

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

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Name of the Factory	: ASROTEX UNIT-2
Address of the Factory	: Shreepur, Gazipur, Dhaka
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	: 23 October, 2013
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 7 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	: R.C. Beam and slab on R.C. Columns
iii.	Floor System	: Beam slab
iv.	Floor Area	: The total area is of the factory is 96,100 sq. ft.
v.	No. of Stories	: 6 storied
vi.	Construction Year	: 2006
vii.	Foundation Type	: Unavailable
viii.	Design Drawings	: Available
ix.	Soil investigation Report	: Unavailable
x.	Construction Materials	: Brick aggregated
xi.	Generator	: Utility Shed

**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. No areas to be used for storage of stacks of 18kg boxes more than 3 boxes high.
2. Factory Engineer to review design, loads and columns stresses in area identified above.
3. Verify insitu concrete stresses either by cores or existing cylinder strength data for all columns.
4. A Detailed Engineering Assessment of Factory to be commenced, see attached scope.
5. Get engineer to check load bearing capacity of external escape stair and provide adequate stability to stair in a proper way.

#### Mid Term (Within 6 Weeks):

1. Detailed Engineering Assessment to be completed.
2. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.

#### Long Term (Within 6 Months):

1. Continue to implement load plan.

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2. Get engineer to check if the loading from walls of additional guest apartment can be safely carried by roof slab.
3. Get engineer to check the roof slab for maximum allowable loading.
4. Remedy reasons for degradation in beams of 2nd and 3rd floor and check concrete cover of beams affected.
5. Get engineer to check stability of steel structure in first floors of sheds 3 and 4.

### **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. 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.

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

1. 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.
2. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
3. Inspect, test and maintain the emergency lighting system in accordance with The ACCORD standard. Keep written records on-site.
4. 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.
5. Provide dedicated storage rooms separated by minimum 1-hr fire-rated construction. Where separate storage rooms may not be 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>.

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

#### Mid Term (within 6 Months):

1. Remove single-station smoke alarms. Provide automatic smoke detection throughout the building, tied into the fire alarm system, in accordance with NFPA 72.
2. Seal all penetrations and openings to the interior of the building along the discharge path, up to a height of 10 ft., to provide a minimum 1-hr fire separation. Alternatively, provide a second remote discharge path to the public way (only include this if feasible).

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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.

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

Immediate (Within 1 month):

1. Cable sleeves must be provided up to 2m height for HT power cable protection.
2. HT power cable must be laid in cable trenches provided, and the trenches must be covered for cable protection.
3. Leakage current collector of the HT cable end-termination must be connected to the earth.
4. Transformer breather must be installed to prevent moisture ingress.
5. Establish a routine cleaning program to keep neat and clean the transformer room. Shut the power of the transformer and clean the exterior of the transformer at scheduled period.
6. Cable trench must be covered with non-flammable material to protect the cables.
7. Clean the dust and debris of all cable trenches. Establish a periodic cleaning program and maintain records of the activities. Provide checkered plate on trench for preventing ingress of dust and debris in future.
8. Install the base plate of the panel as well as seal all the unused openings of the panel to make the distribution panel dust and vermin proof.
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. Phase barriers between different phases must be installed to avoid arc flashing. Standard separators provided by the MCCB manufacturer must be used.
11. Adequate rubber mat must be provided in front of panel for operators' safety.
12. Proper connector (PVC connector) with PIB tape wound around, with junction box shall be provided for every cable joint.
13. Unused panel must be removed from control room to provide ample room for O&M and safety.
14. Wiring support must be adequately support for wiring protections.
15. Sharp cable bends shall be avoided such that no stress is imposed on the termination of the cable or insulation of the cable.
16. Wiring duct must be cleaned periodically. Provide cover to prevent entering of lint and dust inside duct.
17. Mid way joining of wires and cable must be avoided. Terminations should be made only at the terminals.
18. Conduit should be provided at wall crossing to avoid wires exposure and protections. Provide proper cover to seal the exposed wires.

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19. Multiple tapping or looping at MCCB terminals must be avoided. Use bus bar for tapping of power supply to other distribution.
20. Wires must be protected to full length. Provide cover to seal exposed wires.
21. Arrange wires and cable neatly. Excess cable/wires either be trimmed or arranged properly.
22. Provide thimble/lugs for cable/wires termination.
23. Thimble must be crimped tightly to avoid any loose connections. Provide new thimble.
24. Distribution panel must be clear from any obstruction for operation and flammable materials should not be stored near DB panel.

### Short Term (Within 3 Months):

1. Install a cable tray or construct cable trench for routing and protecting the LT cables.
2. Construct a wall instead of iron frame up to ceiling separating from the remainder of the substation. Ensure forced ventilation is provided during wall construction and penetrations are sealed using appropriate fire rated non-combustible material.
3. Heat resistance conduit or industrial conduit should be provided to draw wires inside boiler room.
4. Large exhaust fan in production area must be connected through DOL switch (motor starter). It will not restart automatically even after power restored.
5. Flammable material should be used for electrical installations. Replace cover with metal or nonflammable material.

### Mid Term (Within 6 months):

1. Transformer room may be rearranged or some of the panels may be relocated to increase the room size of the transformer. Assign an electrical engineer to rearrange the room.
2. Panel base plate must be provided and panel must be sealed for vermin proof to avoid ingress of lint and dust.
3. Cables terminating at distribution boards must be supported in risers and protected throughout its length till the panel base or top plate. Re-arrange the cables to avert acute bend.
4. Top cover of wiring duct must be provided and ends must be closed to prevent ingress of lint and dust inside the duct.
5. Wires must not be left exposed in any kind of wiring system. Conduit must be provided to full length of wiring.
6. Electrical distribution panels must not be installed below staircase or near egress path.
7. MCCB must be installed inside panel board and appropriate enclosure.
8. DB may be redesigned to arrange the wires inside neatly. Cable trucking or Panduit should be used for cable dressing.
9. Remove all the multiple connections made at a single point of bus bar and connect individual branch cables to individual points on bus bar using individual lugs according to the respective cable size.

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10. Adequate space must be provided while installing MCCB to avoid live part touching panel body and easy workability.
11. Use safe route for wiring and wiring protection. Use rigid conduit to protect the cables.

Long Term (More than 6 months): NA