

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

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Name of the Factory	: <b>Winsome Knit Composite Ltd.</b>
Address of the Factory	: Kakil, Sataish, Mudafa, Bhadam Road, Tongi, Gazipur, Tongi, Dhaka, Bangladesh
Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Alliance
Date of Structural Inspection	: 26 April 2014
Fire & Electrical assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 27 April 2014

### **BASIC INFORMATION:**

The present garment factory comprises of two building out of which one is single storied main production shed and another is two storied RCC ancillary building. The following general information was noted:

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|-------|---------------------------|---|
| i.    | Building Usage Type       | : Garments Factory.   |
| ii.   | Structural System         | : Main production shed is Steel structure with gable frame, ancillary building is RCC beam column frame structure(MRF). |
| iii.  | Floor System              | : Main production shed is Steel deck slab, ancillary building is RCC beam slab.   |
| iv.   | Floor Area                | : Main production shed: 17645 sft, Two story RCC building: 960 sft.   |
| v.    | No. of Stories            | : Main production building is single storied with mezzanine floor , Ancillary building is two storied.                  |
| vi.   | Construction Year         | : 2010-11.  |
| vii.  | Foundation Type           | : Unknown   |
| viii. | Design Drawings           | : Not Available   |
| ix.   | Soil investigation Report | : Available   |
| x.    | Construction Materials    | : Mild steel and Reinforced Concrete (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 : NA

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.

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The 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 to confirm structural performance of the structure.
- ii. Under guidance from a qualified structural engineer arrange Detail Engineering Assessment of the structure.
- iii. 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.
- iv. Have a qualified structural engineer document compliance with the seismic and wind requirements stated in the 2006 BNBC.
- v. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- vi. Have a qualified structural engineer complete further analysis of the structure and develop a remediation plan if required.
- vii. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- viii. Complete further testing on areas of deterioration and have a qualified structural engineer develop a remediation plan.
- ix. Develop engineered plans to brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard. Install anchor and braces as shown on approved plans.
- x. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3.
- xi. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- xii. Provide Certificates of Occupancy for review.
- xiii. Provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.

Long Term (6 months)

: Necessary remediation after DEA.

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

Immediate (3 to 6 Days)	Keep means of egress continuously free and clear of all obstructions or impediments to full instant use in the case of fire or other emergency.
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	Remove all combustibles stored underneath the cutting tables at the noted locations.
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>Provide an automatic fire alarm and detection system per NFPA 72 and arrange for direct connection of the system to a central station monitoring service or the Fire Service and Civil Defense as per Alliance Standard Part 5 Section 5.7.5 Monitoring. Until that time that a central station monitoring service or direct connection to the Fire Service and Civil Defense can be set up, a person shall be assigned to contact the fire department in the event of fire alarm activation. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this person.</p> <p>Impart training in accordance with Alliance Safety Training Curriculum and keep record with proper documentation.</p> <p>Fire drills shall be conducted under the direction of a Fire Safety Director. All other requirements for fire drills shall be conducted in accordance with BNBC Part 4 Appendix A.</p> <p>Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees. The evacuation plan shall include provisions to assist physically disabled persons. A list of all employees with physical disabilities shall be kept by the Fire Service Director.</p> <p>Post the 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>Develop a testing and maintenance program that ensures the operation of all exist signs is verified at least once per year. If battery-operated signs are used, these lights shall be tested on a monthly basis. Functional testing of battery powered signs shall be provided for a minimum 90 min once per year.</p> <p>Develop a testing and maintenance program that ensures the emergency power for exit signs is tested at least once per year. If battery operated signs are used, these lights are tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum 90 min once per year.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p>
Long Term (6 Months)	<p>Pull stations at egress points, smoke detectors in air handling equipment, visual and audible devices must be spaced appropriately and directly connected to the fire alarm system for automatic activation based on occupancy type in accordance with NFPA 72.</p> <p>Provide opening protective at all windows and other</p>

