ELECTRICAL SAFETY INSPECTION REPORT

RIO FASHION WEAR LTD. & RIO DESIGN LTD., DHAKA, BANGLADESH

Factory List:

1. Rio Fashion Wear Ltd (RFW)
2. Rio Design Ltd. (RDL)

Inspected on November 02, 2013

ACCORD
on Fire and Building Safety in Bangladesh

SUMMARY

A 12 storied rented building with the basement and ground floor is shared by two factories namely Rio Fashion Wear Limited and Rio Design Ltd. The building was constructed in 2003. These two factories employ 1,730 workers during normal production conditions.

The Factory was surveyed for electrical safety by Woosun Energy and Construction Co., Ltd. (WEC).
The purpose of the survey was to identify significant electrical safety issues and to provide recommendations for remediation based on applicable standards specified by the Accord. The scope of this initial electrical safety inspection was limited to the review and identification of major electrical safety issues. The inspection did not include identification of minor deficiencies, which will be further addressed as part of follow-up inspections.

Table below summarizes the major electrical safety issues identified during the inspection.
Recommendations have been provided to address each issue.

An implementation schedule shall be developed by the factory to remediate each of the findings. The Specific timing of improvements, including any requested extensions due to design / installation constraints shall be submitted to the Accord for approval.

FINDINGS AND RECOMMENDATIONS

Finding #: E- 1	
Category: TRANSFORMER ROOM	Power transformer inside substation room.
Finding: Transformer compartment is too small for normal maintenance and not well ventilated.	
Recommendation: Assess possibilities to expand the room or relocate. Otherwise, the transformer room must be guarded and notified to be completely shut down during any operation or maintenance.	
Remediation Timeframe: 3 Months	

Finding #: E- 2	
Category: TRANSFORMER ROOM	Power Transformer room filled with dust (left) and wire mesh guarded window (right).
Finding: Excessive dust deposit on the transformer and transformer room.	
Recommendation: Clean the transformer and transformer room regularly. Install ventilating shutter on the wire mesh window.	
Remediation Timeframe: 3 Months	

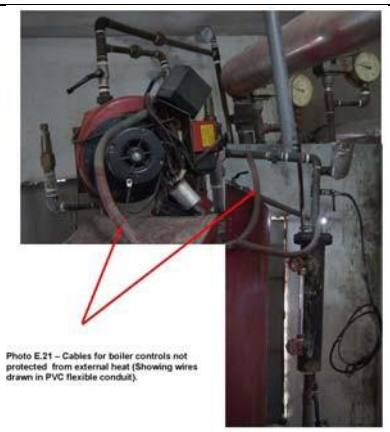
Finding #: E- 3	
Category: TRANSFORMER ROOM	
Finding: Excess HT cable not supported and not protected.	
Recommendation: Excess cable must be supported and protected in cable trenches or in trays. HT service cables may be buried underground outside the substation building before entering.	
Remediation Timeframe: 3 Months	

Excess power cables coiled and leaning on wall inside transformer room.

Finding #: E- 4	
Category: TRANSFORMER ROOM	
Finding: Arcing horns are tapped with insulation tapes.	
Recommendation: The tapes must be removed during one of the shutdowns or maintenance and gaps between the horns must be adjusted as per voltage ratings.	
Remediation Timeframe: 3 Months	

A pair of Arcing horns.

Finding #: E- 5	
Category: BOILER & COMPRESSORS	
Finding: Wiring in boiler room are not spaced/protected from heating components	
Recommendation: The cables may be enclosed or run in heat resistant enclosures. Damages due to heat may also be prevented by installing cable trays and avoiding direct contact with the hot objects. Termination of cables and wires must also be redone to avoid ingression of moisture	
Remediation Timeframe: Within 1 Month	



Wirings in flexible PVC conduits in boiler room.

Finding #: E- 6 **Category:** TRANSFORMER ROOM **Finding:** Transformer output (LV side) is connected through MCCB (In=400A) and is not enclosed (directly mounted on the wall). **Recommendation:** The MCCB may be installed in standard enclosures and must be protected. Cables terminating at the MCCB must be firmly fixed with cable glands. Install phase barrier between MCCB terminals. **Remediation Timeframe:** Within 1 Month	 MCCB installed on the wall (Transformer room) without enclosure.

