

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Din Apparels Ltd.
Address of the Factory	: 74, East Kazipara, Mirpur, Dhaka-1216, Bangladesh
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 11 February, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 11 February, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 11 February, 2015
BGMEA Membership No.	: 2984

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:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: RCC beam column system.
iii. Floor System	: RCC Beam slab.
iv. Floor Area	: 19868 sft
v. No. of Stories	: 5 storied +Non engineered shed(20% of roof)
vi. Construction Year	: 1995-96 and 2005
vii. Foundation Type	: Isolated Column Footing
viii. Design Drawings	: Available: Design Architectural drawing, Design Structural Drawing, Approval drawing. Not available: floor load plan, Machine layout plan
ix. Soil Investigation Report	: Available
x. Construction Materials	: Brick aggregate.
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:

Short Term (Immediate)	: 1. Area of overstress should not to be used for storage as the columns are over stressed. 2. Qualified Engineer to assess damaged columns and extent of damage assessed. If damage is not extensive in situ repair may be feasible. If damage is extensive, columns will need to be propped and strengthening options will need to be developed. 3. Detail Engineering Assessment (DEA) should be commenced.
Mid Term (6-weeks)	: 1. Carry out strengthening and repair of the distress of the identified column as required.
Long Term (6-months)	: 1. Building engineer to check, collect information and produce accurate and complete as-built documentation as required.

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2. Continue to monitor for cracking and dampness on an on-going basis

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>None</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>Factory needs to have proper testing plan & record of fire safety equipment.</p> <p>Lights in storage area need to be installed with protective covers and fire rated conduit.</p> <p>Penetration and opening in the wall of bondedware house needs to be closed by 4 hours fire rated construction/materials.</p> <p>Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct need to be minimum 2.9 m and when used as a storage facility there needs to have a minimum clearance of one third the floor height from the ceiling to the top of the storage stack</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 (Including machine layout) with proper dimensions showing means of escape.</p> <p>Fire license needs to be revised with full area coverage of the factory.</p> <p>Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher.</p> <p>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.</p> <p>Factory needs to provide handrail on both sides of all the stairways.</p> <p>Illuminated emergency light needs to be covered in all floors, exits, staircases and aisles of all the factory buildings or sheds. The intensity of illumination by means of escape lighting needs to be equal or more than 10 lux. The aisles need to be illuminated with escape lighting to a level of not less than 2.5 lux at floor level.</p>

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	<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>Factory needs to have a proper pre-plan for fire service & civil department.</p> <p>The minimum width of exit door to be 0.90 m.</p> <p>Storage area (Bonded warehouse) needs to be protected with 4hours rated enclosure and lobby with 2 hours rated opening or doors from the final exit route-1 as well as stair-1. Final exit route-1(Stair-1 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 bonded ware house at ground floor by 4 hours rated construction and lobby with 2 hours rated door/opening, also need to have the protected escape route till to reach safe refuse area.</p> <p>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 including ground floor and need to have the protected escape route till to reach safe refuse area.</p> <p>Boiler and generator room needs to be fire separated with 4 hours fire rated enclosure and 2 hour rated opening or doors.</p> <p>Both of the staircases 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>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. Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline.</p> <p>Factory need to install proper standpipe system having at least 75 mm diameter of riser.</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</p>

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	<p>(38mm nominal) may have a minimum pressure of 200 Kpa.</p> <p>Factory needs to be installed Siamese connection 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 & 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 $1900 \times 75 = 142500$ 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>	None
<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>Provide two separate and distinct connections of earthing for each generator.</p> <p>Ensure all distribution boards (including panel door) are earthed properly.</p> <p>Provide additional insulation for wiring exposed to external heat sources to protect cable.</p> <p>Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit.</p> <p>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>Install appropriate type of safety signage at generator room. Also ensure graded rubber mats are provided in front of all distribution boards.</p>

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	<p>Provide Instruction board for first aid and artificial respiration in the generator room.</p> <p>Ensure distribution boards are installed in compliant locations in terms of height, access and surrounding weather.</p> <p>Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth bus bar of distribution boards and ensure continuous earth path is back to main building intake.</p> <p>Rewire to ensure each incoming supply to an MCB has a dedicated supply from bus bar. Avoid the use of multiple cables on outgoing side of MCCB's, Fuse and bus bar.</p> <p>Replace wooden bases with metal clad construction for the mounting Circuit breakers, fuses and bus bars Ensure all electrical cables are sized according to capacity of circuit breakers.</p> <p>Provide adequate support or mechanical guards for wiring where necessary.</p> <p>Use noncombustible material to make channel and provide adequate covers on cable channel.</p> <p>Ensure cable joints are made in respect of conductivity, insulation and mechanical strength.</p> <p>Provide emergency power connection for life safety loads (fire alarm, emergency lighting, exit signage, etc.) temporarily within 6 weeks and find out a permanent solution within 6 months Connect all metal in the building to the building earthing system.</p> <p>Ensure Lighting fixtures are supported from the structure properly.</p> <p>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</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>

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	<p>Inspect electrical panel boards on an annual basis.</p> <p>Ensure the generator room has adequate fire separation from the main building.</p> <p>Provide dedicated & adequate size of neutral with proper identification for each circuit.</p> <p>Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</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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