

Well Lord Knitwears Ltd.

Preliminary Factory Safety Inspection

Electrical Safety Assessment Report for Well Lord Knitwears Factory

260873-00

Issue | May 9, 2018



This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 260873-00

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1 Executive Summary

On Wednesday 5th April 2018 Mr Sayyed Saleem of Arup carried out a visual Electrical Safety Inspection of the Well Lord Knitwears Ltd. factory at the address and coordinates given on the cover page of this report. The inspection was non-intrusive and was carried out in accordance with the Accord Standard for existing factory buildings in Bangladesh. Limited testing of the electrical systems was carried out.

Well Lord Knitwears Ltd occupy the entire building and allowed us access to all areas.

At the factory we met with Major Mohammed Nazmul Ahasan (Executive Director), Mr Nurul Islam (Maintenance Manager) and Meer Abdusalam (Manager for HR Compliance). A number of other Well Lord Knitwears Ltd employees accompanied us during the inspection.

The factory generally comprises three buildings; a Main Production building, a Warehouse building and a Boiler building. Construction for the Main Production building started in 2013 when Ground and 1st Floors were built, and 2nd to 5th Floors added in 2017-18. The Warehouse and Boiler buildings were also built during this latter period.

Well Lord Knitwears Ltd are part of the Bengal Hurricane Group, and sister companies of the same Group occupy the Ground and 1st Floors ie. the knitting unit of Arabi Fashion Ltd on Ground Floor and the printing unit of Bengal Hurricane Dyeing and Printing (Pvt) Ltd on 1st Floor. Well Lord Knitwears Ltd sewing section occupy 2nd Floor and their cutting/finishing sections the 3rd Floor. The 4th Floor is vacant but starting to be fitted out for a second sewing floor and the 5th Floor is still under construction, intended for a second cutting/finishing floor. Layouts and use for 4th and 5th floor will replicate 2nd and 3rd Floors.

All floors of the building are managed by Well Lord Knitwears Ltd, and maintenance, HR and compliance are also the responsibility of this common management team.

The total workforce in the building is approximately 820 people, of which a maximum of 20 people could be located in the Warehouse and Boiler building at any one time. Different floors of the building have different shift times, with Ground and 1st Floors operating 24-hours a day, the rest of the factory one day shift.

The Main Production building is a 6-storey RC structure, the warehouse a 4-storey RC structure and the Boiler building a single storey RC frame structure with steel roof. There was also a separate single storey building housing the Control Room, Medical Centre and Crèche.

The inspection was carried out principally to identify issues affecting the life safety of occupants in the Production and Warehouse buildings. Other separate ancillary buildings were also inspected with a view to identifying any life safety

impact on the occupants of the Production building for a fire anywhere on the premises.

A summary of Actions with associated priorities and timeframes are given at the end of this report.

A high level and non-exhaustive list of key concerns are:

- Presence of flammable material near electrical panels.
- Earthing connectivity to metal part of all machines.
- Accumulation of dust on electrical items.
- Insufficient internal road lighting.

Please note that these actions should be completed as soon as practically possible and certainly within the timeframe noted.

The purpose of the inspection was to identify significant fire safety issues and to provide actions for remediation based on applicable Accord standards.

Our assumptions and limitations are also noted at the end of this report.

2 General Information

2.1 General Factory Information

Factory Name	Well Lord Knitwears Ltd
Factory Address	Bokran, Monipur, Bhabanipur, Gazipur 1703, Bangladesh
GPS Co-ordinates	+24.126995, 90.393415
Contact Person	Major Mohammed Nazmul Ahasan
Inspection Participants	Nurul Islam - Well Lord Knitwears Ltd
	Meer Abdusalam - Well Lord Knitwears Ltd
	George Faller - Arup (conducting Fire inspection)
Visiting Cards	
Other Tenants	Other Bengal Hurricane Group sister concerns: Knitting unit of Arabi Fashion Ltd on Ground Floor Printing unit of Bengal Hurricane Dyeing and Printing (Pvt) Ltd on 1 st Floor