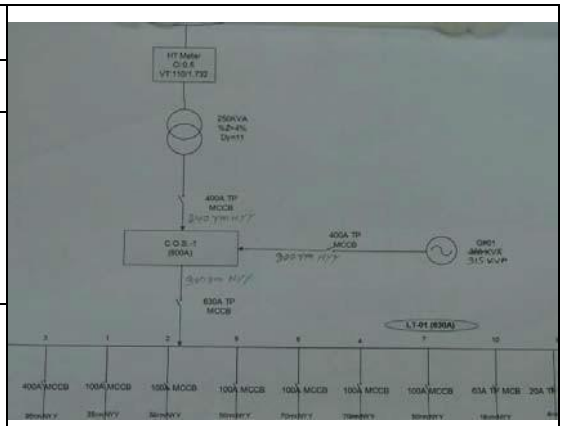
Finding #: E- 7 **Category:** TRANSFORMER ROOM **Finding:** The ground connections and the Earth Bus are not proper. The earth conductors terminating to & from Earth Bus are of various type and sizes. **Recommendation:** All earth conductor terminating to and from earth bus must be checked and sized as required. All connections must be reinstalled cable lugs and nuts & bolts (Brass/steel) **Remediation Timeframe:** 3 Months	 Main earth strip (bus) in substation. Earth conductors of different sizes terminating at the strip.

Finding #: E- 8 **Category:** TRANSFORMER ROOM **Finding:** Earth Lead (from earth electrode) installed is not sized adequately. **Recommendation:** Earth lead must be replaced by higher cross-sectional area. **Remediation Timeframe:** Within 1 Month	 Main earth bus terminating the main earth conductor from the electrode.

Finding #: E- 9	No Photo
Category: GENERATOR ROOM	
Finding: Generator room congested.	
Recommendation: Generator room must be kept free from storage items, especially in front of the electrical control panel. Assess for possibilities to expand the room or relocate in larger room.	
Remediation Timeframe: Within 1 Month	

Finding #: E- 10	 Cables in flexible PVC conduits terminating at MCCB termination box.
Category: GENERATOR ROOM	
Finding: Cables terminating at generator terminal box are not supported and not firmly fixed.	
Recommendation: Cables terminating at generator terminal box must be supported and protected. Existing cables in flexible PVC conduit must be additionally supported. Cables may be supported in risers and securely fixed to the terminal box installing cable glands.	
Remediation Timeframe: Within 1 Month	

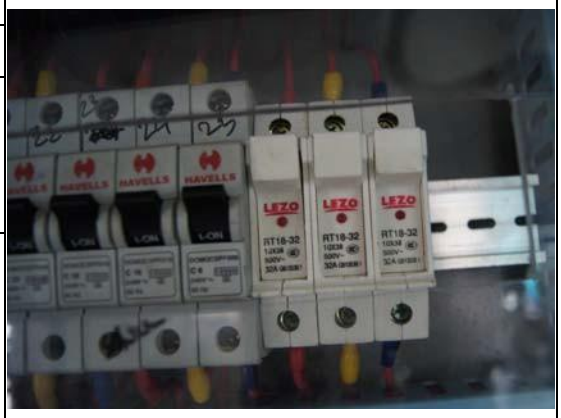
Finding #: E- 11	No Photo (All panels)
Category: SWITCHBOARDS AND PANELS	
Finding: Warning and danger signs on electrical panels and switchboards inside factory are not provided/installed.	
Recommendation: a. Danger signs (Medium Voltage) should be posted in the compartment. b. Safety signs must be posted in English and Bengali. c. Instruction for Artificial Resurrection after electric shock must be placed in the compartment.	
Remediation Timeframe: 3 Months	

