water to enter substation / transformer / switch rooms.</li> <li>• Provide adequate ventilation arrangements for indoor substation.</li> <li>• Provide 4 hour fire rated walls all around the transformer / generator room on ground level.</li> <li>• Provide adequate cable trenches with non-flammable covers at substation areas.</li> <li>• Provide calibrated Ammeters / Voltmeters at distribution boards (LT/MDBs).</li> <li>• Energy meters should be installed at convenient height</li> </ul>

	<p>(At least 1.5 m above ground) with proper protection.</p> <ul style="list-style-type: none"><li>• Review capacity of standby generator on basis of loads for essential lighting / AC / Equipment / Services. Replace generator with larger capacity or install second generator if review indicates existing unit is too small.</li><li>• Provide and maintain easy access and proper height of switchboard / panel boards (&lt; 2m from floor level).</li><li>•<ol style="list-style-type: none"><li>1. Wooden switchboards / panel boards should be replaced by non-flammable materials.</li><li>2. Prefer switchboards made of non-flammable materials.</li></ol></li><li>• Power cables/ telecommunication cables / antenna cables should be laid separately.</li><li>• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).</li><li>• Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be covered in proper conduit pipes.</li><li>• Seal the cable entry-exit points of (LT/MDB/DB/SDB)'s with non-flammable materials. In addition:<ol style="list-style-type: none"><li>1. Ensure that HT / LT panels / Switchgears to be vermin / damp proof.</li><li>2. Ensure all unused holes / openings in DBs to be blocked properly.</li></ol></li><li>•<ol style="list-style-type: none"><li>1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.</li><li>2. Ensure that connections between conductors / equipment's provided to durable electrical continuity and adequate mechanical strength and protection.</li><li>3. The continuous earth connection is provided back to the main intake supply earth.</li></ol></li><li>• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.</li></ul>
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