

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

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Name of the Factory	: D.G. Knitting Co.
Address of the Factory	: 2/1, Karnapara, Savar, Dhaka, Bangladesh,
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 29 <sup>th</sup> June, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 29 <sup>th</sup> June, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 29 <sup>th</sup> June, 2015
BGMEA Membership No.	: 4473

### **BASIC INFORMATION:**

The assessed factory building was a 4 Storey RCC building. The structural system of the building was beam column frame and beam slab floor system. All floors of the building occupied by D.G. Knitting Co. The following general information were noted:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: RCC beam column frame structure system.
iii. Floor System	: RCC beam slab floor system.
iv. Floor Area	: Plinth level area is 5713 sft. and total area of the factory is 22852 sft.
v. No. of Stories	: 4 Storey.
vi. Construction Year	: Constructed before 2005 as per verbal information by the factory representative.
vii. Foundation Type	: Unknown.
viii. Design Drawings	: Unavailable.
ix. Soil Investigation Report	: Unavailable.
x. Construction Materials	: Brick aggregate. (Identified by removing plaster)
xi. Generator	: At ground floor 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)	: None.
Mid Term (6-weeks)	: <ul style="list-style-type: none"><li>• As- Remedial action to be undertaken to prevent the seepage of water from pipes and other sources.</li><li>• Engineer to inspect whether waterproofing material is applied or where it can be maintained. For both durability and serviceability, waterproofing on the roof slab is recommended.</li></ul>
Long Term (6-months)	: <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</li></ul>

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structural adequacy of the floor system taking into account the factory design imposed loading.

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>• Ensure adequate numbers of fire drills under the Fire Safety Plan.</li> <li>• Factory need to have proper testing plan &amp; record of fire safety equipment.</li> <li>• Factory needs to have sufficient number &amp; width (0.9m) of marked aisles at ground floor of the building.</li> <li>• Factory needs to have sufficient total width of marked aisles (5 mm per occupant) of the factory.</li> <li>• Lights in storage area needed to be installed with protective covers and conduits.</li> <li>• Walls of such opening shall have at least 2 hour fire resistance rating or close the opening with 2hr rated construction.</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>• Factory needs to be installed with adequate illuminated emergency lighting in floors, exits &amp; stairs.(Escape route).</li> <li>• Ensure illuminated exit signs in floors so that it is visible from all positions.</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>• Needs to have as built drawing with proper dimensions showing means of escape.</li> <li>• Factory needs to have a valid fire license for the full occupied area.</li> <li>• Factory Manager/Director needs to arrange fire safety training for the workers of the factory from proper</li> </ul>

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	<p>authority time to time.</p> <ul style="list-style-type: none"> <li>• Factory need to be fitted fire rated doors with self-closing mechanisms, which shall open in the direction of travel and that allowable to easy opening from inside, also having minimum widths according Table 4.2.</li> <li>• Provide handrail on both sides of stairways.</li> <li>• Factory need to Emergency backup power for critical fire safety system (signage, fire alarm &amp; detection system, emergency lighting, AFD and Alarm systems etc.).</li> <li>• Install suitable public address system having communication to all floors as well as facilities to receive messages from all floors.</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>• Fire department pre-plan needs to be developed.</li> <li>• Maximum travel distance is found 23.0 m. Which is not permitted for single exit at 04-storied reinforced concrete building.</li> <li>• Another stair needs to install in the factory.</li> <li>• Final exit-1 need be to separate with generator room by 2 hr rated construction &amp; 1.5 hr rated door opening.</li> <li>• Storage area needs to be protected with 2 hour rated construction &amp; 1.5 hours rated opening or doors.</li> <li>• Generator room needs to be fire separated with 4 hours fire rated enclosure and 2 hour rated opening having direct access from outside.</li> <li>• Stairs need to be protected with 2 hour fire rated and smoke resistant lobby &amp; enclosure, also having 1.5 hour rated opening or door and provide a protected route from all though the stairway to the final exits.</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> </ul>

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	<ul style="list-style-type: none"> <li>• Factory needs to be installed with control panel for centralized automatic smoke detection &amp; fire alarm system according to NTPA Guideline.</li> <li>• Standpipe system needs to be installed for first aid hose system at factory building.</li> <li>• (a) The number of hose required according to Table 4.4.1, Page 10436 of BNBC2006 (1 hose per 1000 m2)</li> <li>• (b) The minimum hose diameter is 38 mm, or 1.5" preferably fabric hose with variable nozzle to be used.</li> <li>• Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 kPa and standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200 kPa.</li> <li>• Ensure Siamese connection for existing standpipe &amp; hose system.</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 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.</li> </ul>
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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>	<ul style="list-style-type: none"> <li>• 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.</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>• Discharge the generator exhaust to the exterior of the building in a safe location.</li> <li>• Ensure all distribution boards (including panel door) are earthed properly.</li> <li>• Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering.</li> <li>• Ensure inspection for all earthing system is being</li> </ul>

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	completed and documented.
<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>• Install appropriate type of safety signage at generator room. Also ensure graded rubber mats are provided in front of all distribution boards.</li> <li>• Provide Instruction boards for first aid and artificial respiration in the generator room.</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.</li> <li>• Replace wooden boxes and bases with metal clad construction for mounting the circuit breakers and switch controls.</li> <li>• Ensure all electrical cables are sized according to capacity of circuit breakers.</li> <li>• Provide adequate support or mechanical guards for electrical wiring where necessary.</li> <li>• Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</li> <li>• Connect all metal in the building to the building earthing system.</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>• Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers.</li> <li>• Ensure distribution boards have no opening and all live</li> </ul>

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	<p>internal components are concealed properly.</p> <ul style="list-style-type: none"><li>• Install circuit breakers in proper way to ensure safe installation.</li><li>• Provide dedicated &amp; adequate size of neutral with proper identification for each 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 proper cable terminator/connector for stranded conductors at its point of termination.</li><li>• Provide an emergency power generator with adequate capacity for the building.</li><li>• Install separate distribution boards for lighting and power circuits.</li><li>• Install lightning protection system on the building.</li></ul>
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