Finding #: E- 12	
Category: SWITCHBOARDS AND PANELS	
Finding: The Switchgears (like MCCB, Changeover Switches, Feeder protection breakers) are not selected/engineered properly. The up-stream breakers are lower current rated than the downstream breakers.	
Recommendation: Proper selection of switchgear and protective devices after detail engineering must be done. Protection coordination of Main breaker with the downstream breakers must be checked and coordinated. Might require replacement/resizing of some switchgear.	Factory Electrical system SLD showing cable sizes
Remediation Timeframe: 3 Months	

Finding #: E- 13	
Category: SWITCHBOARDS AND PANELS	
Finding: Sub-Distribution boards are not of proper standards. Wiring, termination and Bus bars arrangements are not as per standards.	
Recommendation: Bare bus bars inside the SDBs are placed at the lower part inside the SDB which poises danger of electric shock to the operator(s) during operation and maintenance. Exposed bus bars may be protected with insulating and electrically graded covers.	Arrangement inside SDB board.
Remediation Timeframe: 6 Months	

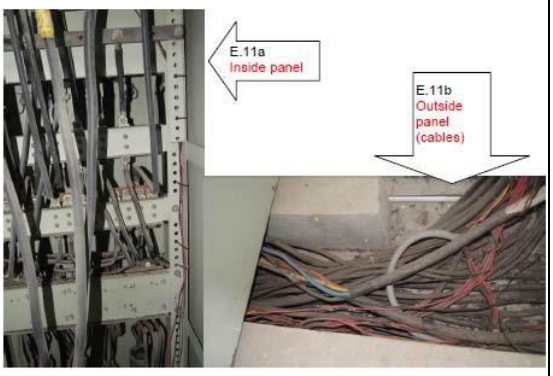
Finding #: E- 14	No Photo
Category: SWITCHBOARDS AND PANELS	
Finding: Earth Strips (Bus) too small for branch earth connections. In most of the panels, the earth strips are placed on the sides making difficult to check/test or maintain. Risk of electric shock while working/testing.	
Recommendation: The earth strip must be relocated either below the bus or outside panel (not standard practice but safer). The strip should be longer and proper size.	
Remediation Timeframe: 3 Months	

Finding #: E- 15 **Category:** SWITCHBOARDS AND PANELS **Finding:** Spacing between the phases inside panels are dangerously close. Slight increase in temperature above operating temperature may result in direct short circuit. **Recommendation:** Cables connecting the MCCB and the respective bus bar must be changed and dressed from the side to provide safe spacing between any two phases. **Remediation Timeframe:** Within 1 Month	 Cable links between main MCCB and bus bars crossing other phases without safety clearances.

Finding #: E- 16 **Category:** SWITCHBOARDS AND PANELS **Finding:** Sub-distribution board inside factory are overcrowded with MCBs. No spare feeders and provisions for spare. **Recommendation:** Additional SDBs may be installed to provide space for safe working environment or the existing panels can be replaced with larger panels. The bus bars provided in the panels can be removed by providing loop of sufficient current carrying capacity on incoming end of the MCBs. **Remediation Timeframe:** 3 Months	 One end of the DIN rail on which the MCBs are mounted inside the SDB.

Finding #: E- 17 **Category:** SWITCHBOARDS AND PANELS **Finding:** Breaker identifications are written in ink on the specific MCB with Numbers over its ratings. **Recommendation:** MCB schedule may be prepared and displayed on the panel door. Alternatively, it can be marked on the inner separation board and provide the details on the SLD. **Remediation Timeframe:** Within 1 Month	 MCBs inside panel marked with marker over the MCB ratings.

