

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

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Name of the Factory	: <b>CREATIVE SWEATERS (PVT.) LTD. UNIT-2</b>
Address of the Factory	: I/A, Shilpa Plot, Darus Salam Road, Mirpur-1, Dhaka-1216, Bangladesh
Dhaka Present Status of the Factory	: <b>Under Operation</b>
Structural assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Structural Inspection	: 11 June, 2014
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 5 July, 2014

**Basic Information:** The present garment factory is a commercial building with beam-column frame system. The following general information was noted:

i. Building Usage Type	: Garment factory
ii. Structural System	: RC beam and column frame with 2 way spanning slab
iii. Floor System	: Beam slab
iv. Floor Area	: Unavailable
v. No. of Stories	: 10 storied
vi. Construction Year	: 2010
vii. Foundation Type	: Pad foundation
viii. Design Drawings	: Available (Signed by RAJUK in 1992)
ix. Soil investigation Report	: Available (Dated 2008)
x. Construction Materials	: Unavailable
xi. Generator	: Ground floor

**Recommendations for Corrective Action:** The recommendations of corrective action for both Structural and Fire & Electrical Safety are as follows:

### The recommendations for Structural Safety corrective actions are:

Immediate (Now):

1. The toilet plinths on the north east corner on all floors are to be fully propped all the way down to basement foundation level.
2. The water tanks on the roof are to be fully emptied
3. Basement construction works are to be stopped immediately. Sections of the ground floor slab to basement areas already constructed are to be fully propped. Columns that no longer have restraint from the ground floor are to be braced to provide lateral restraint.
4. The Imposed Loading on floors 1,2,3 and 4 is to be limited to 1.5kN/m<sup>2</sup> and the Imposed Loading on floors 5,6,7,8,9 and 10 is to be limited to 1kN/m<sup>2</sup>.
5. A Detail Engineering Assessment of the Factory is to be commenced per the attached scope.

Mid Term (Within 6 Weeks):

1. Detail Engineering Assessment to be completed.
2. Produce and actively manage a loading plan for all floor plates within the Building giving consideration to floor capacity and column capacity.
3. Locations of loading noted to be surveyed and capacity of floor structure to be assessed by the Building Engineer to confirm that the floor structure is designed to carry these loads.

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

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### Long Term (Within 6 Months):

1. Actions identified in the Detail Engineering Assessment to be fully implemented on site.
2. Actions deemed required following the above assessment to be fully implemented.
3. Continue to implement and manage the loading plans.
4. Building Engineer to provide detailed calculations for the noted structure and the associated light steel roofs. These should confirm their ability to withstand all wind loading pressure, suctions and uplift forces.
5. No further floors are to be added to the Building until the Building Engineer confirms with detailed calculations that the columns are capable of supporting the additional loading.
6. It should be noted that no permit exists for additional floors.

### **The recommendations for Fire Safety corrective actions are:**

#### Immediate (Within 1 month):

1. Remove locking features from all egress doors / gates. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.
2. Remove all storage from exit stairs and egress paths.
3. Remove the exit passageway with combustibile material and Provide the exit passageway consists of non-combustibile material and handrails on both side in accordance with NFPA 101, until the exit stairs discharge is made by fire barrier.
4. Replace all gates / sliding doors along the means of egress with side-hinged, swinging egress doors. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.
5. Based on ceiling configuration, provide additional detectors where needed, and space them in accordance with NFPA 72.
6. Provide exit signs above all exits to the exterior and all doors to the exit stairs. Additional exit signs shall be placed throughout the facility anywhere the continuation of egress path is not obvious.
7. Regularly test the emergency lighting system on each floor and replace/repair lights as needed.

#### Short Term (Within 3 Months):

1. Separate the hazardous materials / flammable liquid storage room by a minimum 2hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
2. Separate the generator and transformer rooms by a minimum 2-hr fire-rated construction. Seal and/or protected all openings to maintain the required fire separations.
3. Provide dedicated storage rooms separated by minimum 1-hr fire-rated construction. Where separate storage rooms are not feasible, provide defined storage areas and limit the storage arrangement as follows:

-Maximum height of 2.4m and maximum area of 23m<sup>2</sup>

-If sprinkler protected: maximum height of 3.66m and maximum area of 93m<sup>2</sup>

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

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Separate areas of unenclosed combustible storage by a minimum clear distance of 3m.

4. Provide minimum 1.5-hr fire rated doors and seal all unprotected openings to separate the exit stairs from work areas and other building spaces on all floor levels. Ensure that the fire doors are self-closing and positive latching and that they are provided with fire exit (panic) hardware where serving production floors. If fire doors are required to be held open for functional reasons, provide automatic closing devices tied to the fire alarm system.
5. Provide a minimum 2-hr fire rated shaft to separate the utility risers from each floor level.
6. Provide 2-hr continuous stairwell enclosure to ground floor from roof floor.
7. Modify the egress door to swing in the direction of egress travel.
8. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
9. Inspect, test and maintain the emergency lighting system in accordance with The ACCORD standard. Keep written records on-site.
10. Test the emergency lighting system on each floor and provide additional emergency fixtures to provide adequate illumination along the means of egress. Provide a minimum illumination of 10 lux at the floor level within exit stairs and exit discharge paths and minimum 2.5 lux along exit access aisles.

