

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

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Name of the Factory	: AMBIA KNITTING & DYEING LTD.
Address of the Factory	: Halimkharchar, Charkana, Patiya, Chittagong.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 25 <sup>th</sup> February, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 25 <sup>th</sup> February, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 25 <sup>th</sup> February, 2015
BKMEA Membership No.	: 969.

### **BASIC INFORMATION:**

The assessed factory building was a Single Storey truss shed structure supported by RCC columns. There were three other buildings on north side of the factory. All those buildings were three storey RCC structure. One of them was garment factory, which is now vacant and other two were residential building. The factory operates in the building on an ownership basis. The following information was noted:

- i. Building Usage Type : Knitting and Dyeing Factory
- ii. Structural System : Profile sheet truss structure supported by RCC columns
- iii. Floor System : RCC Beam Slab at mezzanine floor.
- iv. Floor Area : The typical plinth area is 26740 sft. and total production floor is 30590 sft.
- v. No. of Stories : Single Storey.
- vi. Construction Year : 2005.
- vii. Foundation Type : Unknown.
- viii. Design Drawings : Available but not approved.
- ix. Soil Investigation Report : Unavailable.
- x. Construction Materials : Brick aggregate (For RCC column).
- xi. Generator : Adjacent to west exterior wall of the building (Outside 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:

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|------------------------|---|
| Short Term (Immediate) | : None.   |
| Mid Term (6-weeks)     | : <ul style="list-style-type: none"><li>• As built architectural and structural drawing 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 structural design as described in the following recommendations.</li></ul> |
| Long Term (6-months)   | : <ul style="list-style-type: none"><li>• The connection of steel structure needs to be checked by building engineer. The ties between purlin are required to ensure the stability of the steel shed.</li></ul>   |

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- Sections of plaster finish to beams and slab to be removed to investigate if cracks penetrate 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>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>• 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> <li>-Signage should be uniform</li> </ul> </li> <li>• Provide fire extinguisher at building-1 &amp; building-2 and to keep the record for re filling &amp; properly tagged.</li> <li>• Place the extinguisher near the path of exit travel &amp; easily accessible</li> <li>• The first aid hose and standpipe performance should be checked periodically and 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>• 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</li> </ul>

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	<p>doors should be open-able from the side they serve without the use of a key.</p> <ul style="list-style-type: none"><li>• Prepare proper plan &amp; design for another exit door at discharge level. - Minimum clear width should be 0.9 meter.</li><li>• Prepare proper plan &amp; design for another staircase. - Minimum clear width should be 0.9 meter.</li><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 0.75 hours fire rated doors in all stair way encloses.</li><li>• Prepare proper plan and design for fire rated barrier for 1 hour fire rating separated corridor with 0.75 hrs fire rated door at ground floor.</li><li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at generator room, chemical store and boiler room.</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>• The stairway should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for stairway.</li><li>• Produce design and plan for automatic detection system with automatic fire alarm.</li><li>• Install Manual activation call point at all exit routes</li><li>• Prepare proper design and plan for dedicated fire pump with alternate backup power supply.</li><li>• Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline.</li><li>• Visual alarm should be placed at the generator room.</li><li>• Obtain building approval from issuing authority.</li><li>• Obtain the boiler license from the proper issuing</li></ul>
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	authority.
<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 exit door 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 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>• All stairway to have direct access to any designated refuge area which requires 1 hour fire rated construction with 0.75 hrs fire rated door at ground floor for fire separated corridor.</li> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated door at generator room, chemical store and boiler room.</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>• Stand pipe supplying first aid hose should have minimum pressure of 200 KPa.</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>• Provide IP degree of protection to wiring system to protect the wiring circuit from ingress of water 2. Ensure that the entire wiring network should have provisions to prevent the ingress of water in to the electrical wiring system.</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>• All strands cables at exposed ends should be properly soldered / crimped and insulated.</li> <li>• Provide weather proof casing for switchboards exposed to weather (located outside the building).</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</li> </ul>

	<p>after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc.</p> <p>2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation.</p> <p>3. As built drawing to be approved by the engineer-in-charge.</p> <ul style="list-style-type: none"><li>• Refill the silica gel. Ensure that accessories of transformers like breathers, vent pipe, bushels relay, silica gel must be in order at substation.</li><li>• All unwanted materials should be removed from substation &amp; Generator room.</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 LT panels.</li><li>• Adequate number of caution boards should be kept in the substation 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>• 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>• Provide cable connections with properly soldered / welded lugs at (LT/DB/SDB)'s. Ensure that all the electrical connections are properly secured with lugs.</li><li>• Avoid looping and bunch of cable at MCCB/MCB or</li></ul>
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	<p>bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards.</p> <ul style="list-style-type: none"> <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 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>• Provide adequate clearance in all sides of main HT/LT panel boards/transformer for easy maintenance.</li> <li>• Maintain the minimum height of 3.6 m for the substation room. Increase the height or relocate it.</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>• 1. Wooden switchboards should be replaced by non-flammable materials.</li> <li>• 2. Prefer switchboards made of non-flammable materials.</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>• Seal the cable entry-exit points of (LT/MDB/DB/SDB)'s with non-flammable materials. In addition: 1. Ensure that LT panels / Switchgears to be vermin / damp proof. 2. Ensure all unused holes / openings in DBs to be blocked properly.</li> <li>• Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have</li> </ul>

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	<p>two separate and distinct connections to the earth / ground.</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 / equipments 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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