Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: SHAH AMANAT KNITTING & DYEING INDUSTRIES LTD.
Address of the Factory	: South Hulain, Yakubdandi, Patiya, Chittagong.
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Structural Inspection	: 2015-06-25
Fire Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Fire Inspection	: 2015-06-25
Electrical Assessment Conducted by	: TÜV SÜD Bangladesh (Pvt.) Ltd.
Date of Electrical Inspection	: 2015-06-25
BKMEA Membership No.	: 1333

BASIC INFORMATION:

The following information was noted:

i. Building Usage Type	: Dyeing, Socks and Knitwear's Factory.
ii. Structural System	: Buildings 1 and 2: RCC beam-column frame. Sheds 4, 5 and 7: Prefabricated steel sheds. Sheds 1, 2, 3 and 8: Angle roofed sheds supported on RCC columns.
iii. Floor System	: Buildings 1 and 2: RCC beam slab system Sheds 4: Concrete deck on sub beam-girder framing system at 1st floor, roof is profile sheeted Sheds 5 and 7: Profile sheeted roof. Sheds 1, 2, 3 and 8: Angle roofed sheds supported on RCC columns.
iv. Floor Area	: Main production sheds: Shed 5: Typical plinth area: 28,000 sft. (Approx.) Shed 4: Typical plinth area: 14,264 sft. (Approx.) Shed 7: Typical plinth area: 11,000 sft. (Approx.) Total operational area: 70,328 sft. (Approx.)
v. No. of Stories	: Building 1: Single Storey (Triple height) Building 2: 3 - Storey Shed 4: 2 - Storey Shed 5: Single Storey (Double height)
vi. Construction Year	: Construction of all the buildings and sheds completed on 2010.
vii. Foundation Type	: Shallow foundation as per as-built structural drawings.
viii. Design Drawings	: Not Available.
ix. Soil Investigation Report	: Available.
x. construction Materials	: RCC components, Brick Aggregated concrete.
xi. Generator	: Generators located in Building 1 (Gas generator), and Shed 1 (Diesel generator).

RECOMMENDATIONS FOR CORRECTIVE ACTION: No critical or high risk observations were found during the day of assessment in the factory which can hamper the regular operations. Some non - conformities were found for which mid and long term corrective actions are 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 authority. As part of this process building engineer will be required to make a number of checks on the as-built construction.
Long Term (6-months)	: 1. Building Engineer need to check the lateral stability system of the Building-1 frame regarding load capacity of the slenderness columns. Factory management to carry out any remedial actions as directed by the Building Engineer for Lateral stability system of Building 1.

The recommendations for **Fire & Electrical Safety** corrective action are:

(A): Recommendations for Fire Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	N/A
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity*	• Provide exit signage on all Evacuation pathways such that: - 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. • Factory management should be checked alarm call points & manual alarm system periodically and maintained the record properly. • Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan & should kept record properly.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• 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. • 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. • Prepare proper plan and design for fire rated barrier for 1 hr fire

	rating separated corridor with 0.75 hr fire rated door at ground floor shed-1. Or provide another exit directly to corridor between shed. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor chemical store and 2 hrs fire rated barrier with 1.5 hrs fire rated door for Yarn & gray fabric store, which is located adjacent to final exit route. • Produce proper plan and design for another exit door at mezzanine floor. • 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 of all shed building. • Automatic alarm systems must be provided throughout the factory; the alarm must be automatically triggered on detection of a fire. • Provide adequate nos. of smoke detectors to cover the whole factory building. • 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. • Power backup supply should be provided for fire alarm system. • Obtain the fire license with full covered area from the proper issuing authority. • Obtain building approval from issuing authority.
Long Term (The remedial works indicated must be carried out within a period of 6 months)	• Install 1 hr fire rated construction with 0.75 hr fire rated door at ground floor for fire separated corridor at shed-1. • Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor chemical store and 2 hrs fire rated barrier with 1.5 hrs fire rated door for Yarn & gray fabric store, which is located adjacent to final exit route. • Execute another exit door at mezzanine floor for safe evacuation.

	• 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.

(B): Recommendations for Electrical Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• 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.
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity)*	• All strands cables at exposed ends should be properly soldered / crimped and insulated.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• 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. 2. Drawings to indicate exact positions of all points of switch boxes

	and other outlets to match existing installation. 3. As built drawing to be approved by the engineer-in-charge. • Provide adequate illumination for generator room. • Provide rubber mats of adequate size in front of all distribution panels. • Install smoke detection and provide firefighting equipment in the generator room. • Provide and maintain clear and legible identifications numbers & names on all incoming and outgoing circuits of LT panels. • 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. • 1. Remove all the inflammable materials from surrounding of electrical circuitry at DBs. 2. Ensure that all electric circuitry clean of inflammable materials. 3. Conduct periodic maintenance and maintain the records. • Provide proper clearance of 0.8 - 1.0 m in front of distribution panel. • Provide cable connections with properly soldered / welded lugs at (DB)'s. Ensure that all the electrical connections are properly secured with lugs and glands. • 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 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 DBs identifying end use load, voltage, number of phases. • Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box. • Seal the cable penetrations through walls adequately with fire resistive elements. • Provide proper separate earthing/grounding to generator. Ensure that

	generator body frame to have two separate and distinct connections to the earth / ground. • 1. Provide sufficient and separate earthing for LT panels in substation/transformer room 2. Provide adequate number of earth electrodes. • Provide adequate earthing to body and doors to all MDBs / DBs.Ensure that all electrical panels provided with proper and separate earth potential.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Provide adequate ventilation arrangements for generator room. • Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 56m2, or relocate the generator room. • 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. • 1. Wooden switchboards / panel boards should be replaced by non-flammable materials. 2. Prefer switchboards made of non-flammable materials. • 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 (LT/MDB/DB/SDB)'s with non-flammable materials. In addition: 1. Ensure that HT / LT panels / Switchgears to be vermin / damp proof. 2. Ensure all unused holes / openings in DBs 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 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.