

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

---

Name of the Factory	: Vaajon Apparels Ltd.
Address of the Factory	: Plot no. B-25-28, BSCIC Industrial Estate, Konabari, Gazipur.
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 6 <sup>th</sup> June, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 6 <sup>th</sup> June, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 6 <sup>th</sup> June, 2015
BGMEA Membership No.	: 3286
BKMEA Membership No.	: 750

### **BASIC INFORMATION:**

The total factory is composed of multiple adjacent structures residing in a production complex. The composing buildings are: 1 no. 3 Storey RCC building (Building-1), 1 no. 4 Storey RCC building (Building-2) and 2 nos. Single Storey PEB profile sheds. The following information was noted:

- i. Building Usage Type : Garment Factory.
- ii. Structural System : Building-1 & Building-2 is RCC Beam slab frame and Shed-1 & Shed-2 is Profile sheeted shed
  
- iii. Floor System : Building-1 & Building-2 is RCC Beam slab and Shed-1 & Shed-2 is Profile sheeted shed at roof.
- iv. Floor Area : 3 storied building - Total floor area = 16.440 sq. ft. 4 storied building - Total floor area = 9790 sq. ft. Shed-1 - Total floor area = 4410 sq. ft. Shed-2 - Total floor area = 3640 sq. ft.
  
- v. No. of Stories : RCC Building -1 = 3 storied (No Basement.)  
RCC Building -2 = 4 storied (No Basement.)  
Shed-1 = Single storied.  
Shed-2 = Single storied.
  
- i. Construction Year : Unknown.
- ii. Foundation Type : Unknown.
- iii. Design Drawings : Unavailable.
- iv. Soil Investigation Report : Unavailable.
- v. Construction Materials : For Building-1 used stone aggregated, for Building-2 used brick Aggregated. (Identified by removing Plaster)
  
- i. Generator : Located at Shed-1

### **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.

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

Mid Term (6-weeks)

:

i. As-built architectural and engineering drawing to be prepared for two nos. building and two nos. shed and submitted for approval by appropriate authority. As part of this process building engineer will be required to make a number of checks on the as-built construction.

Long Term (6-months)

: None.

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>	<ul style="list-style-type: none"> <li>• Direct route of access to required exits should be provided through stairways which are maintained free of obstructions.</li> <li>• Direct route of access to required exits should be provided through stairways which are maintained free of combustibles.</li> <li>• Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level.             <ul style="list-style-type: none"> <li>- Illuminated exit sign should be posted above the exit door,</li> <li>- It should be clearly visible at all time,</li> <li>- Provide directional signs wherever necessary.</li> <li>- All exit doors should be clearly marked for easy identification.</li> <li>-Signage should be uniform.</li> </ul> </li> <li>• Provide right number of fire extinguisher at all floors and to keep the record for re filling &amp; properly tagged.</li> <li>• The first aid hose and standpipe performance should be checked periodically and properly tagged.</li> <li>• Provide additional firefighting equipment like sand &amp; water buckets near exit or easily accessible area for first</li> </ul>

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

	<p>phase firefighting.</p> <ul style="list-style-type: none"> <li>• Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety Plan &amp; should kept record properly.</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>• Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter.</li> <li>• Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key.</li> <li>• Exit door should have minimum clear width 0.9 meter.</li> <li>• Provide handrails on both side of each stairway with height of 0.9m measured from the nose of stair to the top of the handrail.</li> <li>• Doors in stair should be outward opening, side-swing, self-closing, non-lockable 1.5 hours fire rated doors for building-1 &amp; 2 in all stair way encloses.</li> <li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor substation room (building-1) and ground floor boiler room (shed-2), which located at the adjacent to dyeing section</li> <li>• Design and plan for 2 hours fire rated enclosure for all vertical shafts as per requirements of RMG guideline.</li> <li>• Produce proper design and plan for 2 hours fire separation for lift wells.</li> <li>• Prepare proper plan and design for 2 hours fire rated barriers with 1.5 hrs fire rated door at 1st floor fabric &amp; yarn store area, which is adjacent to knitting section.</li> <li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at ground floor (shed-1) generator room &amp; chemical room, ground floor (shed-2) boiler room, ground floor (building-1) substation room and 1st floor (building-1) dyes chemical room only 2 hours fire rated door.</li> <li>• The egress paths should be illuminated with emergency lighting with power back-up supply &amp; illumination</li> </ul>

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

	<p>should be a minimum of 10 lux for all corridors &amp; exit doors. Aisles should be provided with a minimum 2 lux.</p> <ul style="list-style-type: none"> <li>• The stairway should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for stairway.</li> <li>• Produce design and plan for automatic detection system with automatic fire alarm.</li> <li>• Prepare proper design and plan for dedicated fire pump with alternate backup power supply.</li> <li>• Obtain the fire license with full covered area from the proper issuing authority.</li> <li>• Obtain building approval from issuing authority</li> <li>• Obtain the boiler license from the proper issuing authority.</li> <li>• Obtain the boiler operator license from the proper issuing authority.</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>• Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor substation room (building-1) and ground floor boiler room (shed-2), which located at the adjacent to dyeing section</li> <li>• Implement the design 2 hours fire rated enclosure for all vertical shafts.</li> <li>• Implement the design for 2 hours fire rated walls for lift wells</li> <li>• Provide 2 hour's fire rated barriers with 1.5 hrs fire rated door at 1st floor fabric &amp; yarn store area, which is adjacent to knitting section.</li> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated door at ground floor (shed-1) generator room &amp; chemical room, ground floor (shed-2) boiler room, ground floor (building-1) substation room and 1st floor (building-1) dyes chemical room only 2 hours fire rated door.</li> <li>• Install automatic detection system with automatic fire alarm.</li> <li>• Install dedicated fire pump with alternate backup power supply.</li> <li>• Provide sufficient number of hose pipe with respect to area and travel distance as per RMG guideline.</li> <li>• Stand pipe supplying first aid hose should have</li> </ul>