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	<p>openings on all the fire rated wall across the entire premises as per Alliance standard part 4, section 4.6.</p> <p>Install automatic fire detection system. Otherwise, provide another exit to satisfy maximum travel distance requirement, i.e. keep it within 45m.</p> <p>Replace all collapsible, sliding, roll-down gates and shutters in means of egresses with side-hinged swinging type doors of proper width.</p> <p>Remove existing aisle marking and draw new marking fulfilling the minimum aisle width requirement. Relocate the machines accordingly if necessary.</p> <p>Get at least 25 percent worker trained and certified in fire fighting, first aid and rescue training by the proper authority.</p> <p>Install fire department connections where required and in compliance with the standard as per Alliance Standard Part 5 Section 5.5.4 which states that According to Alliance Standard,Part-5, Section-5.5.4, fire department (Siamese) inlet connections shall be provided to allow fire department pumper equipment to supplement the fire protection systems. Fire department outlet connections shall be provided to allow fire department pumper vehicles to draw water from ground-level or underground water storage tanks.</p> <p>Connections shall match the Fire Service and Civil Defense hose thread standard.</p> <p>Provide fire-resistive rated construction barriers between hazard types following Table 4.4.1 of Alliance Standard or Table 4.1.1 from BNBC Part 4. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Install Illuminated exit signs 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>Provide guard rail of minimum 1067 mm (42 in.) height on both sides.</p> <p>Fire extinguishers are to be inspected, tested, and maintained in accordance with NFPA 10 Chapter 7 as demanded in Alliance Standard Part 13 Section 13.10.3.</p> <p>Install appropriate means of illumination at the noted locations. The means of egress paths shall be illuminated at all times the building is occupied. Illumination shall be a minimum of 10 lux for all corridors, exit doors, and stairways. Aisles shall be provided with a minimum 2.5 lux.</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. The duties of the Fire Safety</p>
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	<p>Director shall include the following:</p> <ol style="list-style-type: none"> <li>(1) Establish internal and external rally points and communicate to all employees in the building.</li> <li>(2) Fire department pre-planning.</li> <li>(3) Conduct safety inspections as outlined in Alliance standard 13.9.</li> <li>(4) Ensure all testing of fire protection equipment is conducted in accordance with Alliance standard 13.10.</li> </ol> <p>Make sure all required exit signs are illuminated continuously at all times. Exit signs may be illuminated either by lamps external to the sign or by lamps contained within the sign. 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>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B. In general, this program should address process of request and approval authorities, necessary checks prior approval, standby fire watch and fire fighting equipment, sounding of alarm procedure, duration and expiry of permit and reapproval procedure etc.</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 authority for authorizing a cleaning delay and rescheduling. As a general rule the maximum tolerable deposit thickness for loose fluffy lint is 13 mm (½ in.) over a maximum of 46.5 m<sup>2</sup> (500 ft<sup>2</sup>). Limit dense deposits to 6 mm (¼ in.) and oil saturated deposits to 3.2 mm (⅛ in.).</p>
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### The recommendations for Electrical Safety corrective actions are:

Immediate (3 to 6 Days)	<p>Ensure the generator room clean and free of dirt, debris.</p> <p>Find out the cause of signs of burning and thermographic observation of temperature was high. So take proper action for both causes.</p>
Short Term (3 Weeks)	<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> <p>Ensure proper identification of emergency power distribution boards and circuits.</p> <p>Ensure generator room is properly illuminated.</p> <p>Ensure safety signage posted in the generator room.</p> <p>Complete an oil analysis on applicable transformers at</p>

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	<p>appropriate intervals based on voltage and power.</p> <p>Ensure inspection, maintenance, and testing procedures of the emergency generator being completed and documented.</p> <p>Ensure electrical connections at equipment, fixtures, etc. are properly secured.</p>
Mid Term (6 Weeks)	<p>Have a qualified electrical engineer develop an as-built single line diagram detailing key components and capacity of the electrical system, including electrical equipment layout, distribution schedule, and grounding riser plan.</p> <p>Provide readily accessible single point of disconnect for each main electrical service feed.</p> <p>Ensure distribution boards are metal enclosed with a dead front construction.</p> <p>Ensure overcurrent protection device (circuit breaker) for each and every loads.</p> <p>Consult with a qualified Electrical Engineer and ensure electrical cabling are sized according to capacity of circuit breakers.</p>
Long Term (6 Months)	<p>Have a qualified electrical engineer design a lightning protection system according to the BNBC requirements. Have a licensed electrician install the designed system.</p> <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>Ensure appropriate size for generator room in order to properly access the generator to perform routine maintenance activities.</p>