

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

Name of the Factory	: Zr Sweaters.
Address of the Factory	: Hazi City Complex, Malekerbari, National University, Gazipur
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 27 May, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 27 May, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 27 May, 2015
BGMEA Membership No.	: 5632

### **BASIC INFORMATION:**

The factory building is a four storied RCC beam-column frame structure. The following information was noted:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: RCC beam column system.
iii. Floor System	: RCC Beam slab.
iv. Floor Area	: Total floor area is 38000 sft
v. No. of Stories	: 4 stories
vi. Construction Year	: Building was built in one phase (2007-2008).
vii. Foundation Type	: Unknown
viii. Design Drawings	: Available- approval drawing, machine layout plan Not available- Structural design drawing, architectural design drawing, soil test report, as built drawing, material test report, floor load plan
ix. Soil Investigation Report	: Not Available
x. Construction Materials	: Brick aggregate.
xi. Generator	: Ground floor (separate 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)	: N/A
Mid Term (6-weeks)	: 1. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity. 2. Building engineer to check this leakage of pipes. Also provide adequate slope and proper drainage system
Long Term (6-months)	: 1. Structural engineer has to survey this factory and prepare as built structural drawing, soil test report, and floor load plan and prepare/update calculations showing the structural adequacy of the

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floor system taking into account the factory design imposed loading and the as built structure.

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>Factory Manager/Director needs to arrange fire safety training for the workers of the factory from proper authority time to time.</p> <p>Ensure adequate numbers of fire drills under the Fire Safety Plan.</p> <p>All the firefighting equipment need to be tested 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 need to be installed with protective covers and conduits.</p> <p>Combustibles are to be managed with yarn store. 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>Factory needs to have as built drawing with proper dimensions showing all the means of escape.</p> <p>Fire license need to be updated for mention full occupied area. Factory needs to have a proper pre-plan for fire department.</p> <p>All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key.</p> <p>Stair needs to have provided both side hand rail.</p> <p>Ensure illuminated emergency light in floors and escape routes.</p>

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	<p>Ensure adequate emergency backup power for critical fire safety system in all floors, exit &amp; stair.</p> <p>Ensure illuminated exit signs in floors so that it is visible from all positions.</p> <p>Automatic Fire Detection (AFD) and alarm system needs to be installed in all types of buildings.</p>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>Final exit-01 need be to separate with ground floor Accessories store by 2 hr rated construction &amp; 1.5 hr rated door opening.</p> <p>Accessories store need to be separated with the finishing section by 2 hours rated construction &amp; 1.5 hours rated door.</p> <p><input type="checkbox"/> Generator room needs to be fire separated with 2 hr fire rated enclosure and 1.5 hr rated opening having direct access from outside.</p> <p><input type="checkbox"/> Boiler room needs to be separated with 2 hour fire rated enclosure and 1.5 hour rated door/opening.</p> <p>All the exits connecting to the staircase-1, and 2 need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hour rated door) and provide a protected route from all though the stairway to the final exits.</p> <p>Install control panel for automatic smoke detection &amp; fire alarm system according to NTPA Guideline.</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 mm dia of standpipe.</p> <p>First aid hose system (38 mm nominal) shall be provided (Ref. Fire Service Standard # 9) in addition to Fire Aid Fire Fighting Appliances in existing high rise NTPA (20 m) buildings. In addition 50 mm or larger hose connection facility shall be provided.</p> <p>Factory needs to install standard standpipe, hose and fire pump system to ensure required hose pressure.</p> <p>Factory need to installed Siamese connection after installation</p>

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	<p>of stand pipe system, 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 1900ltr x 75min=142500 liters water storage tank.</p>
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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>	<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 (&gt; ambient+ 40°C) and take proper action.</p>
<p>Short Term</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>Provide two separate and distinct connections of earthing for each generator.</p> <p>Ensure all distribution boards (including panel door) are earthed properly.</p> <p>Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</p> <p>Ensure proper earthing connections at all electrical equipment. 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>Mid Term</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 generator room. Also ensure graded rubber mats are provided in front of all distribution boards.</p> <p>Provide Instruction board for first aid and artificial respiration in the generator room.</p> <p>Ensure distribution boards have a minimum clearance of 1 m (39 in) in front.</p> <p>Provide dedicated &amp; adequate size of earthing with proper identification for each circuit.</p> <p>Rewire to ensure each incoming supply to an MCB has a</p>

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	<p>dedicated supply from busbar. Avoid the use of multiple cables on outgoing side of MCB's.</p> <p>Replace wooden bases with metal clad construction for mounting the lighting boards and switch controls. Use metal enclosure for installation of circuit breakers.</p> <p>Ensure all electrical cables are sized according to capacity of circuit breakers.</p> <p>Provide mechanical guards for electrical wiring 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>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 the generator room has adequate fire separation from the main building.</p> <p>Provide adequate means of ventilation for the generator room based on the installed equipment considering fire barriers.</p> <p>Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.</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>

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	<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 adequate covers on cable channels.</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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