

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Arabee Knitwear Ltd.
Address of the Factory	: Mouchak, Kaliakoir, Gazipur
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Structural Inspection	: 2015-08-23
Fire Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Fire Inspection	: 2015-08-23
Electrical Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Electrical Inspection	: 2015-08-23
BGMEA Membership No.	: 4841

BASIC INFORMATION:

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| i. Building Usage Type | : Garments Factory. |
| ii. Structural System | : RCC Flat plate-column system. |
| iii. Floor System | : RCC Flat plate. |
| iv. Floor Area | : Total operating floor area = 10590 sft (Approx.) |
| v. No. of Stories | : 3-Storey (RCC building), Single storey (Shed) |
| vi. Construction Year | : The RCC building and shed was constructed in single phase, Started in 2005 and 2007 respectively. |
| vii. Foundation Type | : Not confirmed |
| viii. Design Drawings | : Not available |
| ix. Soil Investigation Report | : Not available |
| x. construction Materials | : Brick Aggregated. |
| xi. Generator | : East side at the adjacent shed of the building. |

RECOMMENDATIONS FOR CORRECTIVE ACTION: No Critical or high risk observations were found during the day of audit in the factory. During the assessment, some non-conformity was found for which mid-term and long-term corrective actions have been recommended. There is no need to suspend operation in the factory.

Short Term (Immediate)	: N/A
Mid Term (6-weeks)	: 1. As built architectural and engineering drawings to be prepared and submitted for approval by appropriate authorities. 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.
Long Term (6-months)	: 1. The slab design of GF to 2nd floor needs to be reviewed by building engineer. Lateral system is required to ensure the stability of the structure. 2. The connection of MS angle truss structure needs to be checked by building engineer. The bracing system and tie between purlin are required to ensure the stability of the steel shed.

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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"> • 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"> - Illuminated exit sign should be posted above the exit door, - It should be clearly visible at all time, - Provide directional signs wherever necessary. - All exit doors should be clearly marked for easy identification. - Signage should be uniform • Provide fire extinguisher at all floor and to keep the record for re filling & properly tagged. • Place the extinguisher near the path of exit travel & easily accessible • Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan & should kept record properly.
<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"> • Prepare proper plan and design for one more exit in a way not to exceed the maximum travel distance • 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. • 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. • Prepare proper plan & design for exit door. <ul style="list-style-type: none"> - Minimum clear width should be 0.9 meter. • 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. • Doors in stair should be outward opening, side-swing, self-closing, non-lockable 0.75 hours fire rated doors in all stair way encloses. • Prepare proper plan and design for fire rated barrier for 1 hour fire

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	<p>rating separated corridor with 45 minute fire rated door at ground floor.</p> <ul style="list-style-type: none"> • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route • Prepare proper plan and design for 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at ground floor boiler, which located at the adjacent to grey store. • The egress paths should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for all corridors & exit doors. Aisles should be provided with a minimum 2 lux. • The stairway should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for stairway. • Produce design and plan for automatic detection system with automatic fire alarm. • Install Manual activation call point at all exit routes • Prepare proper design and plan for dedicated fire pump with alternate backup power supply. • Prepare plan and design for dedicated water storage tank for firefighting operation as per RMG guideline. • Obtain fire license / permit from issuing authority • Obtain building approval from issuing authority • Obtain the boiler license from the proper issuing authority. • Obtain the boiler operator license from the proper issuing authority.
<p>Long Term (The remedial works indicated must be carried out within a period of 6 months)</p>	<ul style="list-style-type: none"> • Implement the plan and design for one more exit • Install exit door as per plan and design. <ul style="list-style-type: none"> - Minimum clear width should be 0.9 meter. • All stairway to have direct access to outside of the factory building, which requires 1 hour fire rated construction and 45 minute fire rated door at ground floor for fire separated corridor. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator room, which located at the adjacent to final evacuation route • Provide 2 hrs fire rated barrier with 1.5 hrs fire rated door for storage area.

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	<ul style="list-style-type: none"> • Provide 4 hours fire rated barriers with 2 hours fire rated door at ground floor boiler, which located at the adjacent to grey store. • Install automatic detection system with automatic fire alarm. • Install dedicated fire pump with alternate backup power supply. • Provide sufficient number of hose pipe with respect to area and travel distance as per RMG guideline. • Provide dedicated storage tank for firefighting operation.
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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"> • Over current protection devices (Circuit breakers) should be installed at all distribution panels.
<p>Short Term (Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity)</p>	<ul style="list-style-type: none"> • All strands cables at exposed ends should be properly soldered / crimped and insulated. • Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.
<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"> • All unwanted materials should be removed from Generator room. • Provide rubber mats of adequate size in front of distribution panel MDB/DB. • Install heat detector and provide firefighting (Fire extinguisher and smoke detector) equipment in the generator room. • 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign. 2. The source of illumination should be providing not less than 50 lux. • 1. All stranded conductors > 6mm² to be provided with cable sockets. 2. All stranded conductors < 6 mm², at exposed end should be soldered / crimped.

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	<ul style="list-style-type: none"> • 1. Ensure that all electric circuitry clean of inflammable materials. • 2. Conduct periodic maintenance and maintain the records. • 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. • Provide proper clearance of 0.8 - 1.0 m in front of all MDBs. • Provide cable connections with properly soldered / welded lugs at (MDB/SDB)'s. Ensure that all the electrical connections are properly secured with lugs. • Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation. • 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. • Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for MDBs, DBs identifying end use load, voltage, and number of phases. • Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box. • Ensure that all cables should be away from areas where they can be damaged. • Provide separate earthing connection to electrical equipment’s. Ensure that earth potential provided for all parts of equipment / installation (other than live parts) and that continuous earth connection is provided back to the main intake supply earth. • Provide adequate earthing to body and doors to MDB. Ensure that all electrical panels provided with proper and separate earth potential.
<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"> • 1. Provide updated SLD matching the existing installation at the factory. • 2. SLD to indicate exact positions of all points of switch boxes and other outlets. • 3. SLD to be approved by the engineer-in-charge. • 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc.

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	<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">• 1. Design to have proper segregation of different end used loads.• 2. Wiring design to have separate and distinct sub-circuits for power and heating system.• 3. All DBs to be placed conveniently.• 4. Wiring to be neat, tidy and located near ceiling. <ul style="list-style-type: none">• Provide calibrated Ammeters at distribution boards (MDB).• Relocate the MDBs with easy access. Ensure that all MDBs should have easy accessibility.• 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.• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).• Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be covered in proper conduit pipes.• Seal the cable entry-exit points of (MDB) with non-flammable materials. In addition: 1. Ensure all unused holes / openings in MDB to be blocked properly.• 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5. 2. Ensure that connections between conductors / equipment's provided to durable electrical continuity and adequate mechanical strength and protection. 3. The continuous earth connection is provided back to the main intake supply earth.• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.
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