### Mid Term (within 6 Months):

1. Provide 2-hr fire-rated exit passageway leading directly outside (vestibules to separate any storage areas) or Provide sprinkler protection for discharge floor in accordance with NFPA 13.
2. Remove single-station smoke alarms. Provide automatic smoke detection throughout the building, tied into the fire alarm system, in accordance with NFPA 72.

### Long Term (More than 6 months):

1. Replace the fire alarm system with a new, listed addressable fire alarm system in accordance with NFPA 72.
2. Provide automatic sprinkler protection throughout the building in accordance with NFPA 13.

### **The recommendations for Electrical Safety corrective actions are:**

#### Immediate (Within 1 month):

1. HT cable on floor may be supported on covered cable-trays installed at safe locations or must be installed in cable trench (raised) with appropriate trench cover (concrete slab or checkered metallic plates). The cables must be arranged properly without any bends to avoid stress on cable insulation.
2. Fill the Breather oil cup with transformer oil up to the required level as instructed by the manufacturer. Consult with transformer servicing company before performing the task. Establish a routine maintenance & inspection program for transformer as well as all other electrical equipment to ensure any future repetition of the occurrence.
3. Disconnect the supply and clean all the debris. Provide metallic cover (checkered plate) or concrete slab on cable trench to prevent the damage of cable insulation as well as prevent the ingress of debris, dust and lint. Establish a cleaning program to keep the cable trench dust- proof.

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

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4. Install the cable tray/ladder/ duct up to the cable entry of the panel in order to support the cables. Ensure the cables are tightly latched with the ladder and provide covers made of noncombustible material preferably metallic sheet to protect the cables' insulation from any physical damage as well as prevent ingress of debris, dust and lint. Provide cable gland for every cable entry and exit hole.
5. Sharp bends in cables, near termination points, must be prevented to avoid stress on cables and terminating points.
6. Wirings installed near steam lines must be protected from external heat and moisture by keeping sufficient clearance between steam pipes and duct and installing adequate thermal-insulation on the steam pipe.
7. Arrange periodic inspection & thermal scan to identify the overloading, loose connection, unbalanced load which may cause the excessive heat-rise and take action accordingly.
8. Provide panel top/base cover plate and provide cable gland according to the respective cable size for cable entry and exit so that the cables are not stressed on the sharp edges of the hole of panels.
9. Provide earth connection for body and doors of metallic distribution boards using green cables preferably braid so that the metallic door remains at zero potential all the time.
10. Install the base plate/top plate of panels and make hole to provide cable gland according to the respective cable size for cable entry and exit so that the cables are not stressed on the sharp edges of the hole of panels. Provide covers (of noncombustible material) if any additional gap remains after installing cable glands.
11. Multiple terminations are not allowed. Use individual slot on bus-bar for each load. Use proper lug / bolt/washer for termination of cables.
12. Protective devices should be encased in metal casing made of 20 SWG thickness metal sheets to reduce the risk of fire spreading due to short circuit.
13. Both the red (L) and Black (N) cables (Phase & neutral cables) of final circuit must run from DB up to Switchboard without joints. Under the circumstance (where this is not possible, cable joints must be realized through porcelain or PVC connectors with PIB tape wound around.
14. Wires close/attached to boiler and generator must be protected from external heat and moisture by metallic heat resistant conduits. If possible, keep sufficient clearance between heat sources and cable/wires.
15. Cables on floor may be supported on covered cable-trays installed at safe locations or must be installed in cable trench (raised) with appropriate trench cover (concrete slab or checkered metallic plates). The cables must be arranged properly without any bends to avoid stress on cable insulation.
16. The exhaust fans may be controlled by Direct On-Line (DOL) switch.

### Short Term (Within 3 Months):

1. Transformer plinth must be high enough to reduce the risk of submersion by flood water.
2. Working space (1.07m preferably) around the transformer.
3. Cables may be supported on covered cable-trays installed at safe locations or must be installed in cable trench (raised) with appropriate trench cover (concrete slab or checkered

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

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metallic plates). The cables must be arranged properly without any bends to avoid stress on cable insulation.

4. Install separators between different phases of MCCBs. Standard separators provided by the MCCB manufacturer must be used.
5. Incoming and outgoing cables terminating at MCCB must be of same size.
6. Disconnect the power source of the cable laid into channel and clean dust and debris of all interior components. Establish a periodic cleaning program and maintain records of the activities. Provide cover made of noncombustible material on the channel for preventing ingress of dust and debris in future.

Mid Term (Within 6 months): NA

Long Term (More than 6 months): NA