

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: SIF TEXTILE INDUSTRIES LTD.ASSOCIATE
Address of the Factory	: Barpa, Post Office: Rupshi, Tarabo, Rupganj, Narayanganj
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 27-July-2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 27 July, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 27 July, 2015
BKMEA Membership No.	: 857

BASIC INFORMATION:

The main factory building-1 is a four storied R.C.C beam column frame structure with non- engineered shed over rooftop which covers 20% of roof area. There is also a single storied truss corrugated PEB shed which is joined with RCC structure. The following information was noted:

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| i. Building Usage Type | : Garment Factory. |
| ii. Structural System | : R.C.C Building with non-engineered shed over rooftop. |
| iii. Floor System | : RCC Beam slab. |
| iv. Floor Area | : 24000 sft |
| v. No. of Stories | : 4storied with non-engineered shed on rooftop. |
| vi. Construction Year | : 2006-2007 |
| vii. Foundation Type | : Foundation system could not be verified since there was no structural drawing and soil test report. |
| viii. Design Drawings | : Available – Machine layout plan.
Not Available –approval drawing full set of structural design drawing, architectural drawing, floor load plan and material test report. |
| ix. Soil Investigation Report | : Not Available |
| x. Construction Materials | : Brick aggregate. |
| xi. Generator | : Separate shed. |

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:

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| Short Term (Immediate) | : N/A |
| Mid Term (6-weeks) | : 1. Factory Engineer to review design loads and column stresses in the areas identified above.

2. Design should be checked by the Building Engineer to verify the lateral stability of the roof and confirm the requirement of any bracing in the roof system. |

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- Long Term (6-months) :
1. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
 2. Structural engineer to prepare approval drawing, full set of structural design drawing, showing structural details, dimensions, levels, foundations and framing on Plan, Section and Elevation drawings.
 3. Provide protective coating to cover the exposed rebar from corrosion.

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 needs to conduct fire drill quarterly (4 times a year) under the fire safety plan and needs to kept the written record of such drills for at least 3 years for the inspection of fire brigade whenever called for.</p> <p>Factory need to have proper testing plan & record of fire safety equipment.</p> <p>Lights in storage area need to be installed with protective covers and conduits.</p> <p>Kitchen area need to be equipped with fire extinguisher & Only fixed temperature type detector.</p> <p>Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct need to be minimum 2.9 m and when used as a storage facility there needs to have a minimum clearance of one third the floor height from the ceiling to the top of the storage stack.</p> <p>All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted.</p> <p>The signs shall be clearly visible at all times, where necessary supplemented by directional signs.</p>

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<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 prepare as built drawing with floor machine layout showing means of escape with proper dimension.</p> <p>Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher.</p> <p>All the exit doors of staircase enclosure need to be replaced by side swinging fire rated doors with self-closing mechanisms so that the staircase remains free from smoke and it needs to be opened in the direction of travel as well as the lockable doors can be opened easily in the direction of evacuation without the use of a key.</p> <p>Factory needs to provide handrail on both sides of all the stairways.</p> <p>Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs.(Escape route).</p> <p>Emergency back-up power needs to be connected for critical fire safety system and not less than 30 minutes in case of failure of power supply.</p>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<p>Fire department pre-plan needs to be developed.</p> <p>Factory needs to maintain minimum width of exit 0.9 m and height 2 m.</p> <p>Factory need to be protected final exit- 01 with fabric store room at ground floor by 2 hours rated construction with 1.5 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area.</p> <p>Factory need to be protected final exit- 08 with chemical store room at ground floor by 4hours rated construction with 2 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area.</p> <p>Child care room is needed to be separated from the cutting section of 3rd floor of the building by 3 hours fire rated construction with 3 hours fire rated door.</p> <p>Factory needs to protected the storage area(yarn store) by 2 hours fire rated construction with 1.5 hours fire rated door/opening from the sewing section of 1st floor of the building.</p>

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	<p>Factory needs to protected the storage area(finish goods store) by 2 hours fire rated construction with 1.5 hours fire rated door/opening from the printing section of ground floor of the extension shed building.</p> <p>Generator, boiler and chemical room needs to be fire separated with 4 hours fire rated enclosure and 2 hour rated opening having direct access from outside.</p> <p>All the stairs 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>Factory need to develop the safety management of flammable liquids storage according to NTPA guideline.</p> <p>Factory need to install centralized and automatic fire detection & alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline</p> <p>The factory need to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple call boxes on all occupied floors, including other tenanted floors of the building.</p> <p>Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline.</p> <p>Factory needs to install proper standpipe system with having at least 75mm diameter of riser.</p> <p>Install 1 riser per 1000 m2 of floor area & Install adequate number of hose in floor area and the minimum hose diameter is 38 mm, or 1.5" preferably fabric hose with variable nozzle to be used in both of the stairways covering the floor area.</p> <p>Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 Kpa. For standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200 Kpa.</p> <p>Factory needs to be installed Siamese connection to the standpipe system located outside the building and</p>
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	<p>accessible for fire department connection.</p> <p>Factory needs to have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory.</p> <p>Factory need 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>Remove all unused cables from distribution boards and make sure all necessary cables are properly terminated at its point of termination using appropriate size and type of lug.</p> <p>Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection etc.) of burning sign and take proper action including replacing cable or equipment where necessary.</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+ 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>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>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 number and type of safety signage at substation and generator room. Also ensure graded rubber mats are provided in front of all panel boards.</p> <p>Provide Instruction boards for first aid and artificial respiration in the substation room and generator room.</p>

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	<p>Fill the transformer oil cup with fresh oil.</p> <p>Provide two separate and distinct connections of earthing for the generator.</p> <p>Ensure main distribution board is installed in compliant locations in terms of height.</p> <p>Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth bus-bar of distribution boards and ensure continuous earth path is back to main building intake.</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>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 switchgear and panel boards on an annual basis.</p> <p>Ensure the generator room has adequate fire separation from the production area.</p> <p>Ensure panel boards have no opening and all live internal components are concealed properly.</p> <p>Provide dedicated & adequate size of neutral with proper</p>

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	<p>identification for each circuit.</p> <p>Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</p> <p>Provide adequate covers on cable channels.</p> <p>Provide proper cable terminator/connector for stranded conductors at its point of termination.</p> <p>Install separate distribution boards for lighting and power circuits.</p> <p>Install lightning protection system on the building and sheds.</p>
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