

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

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Name of the Factory	: Afrah Dresses Ltd.
Address of the Factory	: CDA Market, 75/B, Sagorica Complex, Pahartoli, Chittagong, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 26 <sup>th</sup> February, 2015.
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 26 <sup>th</sup> February, 2015.
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 26 <sup>th</sup> February, 2015.
BGMEA Membership No.	: 4163.

### **BASIC INFORMATION:**

The assessed factory building was a 4 -Storey RCC building. The structural system of the building is RCC beam column frame and beam slab floor system. 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> floor of building were occupied by the assessed factory as rental basis. Ground floor was occupied by different shops. The following information was noted:

i. Building Usage Type	: Garment Factory
ii. Structural System	: RCC beam column frame system.
iii. Floor System	: RCC beam slab floor system.
iv. Floor Area	: The typical plinth area is 11,450 sft. and total production floor (1st, 2nd & 3rd) is 37,462 sft.
v. No. of Stories	: 4-Storey.
vi. Construction Year	: Phase 1 - 1994 to 1996 (GF to 2nd floor) Phase 2 - 2012 (3rd floor).
vii. Foundation Type	: Shallow Foundation (Spread footing - As per Structural drawing).
viii. Design Drawings	: Available (Approval document was available at the factory from CDA on 1st August, 2002 for six storey commercial building.)
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Brick aggregate. (Identified by removing plaster)
xi. Generator	: Adjacent, North-West portion.

### **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 area identified above.</li><li>• Verify insitu concrete stresses either by 100mm dia. cores or existing cylinder strength data for E2, E10 &amp; E14 column.</li><li>• The stacking of fabrics need to be reduced and store it in organized way.</li></ul>

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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.
- Sections of plaster finish to wall-column joint to be removed to investigate if cracks penetrate into the building structure. Investigation needed to determine why cracks occurring.

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>N/A</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>• The minimum clear width of the pathway should be 0.9 meter</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,</li> <li>- 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> </ul> </li> <li>-Signage should be uniform</li> <li>• Factory management should check alarm call points, alarm &amp; detection system periodically and maintained the record properly.</li> <li>• The hose pipe performance should be checked periodically and properly tagged.</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>• Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter.</li> <li>• Remove all locking device from all egress door. All exit doors should be open-able from the side they serve</li> </ul>

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	<p>without the use of a key.</p> <ul style="list-style-type: none"> <li>• Prepare proper plan &amp; design for another staircase. <ul style="list-style-type: none"> <li>- Minimum clear width should be 0.9 meter.</li> </ul> </li> </ul> <p>Or rearrange the occupant load, which is not exceed the 337 no. of occupant.</p> <ul style="list-style-type: none"> <li>• Provide handrails on both side of each stairway with height of 0.9m measured from the nose of stair to the top of the handrail.</li> <li>• Doors in stair should be outward opening, side-swing, self-closing, non-lockable 1.5 hours fire rated doors in all stair way encloses.</li> <li>• Produce design and plan for automatic detection system with automatic fire alarm.</li> <li>• Provide adequate nos. of smoke detectors to cover the whole factory building.</li> <li>• Prepare proper design and plan for dedicated fire pump with alternate backup power supply.</li> <li>• Replace existing 1 inch hose pipe replace with 1.5 inch hose pipe to meet the requirement of RMG guideline.</li> <li>• Prepare plan and design for dedicated water storage tank for firefighting operation.</li> <li>• Visual alarm should be placed at the generator room.</li> <li>• Cover all units / floors in a valid fire license</li> <li>• Implement to a single fire safety management system with approvals from all tenants in the factory building.</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>• Install another staircase as per plan and design. <ul style="list-style-type: none"> <li>- Minimum clear width should be 0.9 meter.</li> </ul> </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 on each floor as per RMG guideline.</li> <li>• Stand pipe supplying first aid hose should have</li> </ul>

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	<p>minimum pressure of 200 KPa.</p> <ul style="list-style-type: none"> <li>• Provide dedicated storage tank for firefighting operation</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>• Over current protection devices (Circuit breakers) should be installed at all distribution panels.</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 proper separate earthing /grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.</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>• 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>• Provide and maintain clear and legible identifications numbers &amp; names on all incoming and outgoing circuits of HT / LT panels.</li> <li>• 1. All stranded conductors &gt; 6mm<sup>2</sup> to be provided with cable sockets.</li> <li>• 2. All stranded conductors &lt; 6 mm<sup>2</sup>, at exposed end</li> </ul>

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	<p>should be soldered / crimped.</p> <ul style="list-style-type: none"> <li>• Provide suitable &amp; non-flammable protected supports and shades for hanged light fittings/fixtures.</li> <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 proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards.</li> <li>• Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation.</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>• Seal the cable penetrations through walls adequately with fire resistive elements.</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 4 hour fire rated walls all around the transformer / generator room on ground level.</li> <li>• Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 36m<sup>2</sup>, or relocate the generator room.</li> <li>• Provide and maintain proper clearance in all sides of generator for ease of maintenance.</li> <li>• 1. Design to have proper segregation of different end used loads.</li> <li>2. Wiring design to have separate and distinct sub-circuits for power and heating system.</li> <li>3. All DBs to be placed conveniently.</li> <li>4. Wiring to be neat, tidy and located near ceiling.</li> <li>• Provide and maintain easy access and proper height of switchboard / panel boards (&lt; 2m from floor level).</li> <li>• Power cables/ telecommunication cables / antenna cables should be laid separately.</li> <li>• Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be</li> </ul>

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	<p>covered in proper conduit pipes.</p> <ul 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 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><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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