Finding #: E- 18	
Category: SWITCHBOARDS AND PANELS	
Finding: Panels are not installed with required safety features.	
Recommendation: a) Panels must be fixed with gland/base plates and must be protected from entry of dust, mice, insects and other small animals. b) Cable terminating at the panels must be firmly attached with proper glands. c) Cable inside the panel must be terminated with proper lugs/terminals	
Remediation Timeframe: 3 Months	



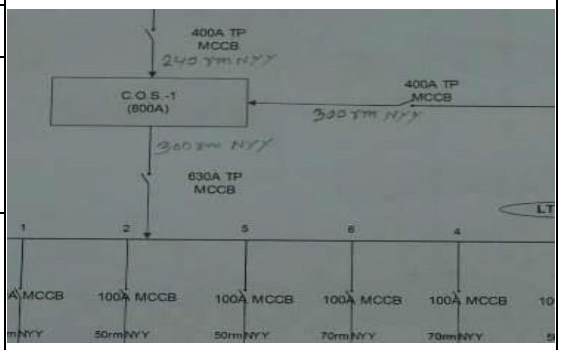
Cables entering panel (in open trench) and inside the same panel.

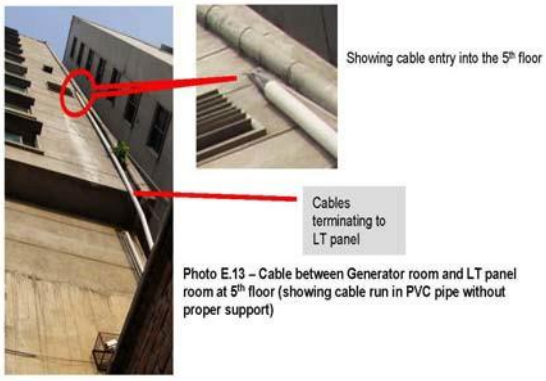
Finding #: E- 19	
Category: SWITCHBOARDS AND PANELS	
Finding: Scheduled maintenance not performed on regular basis.	
Recommendation: Maintenance schedule must be redesigned to ensure no or little dust collection on/in the panel. Summary of Maintenance records must be displayed in the LT panel and detail maintenance record registers must be maintained.	
Remediation Timeframe: Within 1 Month	

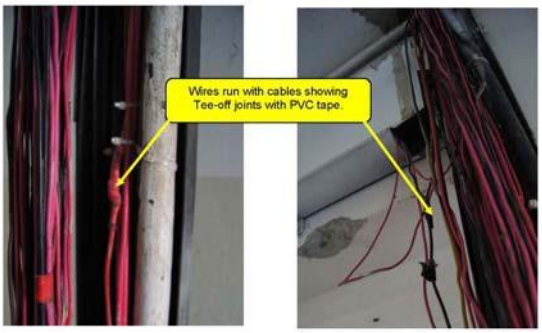
Cable covers and sheath removed before entering the panel and wires exposed (not protected).

Finding #: E- 20	
Category: SWITCHBOARDS AND PANELS	
Finding: Electrical panel room congested and do not have adequate working space around panels.	
Recommendation: Some of the panels may be relocated to provide safe operating space around the panels. Relocating all panels may be an option as the space is used for Electrical Service Shaft	
Remediation Timeframe: 3 Months	

One of the main panels in the factory installed in a narrow room with many other panels.

Finding #: E- 21	
Category: CABLE AND CABLE SUPPORTS	
Finding: Cables sizes in the electrical systems are not selected in coordination to the load connected to it.	
Recommendation: Cable sizes must be calculated and designed to match with the plant capacities (Main transformer, Generators and voltage drop).	
Remediation Timeframe: 6 Months	 7Cables entering floors in electrical room along with wiring in flexible PVC conduit.

Finding #: E- 22	
Category: CABLE AND CABLE SUPPORTS	
Finding: Power Cable delivering power to the LT panels at 5th and 7th Floors are not supported and directly passes through wall opening.	
Recommendation: The cables from Generator Room to 5th and 7th floors must be properly clipped/mounted on cable tray/ cable ladders from Generator output panel to Changeover panel. The cable ends must be firmly fixed to the gland/base plate of respective panels. Entry into the floors must be protected by installing conduits and cable must not be stressed.	
Remediation Timeframe: Within 1 Month	 Main cables installed outside building and in large PVC pipes but not supported/fixed at regular intervals.

