

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

Name of the Factory	: TANRIN APPARELS LTD.
Address of the Factory	: Katrar Chok, Shawghat, Vulta, Rupganj, Narayanganj.
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 2 July, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 2 July, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 2 July, 2015
BKMEA Membership No.	: 1962

### **BASIC INFORMATION:**

The factory building is a three storied RCC building with beam and column system and flat slab system. The following information was noted:

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|-------------------------------|--|
| i. Building Usage Type        | : Garment Factory.   |
| ii. Structural System         | : RCC beam column system.  |
| iii. Floor System             | : RCC Beam slab.   |
| iv. Floor Area                | : 45,200 sft   |
| v. No. of Stories             | : G+3 storied  |
| vi. Construction Year         | : 2011-2012  |
| vii. Foundation Type          | : Isolated footing   |
| viii. Design Drawings         | : Available-Approval drawing<br>Not Available: Structural drawing, Architectural drawing, Soil test report, Floor load plan, machine lay-out plan, material test report. |
| ix. Soil Investigation Report | : Not Available  |
| x. Construction Materials     | : Brick aggregate.   |
| xi. Generator                 | : Ground Floor.  |

### **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 columns stresses in the area identified above.<br>2. Verify in situ concrete stresses either by 100mm dia. cores or existing cylinder strength data for [the identified columns] or [100mm dia. cores from 4 columns].              |
| 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.<br>2. Engage a qualified structural engineer to prepare structural drawing and prepare/update calculations showing the structural |

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adequacy of the floor system taking into account the factory design imposed loading and the as built structure.

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>Lights in storage area are needed to be installed with protective covers and conduits.</p> <p>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.</p> <p>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.</p>
<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 license needs to be renewed by mentioning full coverage area.</p> <p>All the exit doors need to be replaced by side swinging so that unlockable 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 &amp; 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>Final exit route need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance including ground floor and need to be protected from the generator room</p>

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	<p>located at ground floor by 4 hours fire rated construction with 2 hours fire rated doors/opening, also need to have the protected escape route till to reach safe refuse.</p> <p>Accessories store needs to be protected with 2 hours rated construction &amp; 1.5 hours rated opening or doors from the finishing section of 3rd floor of the building.</p> <p>The final exits route(stair-1) need to be protected from generator room by 4 hours rated construction with 2 hours rated doors/opening.</p> <p>Boiler room needs to be protected from iron section by 4hr fire rated construction and 2 hrs rated opening/doors and need to have direct access from outside.</p> <p>All the stairs need to be protected with fire and smoke resistant enclosures and opening (2 hours fire rated enclosure and 1.5 hours fire rated door)and provide the protected route from all though the stairway to the final exits.</p> <p>Dining room is needed to be separated from the sewing section also cutting section at 3rd floor of the building by 3 hours fire rated construction with 3 hours fire rated door.</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 &amp; fire alarm system according to NTPA Guideline.</p> <p>Factory needs to install proper standpipe system with having at least 75 mm dia of riser.</p> <p>Factory need to be installed by 1 riser per 1000 sqm of floor area with at least 38 mm dia of hoses.</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>
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	<p>Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.</p> <p>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.</p> <p>Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least <math>1900 \times 75 = 142500</math> 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/insulation damage and take proper action including replacing cable or equipment where necessary.</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>Ensure proper earthing connections at all electrical equipment. 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>Ensure graded rubber mats are provided in front of all distribution boards.</p> <p>Provide Instruction board for first aid and artificial respiration in the generator room.</p> <p>Provide two separate and distinct connections of earthing for each generator.</p>

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	<p>Provide dedicated &amp; adequate size of earthing with proper identification for each circuit from the earth busbar of distribution boards and ensure continuous earth path is back to main building intake.</p> <p>Rewire to avoid the use of multiple cables from incoming and outgoing side of MCB's/MCCB'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>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 panel boards on an annual basis. Ensure the generator room has adequate fire separation from the production area.</p> <p>Provide adequate means of ventilation for the generator room based on the installed equipment considering fire barriers.</p> <p>Re-locate the generator inside the generator room in order to properly access the generator to perform routine maintenance activities.</p> <p>Ensure distribution boards have no opening and all live internal components are concealed properly.</p> <p>Provide dedicated &amp; adequate size of neutral with proper identification for each applicable circuit.</p> <p>Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</p> <p>Ensure surface/exposed wiring are run either horizontally or vertically with proper mechanical support and avoid wiring at an angle or hanging way with improper support.</p> <p>Provide proper cable terminator/connector for stranded</p>

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	<p>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.</p>
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