

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

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Name of the Factory	: <b>Dana Sweater Industries Ltd</b>
Address of the Factory	: Solidubi, Kashimpur, Gazipur, Dhaka, Bangladesh
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 3-Jun-14
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 3-Jun-14

### **BASIC INFORMATION:**

The present garment factory is comprises of a 3 Main Buildings 8 Ancillary Buildings. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : Main shed: The building is a two storied PEB braced steel frame structure with infill masonry wall. Main shed-01: The shed is a single storied roof truss system supported by RCC column with infill masonry wall. Main shed-02: The shed is a single storied roof truss system supported by steel pipe column with infill masonry wall.
- iii. Floor System : Ground and PEB sections used in 2 Storied Prefab Shed.
- iv. Floor Area : 135232 sft
- v. No. of Stories : Two story prefab main production shed, Single story production shed -1, Single story production shed -2
- vi. Construction Year : 2004-2012.
- vii. Foundation Type : Isolated Spread Footing.
- viii. Design Drawings : Not Available.
- ix. Soil investigation Report : Not Available
- x. Construction Materials : RCC (brick chips).
- xi. Generator : Ground Floor

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

The recommendations of corrective action for Structural, Fire and Electrical Safety comprises of Short Term, Mid Term and Long Term basis are as follows:

#### **The recommendations for Structural Safety corrective actions are:**

Immediate : N/A

Short Term: (3 Weeks) :

- i. Develop a program to ensure that all live loads for which a floor or roof has been designed for will not be exceeded. The designated Load Manager shall oversee this program and ensure it is enforced.
- ii. Designate a representative as the Factory Load Manager. The Factory Owner shall ensure that at least one individual, the Factory Load Manager who is located onsite full time at the factory, is trained in calculating operational load characteristics of the specific factory. The

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Factory Load Manager shall serve as an ongoing resource to RMG vendors and be responsible to ensure that the factory operational loads do not at any time exceed the factory floor load limits as described on the Floor Load Plans.

Mid Term (6 Weeks)

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- i. Engage a qualified structural engineer and assess the building against seismic and wind load conditions. If there are any deficiencies, make a remediation plan accordingly.
- ii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- iii. Complete further testing on the areas of deterioration and have a qualified structural engineer develop a remediation plan.
- iv. Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required.
- v. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- vi. Engage a qualified structural engineer to develop the required documents to confirm the structural integrity of the buildings. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20
- vii. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- viii. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard and post them accordingly.
- ix. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.
- x. The identity of the geotechnical Engineer and IEB membership number needs to be clearly mentioned with a signature on the relevant document.
- xi. Have a qualified structural engineer provide further analysis of the identified cracks to determine the appropriate course of corrective action.

Long Term (6 months)

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- i. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- ii. Repair the exterior façade system to prevent water intrusion.
- iii. Provide Certificates of Occupancy for review.
- iv. Provide a protective coating on the structural elements constructed with MCAC exposed to rainfall or other sources of water. Have the protective coating approved by the Alliance or a qualified structural engineer.

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### The recommendations for Fire Safety corrective actions are:

Immediate (3 to 6 Days)	Keep areas beneath cutting tables clear of combustibles as all times.
Short Term (3 Weeks)	Remove all locking devices from all egress doors and means of egress components in accordance with Alliance Standard Section 6.8. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.
Mid Term (6 Weeks)	<p>Training programs need to be implemented and documented in accordance with the Alliance Safety Training Curriculum.</p> <p>Post occupant load for every assembly and production floor in a facility in a conspicuous space near the main exit or exit access doorway for the space.</p> <p>Post emergency egress maps at the entrance to each exit stair or main point of egress.</p> <p>Need to develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees.</p> <p>Develop a testing and maintenance program that ensures the operation of all egress lighting is verified at least once per year. If battery-operated lights are used, these lights shall be tested on a monthly basis. Functional testing of battery powered lights shall be provided for a minimum 90 min once per year.</p> <p>Stair designation signs need to be provided at each floor entrance from all stairs to the floor in English and Bengali. Signs need to indicate the name of the stair and the floor level. Signs shall be posted adjacent to the door.</p> <p>Need to complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p>
Long Term (6 Months)	<p>All collapsible gates, wooden in-swing doors in the means of egress need to be replaced with required fire rated doors. Door shall be opened in the direction of egress, side-hinged swinging, self-closing type as per Alliance Standard Part 6 Section: 6.8. Doors will be free from general locking arrangement.</p> <p>Install initiating devices and notification appliances as required by the Alliance Standard and NFPA 72. This includes electrical supervision of all valves controlling fire protection systems (sprinklers, fire pumps, water supplies, etc.). Devices should be part of an automatic fire alarm and detection system for the facility. All fire alarm installations shall be submitted for review by the Alliance prior to commencement of installation.</p> <p>Replace non-compliant doors and frames in the means of egress with side-swinging doors. Replacement doors shall be a minimum width of 0.8 m (32 in), and are listed, approved, self-closing, fire rated doors assemblies (door</p>

