

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: VIYELLATEX LTD.
Address of the Factory	: 297 Khairtul, Tongi, Gazipur, Bangladesh
Dhaka Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Structural Inspection	: 7 December, 2013
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 3 November, 2013

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 round column frame with a 2-way solid slab
iii.	Floor System	: Beam slab
iv.	Floor Area	: Unavailable
v.	No. of Stories	: 6-8 storied
vi.	Construction Year	: Unknown
vii.	Foundation Type	: Pad foundation
viii.	Design Drawings	: Available
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Unavailable
xi.	Generator	: Generator Building

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. Maintain current use of the floors and don't change use or increase occupation, either of which could increase loading. Ensure no floor has more than 2kN/m² live load (Occupancy or storage).
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 cores from 4 columns.
4. A Detail Engineering Assessment of Unit 1 to be commenced, see attached Scope.

Mid Term (Within 6 Weeks):

1. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
2. Detail Engineering Assessment for Unit 1 to be completed.
3. Factory Engineer to review design, loads and columns stresses in area identified above.
4. Verify insitu concrete stresses either by cores or existing cylinder strength data for cores from 4 columns.

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Long Term (Within 6 Months):

1. Continue to implement load plan.
2. Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
3. Provide as built drawings and design justification for additional structures. A building permit should be obtained.
4. Monitor cracks on slab. Conduct regular inspection of cracks. Investigate if cracks are only in the plastering.
5. If cracks grow larger, removing all items above the slab and close working areas below the affected areas. Engage an engineer to investigate, repair and strengthen the slab.
6. Building engineer to carry out a stability analysis and provide additional stability system.
7. Building engineer to check the structures and propose additional reinforcements and stability system if it is required.
8. Building engineer to collect information and complete documentation.

The recommendations for Fire Safety corrective actions are:

Immediate (Within 1 month):

1. Remove all door/gate locking features at exit stairs and along the means of egress. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.
2. Replace the sliding doors with side-swinging doors. Remove all door locking features along the means of egress. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.
3. Configure the fire alarm system to initiate automatic occupant notification on all floor levels to facilitate whole building evacuation upon alarm.

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. Seal all penetrations and openings in the exit stair enclosure, or provided minimum 1.5-hr fire-rated opening protective, to maintain the fire separation. Seal all penetrations and openings in the exit stair enclosure, or provided minimum 1.5-hr fire-rated opening protective, to maintain the fire separation.
3. Provide dedicated storage rooms separated by minimum 1-hr fire-rated construction on all production floors where transient storage is required for operations. 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 23m²
 - If sprinkler protected: maximum height of 3.66m and maximum area of 93m².

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

4. Provide minimum 2-hr fire separation of the generator, electrical rooms and all fuel storage. Protect openings with minimum 1.5-hr, self- or automatic closing fire doors.
5. Discontinue using areas of the Chemical Storage building for production. Alternatively, provide a minimum 2-hr fire-rated separation between the production area and associated means of egress and all hazardous storage areas, provide automatic sprinkler protection throughout the Chemical Storage building, and upgrade the fire alarm system as specified in the recommendations for the GMT Unit #2.
6. Rearrange the factory equipment / work tables and remove all storage from aisles in the warehouse to eliminate dead-end conditions.
7. Provide a remotely located second exit for the factory area such that the maximum common path of travel is less than 30 m.
8. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
9. Replace the wood roof with a non-combustible, fire-rated roof assembly and provide sprinkler protection in the pump room.
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 minimum 2-hr fire separation between the exit stair discharge paths and all storage areas on the ground floor. Provide vestibules with minimum 1.5-hr fire doors to protect any openings in the fire separation walls.
2. Provide a remotely located exit for the factory area such that exit access is not required through the storage warehouse and maximum distance is less than 60 m.
3. Provide additional fire alarm appliances to provide audible coverage throughout the building in accordance with NFPA 72 criteria. Where required based on ambient noise conditions (during operations), provide visual notification appliances.
4. Provide automatic fire detection, consisting of either smoke detectors or heat detectors in areas subject to steam accumulation, to provide automatic fire alarm notification to occupants.

Long Term (More than 6 months):

1. Provide automatic sprinkler protection throughout the building in accordance with NFPA 13.
2. Modify the automatic sprinkler system for the warehouse area to provide appropriate protection in accordance with NFPA 13. Provide a minimum 2-hr fire-rated separation between the sprinklered warehouse area and nonsprinklered factory areas.
3. Configure the fire alarm system to initiate occupant notification upon activation of any two smoke detectors in addition to the manual fire alarm stations.

