

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

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Name of the Factory	: TARGET FASHION LTD.
Address of the Factory	: Khokon Complex, National University, Choy Dana, Hajirpukur, Joydevpur, Gazipur.
Present Status of the Factory	: Under Operation
Structural Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Structural Inspection	: 2015-02-04
Fire Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Fire Inspection	: 2015-06-23
Electrical Assessment Conducted by	: VERITAS Engineering & Consultant
Date of Electrical Inspection	: 2015-06-23
BKMEA Membership No.	: 1563

**BASIC INFORMATION:** The present garment factory is a commercial building with dual (both beam-column frame and flat plate) system. The following general information was noted:

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| i. Building Usage Type        | : Garment Factory (Rented)   |
| ii. Structural System         | : Dual system RC flat slab and RC beam slab.   |
| iii. Floor System             | : Beam slab and flat plate slab.   |
| iv. Floor Area                | : 73530 sq. ft.  |
| v. No. of Stories             | : 6 storied  |
| vi. Construction Year         | : Building was built in one phase (2008-2009)  |
| vii. Foundation Type          | : Isolated footing foundation.   |
| viii. Design Drawings         | : Available: partial structural design drawing (detail Sections, slab drawings and proper seal and Signature are not available), as built machine layout Plan<br>Not available: architectural drawing, floor load plan, Material test report |
| ix. Soil Investigation Report | : Available (dated December, 2006)   |
| x. construction Materials     | : Brick aggregate.   |
| xi. Generator                 | : Separate Structure   |

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

Short Term (Immediate) : N/A

- Mid Term (6-weeks)
1. Building engineer to check the capacity and stability of the lightweight roofs and make any necessary alterations.
  2. Analytical report is needed to check the capacity to support roof top water tanks and boiler. Floor load plan needs to be prepared based on analytical report.
  3. Floor load plan needs to be prepared based on analytical report.

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- Long Term (6-months) :1. Results of flat plate review to be input to Loading Plan.
2. Water tanks to be relocated on roof over adjacent core walls. Boiler needs to be relocated at ground floor.
3. Continue to implement load plan.

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>• Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for.</li> <li>• Factory need to have proper testing plan &amp; record of fire safety equipment.</li> <li>• Factory needs to have marked aisles in all working floor according to 0.9m for one side seat and 1.0m for both side seat.</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> <li>• Potable fire extinguisher needs to be installed as an approved type and installed as per manufacturer's instruction and placed near the path of exit travel where easily accessible.</li> </ul>

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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>	<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 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 provide handrail on both sides of all the stairways.</li> <li>• Factory needs to be installed with adequate illuminated emergency lighting in floors, exits &amp; stairs.(Escape route).</li> <li>• 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.</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>• Final exit route-2(Stair-2 route) need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from generator at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area.</li> <li>• Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors.</li> <li>• Generator: Generator room need to be protected with 4 hours rated construction &amp; 2 hours rated opening / door from stair-2 as well as from the final exit route-2 located at ground floor.</li> <li>• Boiler: Boiler room need to be protected with 4 hours rated construction &amp; 2 hours rated opening / door from the finishing section (Iron section) of 1st floor of the building.</li> <li>• Both of the stair(Stair-1&amp;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 through 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 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 100 mm dia of riser.</li> <li>• Factory need to be installed by 1 riser per 1000 sq.m of floor area with at least 38 mm dia of fabric hose with variable nozzle.</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:***

<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> <li>• Find out cause (improper cable selection, improper protective device selection, improper termination, rusted connection) of burning sign and insulation damage and take proper action including replacing cable where necessary.</li> </ul>
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<p>Short Term (<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>• 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>• Ensure proper earthing connections at all electrical equipment.</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>• Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.</li> </ul>
<p>Mid Term <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 appropriate number and type of safety signage and fire-fighting equipment and graded rubber mats at required location.</li> <li>• Provide Instruction board for first aid and artificial respiration in the generator room.</li> <li>• Provide two separate and distinct connections of earthing for the generator.</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.</li> <li>• Avoid the use of multiple cables on outgoing side of MCB's and busbar.</li> <li>• Replace wooden base with metal clad construction for mounting the socket, cutout and switch controls.</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 building to the building earthing system such as cable channel.</li> <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+( 200C-400C)} and take proper action.</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>• 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 appropriate generator room size in order to properly access the generator to perform routine maintenance activities.</li><li>• Ensure panel 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 support or mechanical guards for electrical wiring where necessary.</li><li>• Use noncombustible material to make channel and 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 building.</li></ul>
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