

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: CLEOPATRA KNIT DESIGN LTD.
Address of the Factory	: 232/248, Amanat Siddik Tower, New Chaktai, Chittagong
Present Status of the Factory	: Under operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 15 June, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 15 June, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 15 June, 2015
BGMEA & BKMEA Membership No.	: 4666 & 1700

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 : Flat Plate System.
- iii. Floor System : RCC Flat Plate.
- iv. Floor Area : Floor area is (5500 sq. ft. x 2) = 11000 sq. ft. for main factory building
- v. No. of Stories : 8 storied
- vi. Construction Year : 2005 to 2007
- vii. Foundation Type : Unknown
- viii. Design Drawings : Available document: Approval plan, soil test report. Not available: Architectural drawing, structural design drawing, machine layout plan, floor load plan, material test report was not found.
- 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:

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| Short Term (Immediate) | : 1. A Detail Engineering Assessment of Factory to be commenced |
| Mid Term (6-weeks) | : 1. Detail Engineering Assessment to be completed.
2. Building Engineer to carry out design checks on additional structure.
3. Remedial action to be undertaken to prevent the seepage of water from pipes and other sources |
| Long Term (6-months) | : 1. Continue to implement load plan.
2. A qualified structural engineer should be involved for maintenance by correcting the identified issues for dampness. |

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3. Structural engineer to prepare full set of as built structural drawing and prepare/update calculations showing the structural adequacy of the floor system taking into account the factory design imposed loading and the as built structure under the part of DEA

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>	<ul style="list-style-type: none"> • N/A
<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"> • Factory needs to have proper testing plan & record for fire safety equipment. • Factory needs to close all the opening in the rated wall of the stair case by 2 hours rated construction/enclosure or 1.5 hours rated doors. • 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>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"> • Factory needs to have as built drawing with floor machine layout showing means of escape with proper dimension. • 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. • 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. • Factory needs to provide handrail on both sides of all the stairways. • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs.(Escape route). • 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>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"> • Factory needs to have a proper pre-plan for fire service & civil department. • Factory needs to ensure at least minimum width of stair

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	<p>0.9 m.</p> <ul style="list-style-type: none">• Final exit route-1 and 2 (Stair-1 and 2 route) need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and needs to ensure fire protected route from all stairs to all final exits to safely discharge outside of the factory building.• Storage area needs to be protected with 2 hours rated construction & 1.5 hours rated opening or doors.• Generator: Generator room need to be protected with 4 hours rated construction & 2 hours rated opening / door from stair as well as from the final exit route located at ground floor.• Boiler: Boiler room need to be protected with 4 hours rated construction & 2 hours rated opening / door from the working floor of 2nd floor of the building.• All the exits connecting to the staircase-1, 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 though the stairway to the final exits.• 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.• 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.• Factory needs to install proper standpipe system with having at least 100 mm dia of riser.• Install standard standpipe and hose system as well as fire pump system to ensure required hose pressure at the highest and most remote part of the building.• Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection.• Factory needs to have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory.• Factory need to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment
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	and at least 1900ltr x 75min=142500 liters water storage tank.
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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"> 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. 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+ 40°C) and take proper action.
<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"> Ensure all distribution boards (including panel door) are earthed properly. Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.
<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"> Post appropriate type of safety signage at generator room, also ensure graded rubber mats are provided in front of all distribution boards. Provide Instruction board for first aid and artificial respiration in the generator room. Provide two separate and distinct connections of earthing for the generator. Provide dedicated & 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. Rewire to avoid the use of multiple cables on busbar terminal of distribution boards and change over switch. Replace wooden base with metal clad construction for mounting the mounting circuit breaker, fuse, and switches Ensure all electrical cables are sized according to capacity of circuit breakers. Provide adequate support and mechanical guards for electrical equipment and wiring where necessary. Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. Provide emergency power connection for life safety loads (fire alarm, emergency lighting, and exit signage) temporarily within 6 weeks and find out a permanent

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	solution within 6 months.
Long Term <i>(The remedial works indicated must be carried out within a period of 6 months)</i>	<ul style="list-style-type: none">• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system.• Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data.• Inspect electrical panel boards on an annual basis.• Ensure overhead service connections to the building are led via adequate size and type of service masts.• Ensure the generator room has adequate fire separation from the production area.• Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities.• Ensure distribution boards have no opening and all live internal components are concealed properly.• Provide dedicated & adequate size of neutral with proper identification for each applicable circuit.• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.• Provide adequate covers on cable channel.• Provide proper cable terminator/connector for stranded conductors at its point of termination.• Install separate distribution boards for lighting and power circuits.• Install lightning protection system on the building