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The recommendations for Electrical Safety corrective actions are:

Immediate (Within 1 month): NA

Short Term (Within 3 Months):

1. Power transformer must be separated from the panels against fire and explosions. Barrier walls between panels and transformer may be constricted.
2. Every raised panels must have operating platform for panel operation without additional arrangements. Checkered metal plates may be provided to cover the cable trench. Cable trench must be redone to place the combustible covers.
3. All panels energized with 220V or higher must have warning/danger signs. The substation room must be provided with instructions (in English & Bengali) for restoration of persons after electric shock, and Artificial respiratory (as per BNBC & Factory Act). For a bank of panels, signs should be on the two end panels at a minimum.
4. Larger cables must be fixed with cable glands and enter through base/gland plates of the panel. Smaller cables and wires may be drawn in conduits. The conduit ends may be firmly fixed with check nuts or sockets at the panel gland plates.
5. Loose wirings (conduit/flexible conduits) must be firmly fixed to the ceiling running in parallel to the walls / ceiling. Existing wiring in flexible PVC conduits may be additionally supported in cable trays or in ducts.
6. Cable trays and ladders must be covered with properly sized metal sheets/covers and fixed firmly to avoid falling. The cover must be capable of resisting minor external impact without damaging the cables.
7. Cables must be firmly fixed and terminated using cable glands and enter through base/gland plates. The panels must be protected from intrusion of large insects and animals (mice, lizards, snakes).
8. Electric cables/conduits must not be drawn with other utility pipes. Electric cables / conduits / duct / tray must be separated from other utilities, including communication facilities. Electrical Service shaft may be provided in multistoried buildings (6 story and above as per BNBC code).
9. Cables passing floors/ceiling must be done at safe and designated locations to avoid damage and electric shock to people using the area. Cables installed in aisle may be separated / protected in fire rated ducts.
10. All equipment termination must be done with proper termination including cable glands to avoid ingress of moisture and dust entering the terminals.
11. Cables/wires used in boiler room for boiler control or pumps must be protected against external heat by either providing heat resistant conduits / insulation or providing supports to avoid direct contact with the heat.
12. Two different phases terminating in MCCB must be separated from each other by insulating materials to prevent flash over. Standard phase barriers provided by manufacturer (electrical graded) may be used for barrier.
13. Live bus bars must remain covered at all times during normal operation and maintenance. Instead of single protective sheet, it may be compartmentalized to prevent the bus bar from being exposed all times.

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14. Separate multiple wires in a terminal and install independent cable lugs for each connection.
15. Safety gloves and properly graded tools are not provided on most of the floors. For operator's safety, graded gloves and tools must be provided at a minimum in the Electrical workshop and on every floor near one of the MV panels.
16. Control panels for machines and equipment must be cleaned regularly. Control panels must not be used for keeping books, cloths or anything other than its associated electrical materials. Manuals may be kept using sealable polythene bags hanging/placing on the panel doors.
17. Earth conductors connecting panels must be designed and sized as per Accord guidelines for existing panels. Minimum requirements must be maintained.

Mid Term (Within 6 months):

1. Installing barrier walls between the transformer and the panel will not leave enough working space for O&M. Safe working space may not be available. Relocating and rearranging panels to one side of the room may provide more space.
2. Panels should be relocated and rearranged at safe location (possibly more towards the exit). The transformer and the passage may be separated by fire rated walls.
3. All cables (HT, MV & LV) must be placed on cable tray/ladder and dressed neatly.
4. Cable ends must be firmly fixed with cable glands and must pass through gland/base plates at the bottom of the panel.
5. All panels must be identified as in the schematic diagram, recorded by the factory, in permanent ink.
6. Wirings for exhaust fans must be neatly dressed and firmly fixed to the wall in conduit. If flexible conduits are used, industrial class and grade must be used or must be additionally supported and protected in trays or in ducts.
7. To avoid deterioration of insulation due to heat and ageing, heat shrink tubes may be used or else cable jointing tapes (like 3M, M-Seal, etc.) may be used.
8. Securely fix the wiring and cables inside panel through safe routes to avoid unintentionally touching live parts.
9. Cables and wires terminating longer than 1.5 m length must be supported by means of rigid conduit, cable tray or cable ladders to avoid damage to the cable insulation and to limit the mechanical stress on the terminals. Existing cables in flexible PVC conduits may be additionally supported in cable trays or in ducts.
10. Wires and cables placed on existing ducts and cable trays must be placed inside the duct/tray without disturbing the existing wiring/cables. Additional ducts/trays may be installed for additional wires/cables installed outside the existing ducts.
11. Tee, bends and elbow of cable tray, conduits, ducts and ladders must be done such that the cable are not stressed. Standard joints and bends should be used. Cables supported in trays or ducts must be supported and protected throughout its length.
12. Cables/Wires when passed from one type of support system to another must be done such that the wires/cables are not left exposed. Conduit and trays/ducts may be overlapped to avoid exposing connections.
13. MCCB and breakers must be fixed on proper base plate with nuts and bolts. MCB and fuses must be fixed on rails or holders.

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14. Keeping cover open near operator's work place will exposes operator to risk of electric shock.

Long Term (More than 6 months): NA