

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: CHUNJI KNIT LTD.
Address of the Factory	: Plot 81-82, Satarkul Road, North Badda, Gulshan; Dhaka, Bangladesh
Dhaka Present Status of the Factory	: Under Operation
Structural assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Structural Inspection	: 1 April, 2014
Fire & Electrical assessment conducted by	: Accord (Full report available at bangladeshaccord.org)
Date of Fire & Electrical Inspection	: 29 March, 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/slab with columns
iii.	Floor System	: Beam slab
iv.	Floor Area	: Each floor of building 1 has the area of 13,838 sq.ft. and each floor of building 2 has the area of 14,418 sq.ft.
v.	No. of Stories	: 5 (Building 1) & 6 (Building 2) storied
vi.	Construction Year	: 1996 & 2004
vii.	Foundation Type	: Pad foundation (Building 1) & Piled foundation (Building 2)
viii.	Design Drawings	: Available (signed by RAJUK)
ix.	Soil investigation Report	: Available
x.	Construction Materials	: Brick aggregated (Building 1), Stone aggregated (Building 2)
xi.	Generator	: Southwest corner of the ground floor and in a separate building located 25 ft south of the factory

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 and do not increase loading of the floors.
2. Factory Engineer to review design, loads and columns stresses in all columns.
3. Verify insitu concrete strengths either by 100mm diameter cores or existing cylinder strength data for a minimum of 4 columns.
4. A Detail Engineering Assessment (DEA) of Factory 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 to be completed.
3. Building Engineer to survey and prepare as-built drawings for additional structure as part of DEA (see Item 1).
4. Building Engineer to carry out design checks on additional structure as part of DEA, in particular resistance to wind uplift and loads from roof columns which are off grid.

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5. Building engineer to check design of the supporting beams to ensure that they have sufficient capacity for loads of water tanks.
6. Reduce loads if necessary.
7. Building Engineer to monitor wall cracking and record any further movement.

Long Term (Within 6 Months):

1. Continue to implement load plan.
2. Carry out any upgrade measures required as part of the design checks.
3. If any further movement observed, Building Engineer to investigate foundations by external trial pits and propose remedial measures.

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. 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.
4. Provide means of manual fire alarm activation near exits in accordance with NFPA 72.
5. Regularly test the emergency lighting system on each floor and replace/repair lights as needed.
6. Provide directional exits signs where exits cannot be identified.
7. Repair broken fire alarm equipment.
8. Provide exit signs above all exits.

Short Term (Within 3 Months):

1. Separate the boiler, transformer, and generator rooms by a minimum 2-hr fire rated construction. Seal and/or protected all openings to maintain the required fire separations.
2. 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 23m²

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

3. 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.

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4. Separate the chemical storage room, liquid propane gas storage/system distribution by a minimum 2-hr fire-rated construction. Seal and/or protect all openings to maintain the required fire separations.
5. Seal all penetrations and openings in floor/ceiling assemblies to maintain the fire separation.
6. Reconfigure the egress arrangement to reduce the maximum common path of travel to not more than 30.
7. Inspect, test and maintain the fire alarm system, and keep written records on-site, in accordance with NFPA 72.
8. 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.
9. Reduce occupant load to not more than available exit capacity or provide additional exits.

Mid Term (within 6 Months):

1. Provide 2-hr fire-rated exit passageway leading directly outside. Separate the storage area from the stairwell by a 2- hr vestibule. Alternatively, enclose the exit discharge and provide a separate means of egress from the storage room.
2. Replace the single-station smoke alarms with automatic smoke detectors tied into the fire alarm system. Configure the fire alarm system to initiate occupant notification upon activation of any two smoke detectors in addition to the manual fire alarm stations.
3. Modify stair to discharge directly outside. Or provide 2-hr fire-rated exit passageway leading directly outside.

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. Assign a qualified engineer to develop an as-built drawing according to the actual installation.
2. 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.
3. Arcing horns must be installed (consult with the transformer servicing company).
4. Shut down the transformer and replace the silica gel.
5. The transformer must be installed with barrier walls (instead of grill) between transformer and other panels. The walls must be fire resistant and should have height up to the ceiling or Assign a qualified engineer to design a required transformer room according to BNBC, Section-2.6.3.
6. All distribution should be identified with permanent name plate.
7. Make circular hole at the base plate/top plate of panels and provide cable gland according to the respective cable size for cable entry and exit so that the cables are not stressed on the

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- sharp edges of the hole of panels. Provide covers (of non-combustible material) if any additional gap remains after installing cable glands.
8. Placed electrical graded rubber mat/insulating material in front of all kind of electrical panels permanently.
 9. Periodic inspection is needed to identify all the loose connection and tighten up all the connections.
 10. 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.
 11. Provide phase separators between poles of MCCB made of non-combustible materials preferably use the separator provided by the manufacturer.
 12. Generator body must have two separate and distinct earth connection with 35 sqmm conductor.
 13. Generator Battery bank should be placed inside the steel frame (battery rack).
 14. Remove all the combustible materials placed in close proximity to electrical equipment. Generator Battery must be placed on the battery stand made of non-combustible material (may be steel fabricated).
 15. Lay the cable inside cable trench/Install cable duct to protect the generator output cables and provide covers made of non-combustible material preferably metal to protect the cables insulation from any physical damage as well as prevent the ingress of debris, dust and lint.
 16. Install the cable tray or ladder with cover to provide mechanical support and protection to the HT cable from any physical damage.
 17. Connect the Leakage current-collector of the HT cable to the earthing properly, otherwise, the insulation of the cable may get damaged due to leakage current.
 18. Colour code should be maintained as per standard i.e. Red, Yellow and Blue colours for phases; Black for neutral and Green for earthing.
 19. The wiring duct must be supported from the ceiling and painted.
 20. Cables shall be connected to terminals only by soldered/welded lugs according to the size of the respective cables. Proper crimping tools must be used to punch the cable lug.
 21. Earth conductor should be laid through PVC or steel pipe (on wall/floor at safe location) and it should be supported or clamped at regular interval.
 22. Lightning arrester must be installed (according to BNBC Part 8, section 2.9.) with proper size air termination network, down conductors and earth termination.
 23. Terminal box must be covered such as the live part of the terminal is not exposed (terminal-box cover provided by the manufacturer may be used).
 24. Install the cables through rigid pipe (metallic) for the protection of the cable laid on floor. The pipe must be fixed/ clamped with saddle on floor at regular interval.

Short Term (Within 3 Months):

1. Shut down the transformer and clean the vinyl tape, PIB tape may be used at termination point to prevent deterioration due to heat.

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2. Single line diagram (according to the existing electrical connection) should be displayed on LT panel and all distribution board.
3. Display Danger Sign with the wording "DANGER: 440 VOLTS" written on a permanent plate, on DB boards.
4. Provide cover made of non-combustible material preferably metallic sheet to protect the cables insulation from physical damage as well as Disconnect (switch off) the supply of the channel and clean all the dust, debris & lint inside the channel. Establish a routine cleaning program to keep the channel free from dust & lint.
5. 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.
6. Make circular hole at the base plate/top plate of panels 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. Provide covers (of non-combustible material) if any additional gap remains after installing cable glands.

Mid Term (Within 6 months):

1. 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.

Long Term (More than 6 months): NA