

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

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Name of the Factory	: Dessin Wears Ltd. (Building-02)
Address of the Factory	: 84, Kalmeshwar Road, Board Bazar, Gazipur, Dhaka-1230, Bangladesh
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 07 March, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 07 March, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 07 March, 2015
BGMEA Membership No.	: 3507

### **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	: Dual system, RCC beam column frame(ground to 3rd floor) & RCC flat plate system(4th to 7th floor).
iii. Floor System	: Beam slab & flat plate system.
iv. Floor Area	: 6500 sft
v. No. of Stories	: 8 Storied
vi. Construction Year	: 2005-06
vii. Foundation Type	: Isolated Column Footing
viii. Design Drawings	: Available-Approval drawing, structural design drawing and architectural design drawing. Not available- As built drawing, machine layout plan, floor load plan, test report of construction materials
ix. Soil Investigation Report	: 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:

Short Term (Immediate)	: 1. Reduce live load to 20 psf from the contributory area of A/1 column 2. A Detail Engineering Assessment of Factory to be commenced.
Mid Term (6-weeks)	: 1. A Detail Engineering Assessment of Factory to be completed.
Long Term (6-months)	: 1. Carry out any upgrade measures required as part of the design checks. 2. Building Engineer to carry out design checks on additional

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structure.

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>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>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 year for the inspection of fire brigade whenever called for.</p> <p>Lights in storage area need to be installed with protective covers and conduits.</p> <p>Kitchen area need to be equiped with fire extinguisher &amp; Only fixed temperature type detector5 Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9m 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>Ensure the visibility of exit sign at every exit &amp; in floors from all positions.</p> <p>Portable fire extinguisher need to be installed in private and public buildings as per specification and requirements of BDS 825: 1991 (BDS 825: 91).</p>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<p>Needs to have as built drawing with floor machine layout showing means of escape with proper dimension.</p> <p>Factory needs to have valid fire license covering the full occupied area. 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 Factory needs to have proper testing plan &amp; record for fire safety equipment.</p> <p>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 Provide continuous guards and handrails on both sides of the stairs.</p> <p>Install handrails in stairs between two adjacent floors.</p>

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	<p>Ensure adequate illuminated emergency lighting in floors, exits &amp; stairs<sup>5</sup></p> <p>Ensure emergency backup power for critical fire safety system. Factory needs to install 1 riser per 1000 m<sup>2</sup> of floor area &amp; 38 mm dia of hoses with variable nozzle.</p> <p>Factory needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment.</p> <p>Establish fire command station on the entrance lobby with suitable public address system having communication to all floors as well as facilities to receive messages from all floors.</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 &amp; civil department.</p> <p>Storage areas need to be protected with 2 hour rated construction &amp; 1.5 hour rated opening or doors.</p> <p>Generator room needs to be fire separated with 4hr fire rated enclosure and 2 hr rated opening having direct access from outside<sup>5</sup></p> <p>Boiler room shall be situated on the periphery of the factory building and shall have a 4 hour fire resistance wall.</p> <p>Ensure 2 hour fire rated walls and doors between office &amp; sample section at 9 storied reinforced concrete building &amp; store &amp; knitting section 5 storied reinforced concrete building at 4th floor.</p> <p>All exit stairways serving occupants located more than 23 m above the ground shall be protected by a smoke proof enclosure.</p> <p>The minimum fire resistance rating of the walls separating the smoke proof enclosure from the area of incidence shall be 2 hour with no openings other than those required for fire doors for exit. The fire rating of the fire doors for exit shall not be less than that of the minimum fire resistance rating of the walls of the smoke proof enclosure Stairs need to be protected with fire and smoke resistant enclosures, and provide a protected route from all though the stairway to the final exits.</p> <p>Each bay shall be considered as separate compartment and detectors shall be installed considering each bay an independent compartment.</p> <p>For Low-rise: An auto AFD and alarm system need to be installed.</p> <p>For High rise building: The factory shall be equipped with</p>

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	<p>manually operated electrical fire alarm system and automatic fire alarm system.</p> <p>Manually operated electrical alarm system shall be installed in a building with single or multiple call boxes located on each floor.</p> <p>Install automatic fire and smoke detection system throughout the building to cover every portion in that building.</p> <p>Install proper standpipe system having at least 100mm dia of standpipe.</p> <p>Provide the required flow of 1900 liter/min and minimum pressure of 200 KPa for supplying first aid hose (38 mm nominal) Or Hydraulically design the standpipe and hose system to get the required pressure.</p> <p>Ensure Siamese connection for the existing standpipe &amp; hose system.</p> <p>Install dedicated fire pump with backup power system &amp; sufficient capacity for achieve required pressure in the remote place of the factory</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>Find out cause of burning sign and take proper action including replacing cable or equipment where necessary.</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 (&gt; ambient+ 40°C) and take proper action</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>Discharge the generator exhaust to the exterior of the building in a safe location.</p> <p>Provide two separate and distinct connections of earthing for each generator.</p> <p>Ensure all distribution boards are earthed properly using appropriate type and size of cables and the earthing cables have continuity up to main earth /earthing pit.</p> <p>Provide additional insulation for wiring exposed to external heat</p>

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	<p>sources to protect cable/conduit.</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>Install appropriate number and type of safety signage and fire-fighting equipment at generator room. Also 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>Ensure distribution boards are installed in compliant locations in terms of height and access.</p> <p>Ensure distribution boards have a minimum clearance of 1 m (39 in) in front.</p> <p>Provide dedicated &amp; 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 avoid the use of multiple cables on incoming and outgoing side of MCB's/MCCB's and busbar.</p> <p>Replace wooden base with metal enclosure for mounting the circuit breaker.</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>Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection,</p>

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	insulation damage, multiple cables at single point, ) of overheating { ambient+( 20°C-40°C)} and take proper action.
<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. Inspect electrical panel boards on an annual basis to ensure that the equipment is in good working condition.</p> <p>Ensure the generator room has adequate fire separation from the production area.</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 circuit.</p> <p>Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.</p> <p>Provide adequate mechanical guards for electrical wiring where necessary.</p> <p>Provide adequate and noncombustible covers on cable channel. 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 conductors at its point of termination.</p> <p>Use conduit expansion fittings for conduit runs that span a building expansion joint.</p> <p>Install separate distribution boards for lighting and power circuits.</p> <p>Install lightning protection system on the building</p>