

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

Name of the Factory	: Divergent Knitex Ltd.
Address of the Factory	: Teknagopara, Chandana, Joydebpur, Gazipur, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 4 <sup>th</sup> July, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 4 <sup>th</sup> July, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 4 <sup>th</sup> July, 2015
BGMEA Membership No.	: 5995

### **BASIC INFORMATION:**

The present garment factory is a single storied pre-engineered shed with RCC column. The following general information was noted:

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|-------------------------------|---|
| i. Building Usage Type        | : Garment Factory.  |
| ii. Structural System         | : Pre-engineered (40%) and non-engineered shed (60%) over<br>RCC column.  |
| iii. Floor System             | : Corrugated iron shed over roof truss.   |
| iv. Floor Area                | : Total floor area is 8000 sft. (Approx.)   |
| v. No. of Stories             | : Single storey.  |
| vi. Construction Year         | : 2014-2015   |
| vii. Foundation Type          | : Shallow foundation.   |
| viii. Design Drawings         | : Not available: As built structural drawing, machine layout plan,<br>floor load plan and material test report. |
| ix. Soil Investigation Report | : Available.  |
| x. Construction Materials     | : Brick Aggregate.(In column)   |
| xi. Generator                 | : Separate Structure.   |

### **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) | : None.   |
| Mid Term (6-weeks)     | : <ul style="list-style-type: none"><li>• Structural engineer to prepare full set of structural drawing, as built drawing and prepare/update calculations showing the structural adequacy of the floor system and the as built structure.</li><li>• 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.</li></ul> |
| Long Term (6-months)   | :   |

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- Develop set of as-built drawings showing structure details, loading, dimensions, levels, foundations and framing on Plan, Section and Elevation drawings.
- Install horizontal 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>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<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>	<ul style="list-style-type: none"> <li>• All the firefighting equipment's need to test with proper documents.</li> <li>• Lights in storage area needed to be installed with protective covers and conduits.</li> <li>• 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.</li> <li>• All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs.</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>• Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension.</li> <li>• Fire license needs to be renewed by mentioning full coverage area.</li> <li>• Fire manager/Director need to have safety training from proper authority &amp; worker of the factory should as far as possible be trained for use fire extinguisher.</li> <li>• 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.</li> <li>• Factory needs to be installed with adequate illuminated emergency lighting in floors, exits &amp; stairs. (Escape route).</li> </ul>

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<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"><li>• Fire department pre-plan needs to be developed.</li><li>• Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors.</li><li>• Boiler room needs to be separated with iron section by 4hr fire rated construction and 2 hrs rated opening/doors.</li><li>• Generator room need to be protected from sewing section by 4 hours rated construction with 2 hours rated doors/opening till to reach safe refuse area.</li><li>• Factory need to install centralized and automatic fire detection &amp; alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline.</li><li>• 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.</li><li>• Factory needs to install control panel for centralized automatic smoke detection &amp; fire alarm system according to NTPA Guideline.</li><li>• Factory needs to install proper standpipe system with having at least 75 mm dia of riser.</li><li>• 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.</li><li>• Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.</li><li>• Factory needs to have dedicated fire pump with backup power system &amp; sufficient capacity for achieve required pressure in the remote place of the factory.</li><li>• 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.</li></ul>
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### ***(B): Recommendations for Electrical Safety corrective actions:***

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<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> <li>Remove all unused cable from distribution board and make sure all necessary cables are properly terminated at its point of termination using appropriate size and type of lug.</li> </ul>
<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>	<ul style="list-style-type: none"> <li>Provide two separate and distinct connections of earthing for the generator.</li> <li>Ensure all panel boards (including panel door) are earthed properly.</li> <li>Ensure overcurrent protection device (circuit breaker/fuse) for each circuit or branch circuit.</li> <li>Clean interior components from dust and seal all openings within the enclosure to prevent dust from entering.</li> <li>Provide provision for inspection of all earthing system.</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>Provide Instruction board for first aid and artificial respiration in the generator room.</li> <li>Ensure graded rubber mats are provided in front of all panel boards.</li> <li>Ensure distribution board has a minimum clearance of 1 m (39 in) in front.</li> <li>Install circuit breaker in proper way to ensure safe installation.</li> <li>Provide dedicated &amp; adequate size of earthing with proper identification for each circuit and ensure continuous earth path is back to main building intake.</li> <li>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 and busbar.</li> <li>Replace wooden bases with metal clad construction for mounting the Circuit breaker, fuse.</li> <li>Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</li> <li>Connect all metal in the shed to the main earthing system.</li> </ul>

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	<ul style="list-style-type: none"> <li>• 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.</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.</li> <li>• Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data.</li> <li>• Inspect electrical panel boards on an annual basis.</li> <li>• Ensure the generator room has adequate fire separation from the production area.</li> <li>• Ensure distribution boards have no opening and all live internal components are concealed properly.</li> <li>• Provide dedicated &amp; adequate size of neutral with proper identification for each applicable circuit.</li> <li>• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</li> <li>• Provide adequate mechanical guards for electrical equipment where necessary.</li> <li>• Provide adequate covers on cable channel.</li> <li>• Provide proper cable terminator/connector for stranded conductors at its point of termination.</li> <li>• Install separate distribution boards for lighting and power circuits.</li> <li>• Install lightning protection system on the shed.</li> </ul>