Finding #: E- 23	
Category: CABLE AND CABLE SUPPORTS	
Finding: Wire joints and spliced in between terminals. Wires in trays or ducts are not protected.	
Recommendation: Wiring between floors must be replaced with proper size cables. Joints between terminals must be avoided and where not avoidable, must be joined installing standard cable/wire jointing kits.	
Remediation Timeframe: 3 Months (refer E-24)	 Bunch of wires between floors without supports and protections. Some of the wires in it are joined.

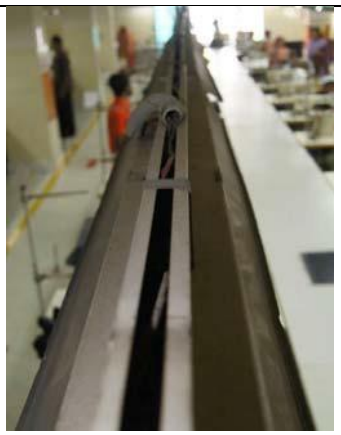
Finding #: E- 24	
Category: CABLE AND CABLE SUPPORTS	
Finding: Wires and cables passing through ceiling/floor between different levels are not supported and not protected.	
Recommendation: Cables and wires passing through ceiling / floors must be protected in rigid pipes and remaining gaps around it must be sealed with fire rated materials. Wires in trays/duct must be additionally protected in conduits. Recommended to install all cables and wires through electrical shaft in ducts.	
Remediation Timeframe: Within 1 Months	Wires and cables bunched and passing through floors and ceiling (Diagram show recommended electrical shaft)

Finding #: E- 25	
Category: SWITCHBOARDS & PANELS	
Finding: Cables terminating at LT panels and PFI panels are not firmly fixed and safely supported inside the panel.	
Recommendation: Cables terminating at panels must be firmly fixed with cable glands through gland plates. Panel base plates must be installed. Cables inside panel must cross over switchgear or devices and must be securely fixed through safe routes inside panel.	
Remediation Timeframe: 3 Months	Cables terminating at panels entering from base without base plates.

Finding #: E- 26	
Category: WIRINGS	
Finding: Unutilized light & ceiling fan points are left open. Wiring extended from concealed wiring points.	
Recommendation: All unused concealed points must be safely protected and covered. Wiring extended from existing concealed wiring points must be connected through terminals or ceiling rose and extensions must not exceed the permissible load.	
Remediation Timeframe: Within 1 Month	Wirings in PVC casing capping wiring extended from concealed wiring point in ceiling.

Finding #: E- 27	
Category: WIRINGS	
Finding: Wiring inside factory supported in PVC conduits and casing capping are exposed at exposed at junctions or at damaged wiring supports.	
Recommendation: Wiring supports must be industrial grade and must provide protection and support throughout its length. Wiring supports must be installed with junctions, bents and sockets to prevent exposing wiring in it.	A typical wiring systems with no standard system followed.
Remediation Timeframe: 3 Months	

Finding #: E- 28	
Category: WIRINGS	
Finding: Wires passing through permanent walls, (Ceiling and floors).	
Recommendation: Wiring passing through walls (ceiling/floors) must be protected in rigid pipes. Damaged conduits may be replaced or repaired and all wiring supports must be installed with its necessary accessories.	Wirings extended from concealed conduit wiring to PVC conduit joined without junctions.
Remediation Timeframe: 3 Months	

Finding #: E- 29	
Category: WIRINGS	
Finding: Wirings supported in overhead GI Sheet wring ducts are not protected.	
Recommendation: Wirings supported in ducts above work tables must be covered to prevent ingression of lint. Wires joined inside ducts must be replaced and existing joints must be connected at the terminals. Power and lighting circuits must separate.	Overhead wiring duct supporting wiring over work tables in one of the production floors.
Remediation Timeframe: 3 Months	

Finding #: E- 30	
Category: WIRINGS	
Finding: Broken switches and wiring installation are seen in many places. It may add to difficulties during hazards.	
Recommendation: Broken switchboards, wiring and conduits must be rectified. Cables/wires run through PVC flexible conduits must be replaced with conduit (rigid PVC or Steel).	Switchboard (gang) damaged and loosely installed.
Remediation Timeframe: Within 1 Month	