	<p>and frame) with latching panic hardware.</p> <p>Need to get required number of people trained and certified in firefighting, first aid, and rescue training by the appropriate authority.</p> <p>Install handrails on both sides of the stairs and intermediate handrails when the width of the stair exceeds 2.2 m. A minimum height of 865 mm (34 in.) and a maximum height of 965 mm (38 in.) as measured from the leading edge of the tread needs to be maintained when installing new handrails. The spacing between vertical members shall not exceed 200 mm (8 inch) up to a height of 865 mm (34 inch).</p> <p>Establish an inspection, testing, and maintenance program for all fire extinguishers. Program need to comply with the requirements of NFPA 10 chapter 7.</p> <p>Provide portable fire extinguishers as per potential fire class and hazards in accordance with NFPA 10 Chapter 5.</p> <p>Install portable fire extinguishers at correct locations and heights based on hazard type per BNBC Part 4 and NFPA 10.</p> <p>Install emergency lighting for all paths of egress in accordance with Alliance Standard Section 6.7. Illumination needs to be a minimum of 10 lux for all corridors, exit doors and stairways. Illumination for aisles needs to be a minimum of 2.5 lux. Egress lighting shall be provided with emergency power or supplemented with battery powered lights that provide a minimum of 10 lux for not less than 30 mins in the event of failure of normal lighting.</p> <p>Provide an emergency power source, either by battery back up or by connecting to the emergency power system, for illuminated exit signs.</p> <p>Install illuminated exit signs with backup power and continuous graphics at entrances to exits and along the path of egress anywhere the continuation of egress is not obvious or there is a change in the direction of the path of travel.</p> <p>Install appropriate means of illumination at the noted locations. The source of illumination shall provide not less than 50 lux at the illuminated surface with a contrast of not less than 0.5. Approved self-luminous signs, which provide evenly illuminated letters having a minimum luminance of 0.2cd/m<sup>2</sup>, may also be used.</p> <p>Create a Fire Safety Director position and fill the position with an individual that has had sufficient training to be able to carry the required duties.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B.</p> <p>Establish written corporate and plant policies on housekeeping to ensure scheduled cleaning for floor, wall, ceiling, supply and return air ventilation systems. Promptly reschedule skipped cleanings. Provide a documented line of</p>
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	authority for authorizing a cleaning delay and rescheduling.
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### The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	Find out the causes of the overheating and consider replacing the cable or equipment.
Short Term (3 Weeks)	<p>Ensure proper identification of emergency power switchboards, distribution boards, and circuits.</p> <p>Provide two separate points of earthing (grounding) by distinct connections for each generator.</p> <p>Develop and implement an electrical safety program. Include key topics such as lock out tag out procedures, personal protective equipment requirements, etc. Reference NFPA 70e for example program requirements.</p>
Mid Term (6 Weeks)	<p>The factory needs to connect only a single cable in a single port.</p> <p>Install phase separators between terminal connections. Verify phase separators are installed at all locations (MCCB).</p> <p>As per BNBC section 2.11.5.4, ensure clear and permanent identification marks are painted in all distribution boards, switchboards, sub main boards, and switches.</p> <p>Ensure meters and other electrical devices installed on the main electrical equipment are operational.</p>
Long Term (6 Months)	<p>Complete Thermographic scans at least on a three year cycle. Thermographic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems &amp; Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Develop an Insulation Resistance Measurement Program that ensures deterioration of insulation resistance will be identified quickly. Testing should be in compliance with International Electrical Testing Association (NETA). All transformers, switchgears etc. shall be subject to an insulation resistance measurement test to ground after installation but before any wiring is connected. Insulation tests shall be made between open contacts of circuit breakers, switches etc. and between each phase and earth.</p> <p>Ensure the generator room properly rated and physically separated from the remainder of the building.</p>