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

	minimum pressure of 200 KPa.
--	------------------------------

### **(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>Over current protection devices (Circuit breakers) should be installed at all distribution panels.</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>Re-locate fuel tanks away from control panels in generator room.</li> <li>All strands cables at exposed ends should be properly soldered / crimped and insulated.</li> <li>Provide weather proof casing for switchboards exposed to weather (located outside the building).</li> <li>Relocate switchboards away from Dyeing machine (&gt; 2.5 m).</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>All unwanted materials should be removed from substation &amp; generator room.</li> <li>Provide rubber mats of adequate size in front of distribution panels.</li> <li>Install smoke detection and provide firefighting equipment in the substation and generator room.</li> <li>Provide and maintain clear and legible identifications numbers &amp; names on all incoming and outgoing circuits of HT / LT panels.</li> <li>1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign. 2. The source of illumination should be providing not less than 50 lux.</li> <li>Individual Fuse protection should be provided to every 15/20 A socket.</li> <li>1. All stranded conductors &gt; 6mm<sup>2</sup> to be provided with cable sockets.</li> <li>2. All stranded conductors &lt; 6 mm<sup>2</sup>, at exposed end should be soldered / crimped.</li> <li>The electrical panels to be of metal case and should be marked with “Danger 415 Volts” and identified with</li> </ul>

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

---

	<p>proper phase marking and danger signage.</p> <ul style="list-style-type: none"><li>• Provide proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards.</li><li>• Provide cable connections with properly soldered / welded lugs at (LT/DB)'s. Ensure that all the electrical connections are properly secured with lugs.</li><li>• Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation.</li><li>• Avoid looping and bunch of cable at MCCB/MCB or bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards.</li><li>• Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases.</li><li>• Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box.</li><li>• Seal the opening of wall at wiring passing through roof partitions. Ensure that all cable penetrations through walls should be adequately sealed with fire resistive elements.</li><li>• Relocate the cables /wiring and panels from chemically affected area. Ensure that all cables should be away from areas where they can be damaged or chemically affected.</li><li>• Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.</li><li>• Provide separate earthing connection to electrical equipment. Ensure that earth potential provided for all parts of equipment / installation (other than live parts) and that continuous earth connection is provided back to the main intake supply earth.</li><li>• Provide adequate earthing to body and doors to all LT/ DBs. Ensure that all electrical panels provided with proper and separate earth potential.</li></ul>
--	---

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

<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>• 1. Provide updated SLD matching the existing installation at the factory.</li> <li>2. SLD to indicate exact positions of all points of switch boxes and other outlets.</li> <li>3. SLD to be approved by the engineer-in-charge.</li> <li>• 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc.</li> <li>2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation.</li> <li>3. As built drawing to be approved by the engineer-in-charge.</li> <li>• Area of substation / transformer to meet requirements of Table 4.3 of RMG Guideline; the area should be 90 m<sup>2</sup>, or relocate the substation room.</li> <li>• Maintain the minimum height of 3.6 m for the substation room. Increase the height or relocate it.</li> <li>• Provide 4 hour fire rated walls all around the transformer / generator room on ground level.</li> <li>• Relocate generator set in substation building / adjacent to substation room.</li> <li>• Modify Area of generator room to meet requirements of Table 4.4, RMG Guideline; the area should be 100 m<sup>2</sup>, or relocate the generator room.</li> <li>• Provide and maintain proper clearance in all sides of generator for ease of maintenance.</li> <li>• 1. Design to have proper segregation of different end used loads.</li> <li>2. Wiring design to have separate and distinct sub-circuits for power and heating system.</li> <li>3. All DBs to be placed conveniently. 4. Wiring to be neat, tidy and located near ceiling.</li> <li>• Provide calibrated Ammeters / Voltmeters at distribution boards (DBs).</li> </ul>
---	--

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

---

	<ul style="list-style-type: none"><li>• 1. Remove all the inflammable materials from surrounding of electrical circuitry at DBs.</li><li>2. Ensure that all electric circuitry clean of inflammable materials.</li><li>3. Conduct periodic maintenance and maintain the records.</li><li>• Provide and maintain easy access and proper height of switchboard / panel boards (&lt; 2m from floor level).</li><li>• 1. Wooden switchboards should be replaced by non-flammable materials.</li><li>2. Prefer switchboards made of non-flammable materials.</li><li>• Power cables and CCTV cables should be laid separately.</li><li>• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).</li><li>• Seal the cable entry-exit points of (LT/DB)'s with non-flammable materials. In addition: 1. Ensure that LT panels / Switchgears to be vermin / damp proof. 2. Ensure all unused holes / openings in DBs to be blocked properly.</li><li>• 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.</li><li>2. Ensure that connections between conductors / equipments provided to durable electrical continuity and adequate mechanical strength and protection.</li><li>3. The continuous earth connection is provided back to the main intake supply earth.</li><li>• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.</li></ul>
--	---