

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

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Name of the Factory	: Spirax Textile-Washing & Allied Inds. Ltd.
Address of the Factory	: House-04,Road-01, Ward-02,Block-D,22,41/42(Rs),Rajabari,
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 23 May, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 23 May, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 23 May, 2015
BGMEA Membership No.	: 5152

### **BASIC INFORMATION:**

The present garment factory is one storied non-engineered truss corrugated iron roof structure. The following information was noted:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: Non-engineered truss corrugated iron roof structure.
iii. Floor System	: Corrugated iron roof.
iv. Floor Area	: 18000sft
v. No. of Stories	: Single
vi. Construction Year	: 2008
vii. Foundation Type	: Isolated footing
viii. Design Drawings	: Available document: structural design drawing (Not signed by structural Engineer), architectural drawings, Soil test report, as built machine layout plan. Not Available – approval drawing, full set of structural drawing with engineer approval.
ix. Soil Investigation Report	: Available (Investigated in july-2007)
x. Construction Materials	: Combined – steel and stone chips.
xi. Generator	: In-side 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:

Short Term (Immediate)	:
Mid Term (6-weeks)	: 1. Design should be checked by the Building Engineer to verify the lateral stability of the shed and confirm the requirement of any bracing in the long direction. 2. Engage a qualified structural engineer to prepare structural drawing with engineer approval, material test report, as built structural drawing and manage a corrected approval plan and prepare/update calculations showing the structural adequacy of the floor system taking into account the factory design imposed loading and the as built structure.

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Long Term (6-months) : 1. Install horizontal and vertical bracing at the roof system if required.

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>	<p>Ensure adequate numbers of fire drills under the Fire Safety Plan.</p> <p>All the firefighting equipment's need to test with proper documents.</p> <p>Factory needs to have sufficient number and width (0.9 m) of marked aisles in the factory.</p> <p>Factory needs to have sufficient total width of marked aisles (5 mm per occupant) of the factory.</p> <p>Lights in storage area needed to be installed with protective covers and conduits.</p> <p>Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9 m and when used as a storage facility there shall be a minimum clearance of one third the floor height from the ceiling to the top of the storage stack.</p>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>Needs to have 'As Built Drawing' with proper dimensions showing means of escape.</p> <p>Factory manager or director needs to arrange fire safety training for the workers of the factory from proper authority time to time.</p> <p>The exit-1 Which is leading to the final exit-1 needs to be replaced by side swinging fire rated doors so that the final exit-1 remains free from smoke as well as the lockable doors can be opened easily in the direction of evacuation without the use of a key.</p> <p>Illuminated emergency light needs to be covered in floor, exits and aisles. The intensity of illumination by means of escape lighting needs to be equal or more than 10 lux. The aisles need to be illuminated with escape lighting to a level of not less than</p>

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	<p>2.5 lux at floor level.</p> <p>Emergency back-up power needs to be connected for (a) exit sign, (b) fire alarm and detection system, (c) emergency lighting, (d) automatic fire detection and alarms systems.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The color and design of lettering, arrows and other symbols on exit signs shall be in <b>high contrast</b> with their background.</li> <li><input type="checkbox"/> The source of illumination, contrast, intensity and luminance needs to be at least 50 lux, 0.5, 5.0 foot-candles and 0.2 cd/m<sup>2</sup> respectively Automatic fire detection (AFD) and alarm system needs to be installed in all types of buildings</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>Factory needs to have a proper pre-plan for fire department.</p> <p>Factory needs to maintain minimum width of exit 0.9 m and height 2 m Factory needs to ensure fire protected route final exit -1 safely discharge outside of the factory.</p> <p>Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Generator room needs to be fire separated with 4 hours fire rated enclosure and 2 hours rated opening.</li> <li><input type="checkbox"/> Boiler room is to have a 4 hour fire resistance construction and 2 hour rated opening door.</li> </ul> <p>Factory need to install centralized automatic smoke detection system with proper sitting arrangement</p> <p>Factory needs to install control panel for detection and alarm system at required location.</p> <p>Install proper standpipe system having at least 100 mm dia of standpipe.</p> <p>Install standard standpipe and hose system as well as fire pump system to ensure required hose pressure at the highest and most remote part of the building.</p> <p>Factory need to installed Siamese connection after installation of stand pipe and hose system and fire pump.</p> <p>Factory needs to install dedicated fire pump with sufficient capacity and backup power.</p> <p>Factory needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least</p>

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	1900 ltr x 75 min=142500 liters water storage tank.
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### **(B): Recommendations for Electrical Safety Corrective Actions:**

<p><b>Immediate</b></p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<p>Isolate/make safe all unused cables first and then remove from distribution boards. If necessary make sure cables are properly terminated at its point of termination using appropriate size and type of lug.</p>
<p><b>Short Term</b></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>	<p>Ensure distribution boards (including panel door) are earthed properly.</p> <p>Ensure overcurrent protection device for main incomer is provided for the distribution board.</p> <p>Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering.</p> <p>Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.</p>
<p><b>Mid Term</b></p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>Install appropriate type of safety signage at substation and generator room. Also ensure graded rubber mats are provided in front of all distribution boards.</p> <p>Provide Instruction boards for first aid and artificial respiration in the substation room and generator room.</p> <p>Ensure in the substation room and generator room, all working place, exit light and escape light have adequate illumination level as per standard.</p> <p>Fill the transformer breather with fresh Silica gel and oil cup with fresh Oil.</p> <p>Provide two separate and distinct connections of earthing for each generator.</p> <p>Ensure distribution boards are installed in compliant locations in terms of access and height.</p> <p>Ensure distribution board has a minimum clearance of 1 m (39 in) in front.</p> <p>Provide dedicated &amp; adequate size of earthing with proper</p>

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	<p>identification for each circuit.</p> <p>Rewire to ensure each incoming supply to an MCB has a dedicated supply from busbar. Avoid the use of multiple cables on outgoing side of MCB's.</p> <p>Ensure all electrical cables are sized according to capacity of circuit breakers.</p> <p>Provide mechanical guards for electrical equipment where necessary.</p> <p>Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</p> <p>Connect all metal in the building to the building earthing system.</p> <p>Ensure Lighting fixtures are supported from the structure properly.</p> <p>Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point, ) of overheating { ambient+( 20°C-40°C)} and take proper action..</p>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</p> <p>Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data.</p> <p>Inspect electrical panel boards on an annual basis.</p> <p>Ensure substation room has minimum height &amp; area as per NTPA Table- 4.3 respectively.</p> <p>Ensure the substation room has adequate fire separation from the production area.</p> <p>Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.</p> <p>Ensure the generator room has adequate fire separation from the production area.</p>

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	<p>Provide adequate means of ventilation for the generator room based on the installed equipment considering fire barriers.</p> <p>Ensure distribution boards have no opening and all live internal components are concealed properly.</p> <p>Install circuit breakers in proper way using metal enclosure to ensure safe installation.</p> <p>Provide dedicated &amp; adequate size of neutral with proper identification for each circuit.</p> <p>Ensure each distribution board is provided with a circuit list and means of identification is obtained as per list.</p> <p>Provide proper cable terminator/conductor for stranded conductors.</p> <p>Install separate distribution boards for lighting and power circuits.</p> <p>Install lightning protection system on the building</p>
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