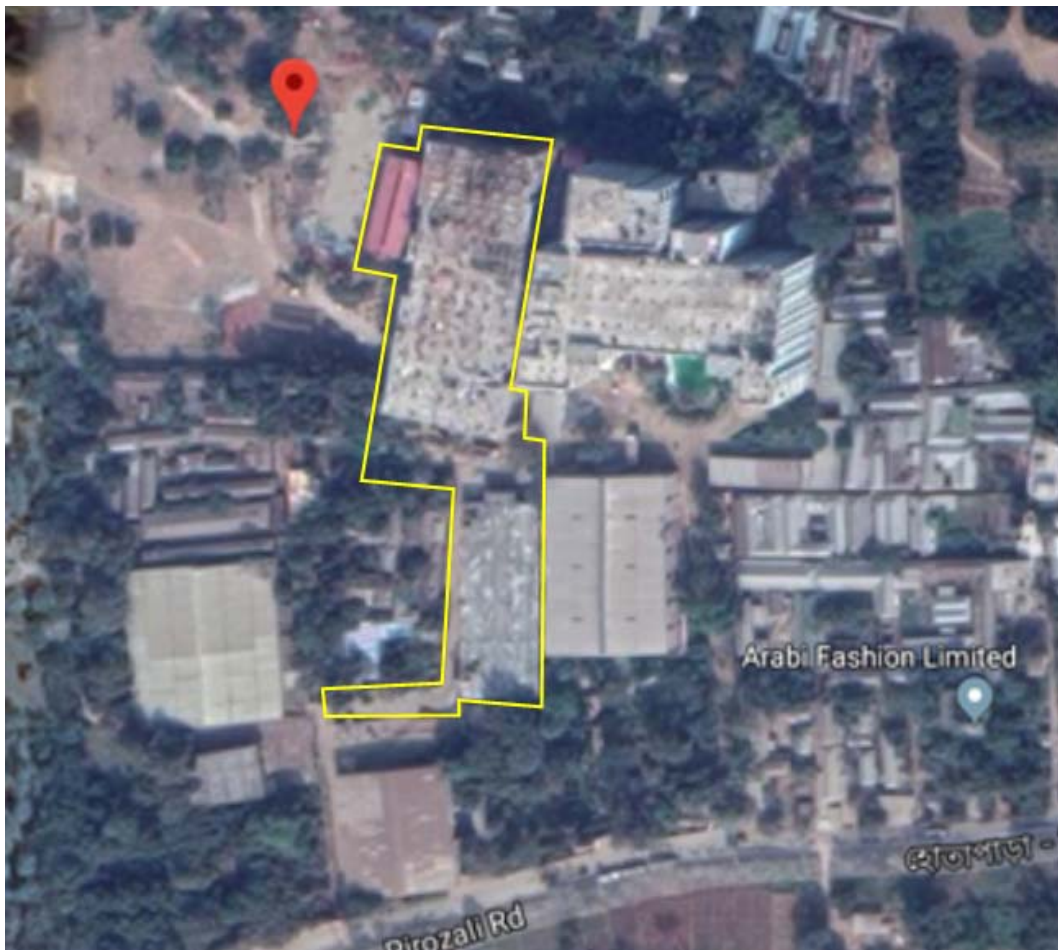


Figure 1 Google Maps Image of Site

2.2 Site Layout

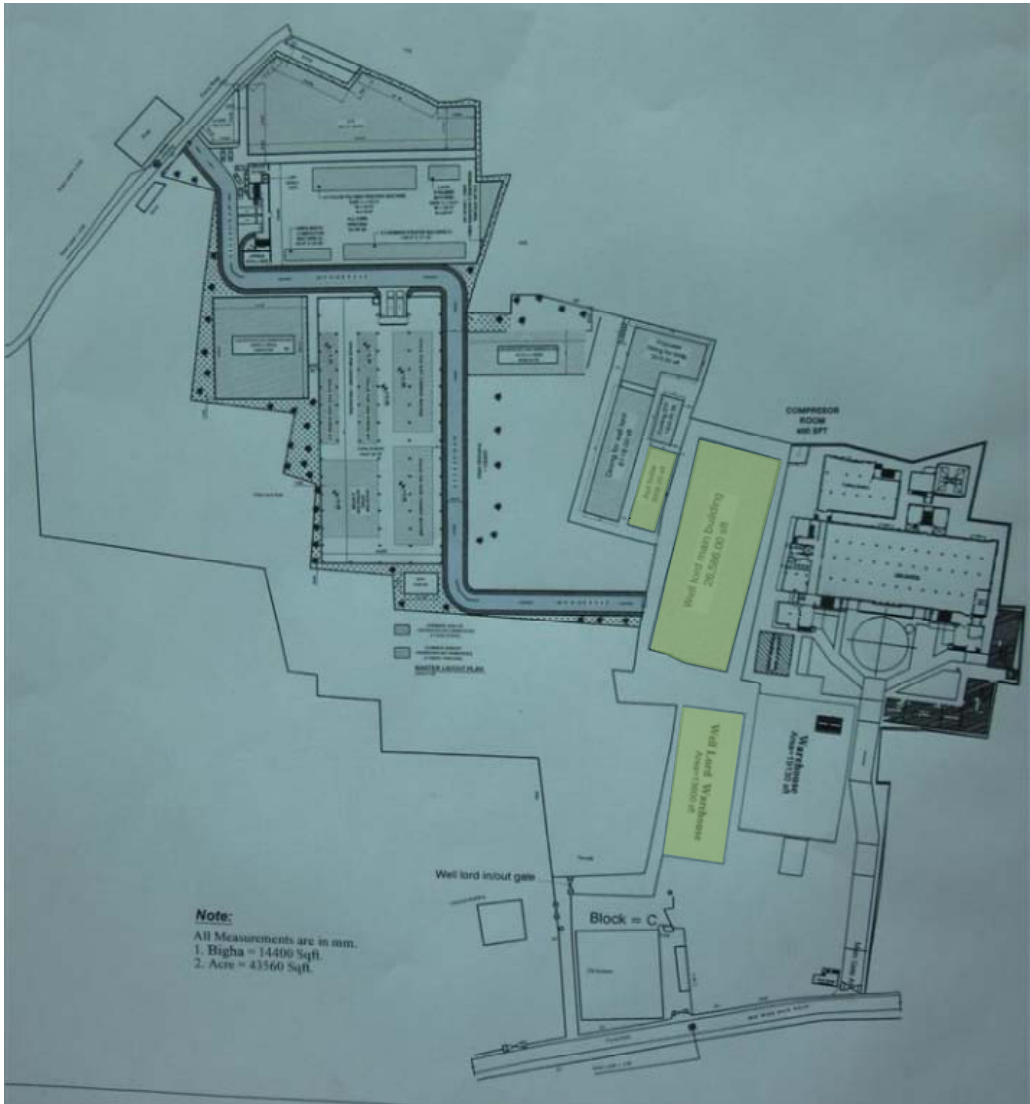


Figure 2 Site plan showing highlighted building of Well Lord Factory.

The following figures shows the three buildings of the Well Lord factory.

Main Production Building	Ware House Building	Boiler Building
		

3 Electrical Systems

3.1 Supplies to Life Safety Systems

Three life safety systems and power supplies to same were observed during the survey as follows;

System	Primary Power	Secondary Power
Emergency Lighting	Utility Power Supply	Multiple UPS units with 90 minutes backup time
Fire Detection and Alarm System	Utility Power Supply	Inbuilt Battery bank with 90 minutes backup time
Factory Fire Pumps	Utility Power Supply	Generator backup

The fire pumps (Diesel, Electric and Jockey) were being installed in the adjacent factory named Arabi Fashion at the time of the inspection and the fire alarm panel of Well Lord is integrated with Arabi Fashion Fire alarm panel. The fire pumps serves Sprinklers, Hose reels and Hoses.

The current installation has just one electric fire water pump. The replacement of this pump is underway with diesel, electric and jockey fire pump with positive suction arrangement.

3.2 Emergency Lighting

Emergency lighting throughout the factory consists of twin spot fittings mounted on exit door and UPS backed light fixtures on production floors. These light fixtures have 90mins backup supply.

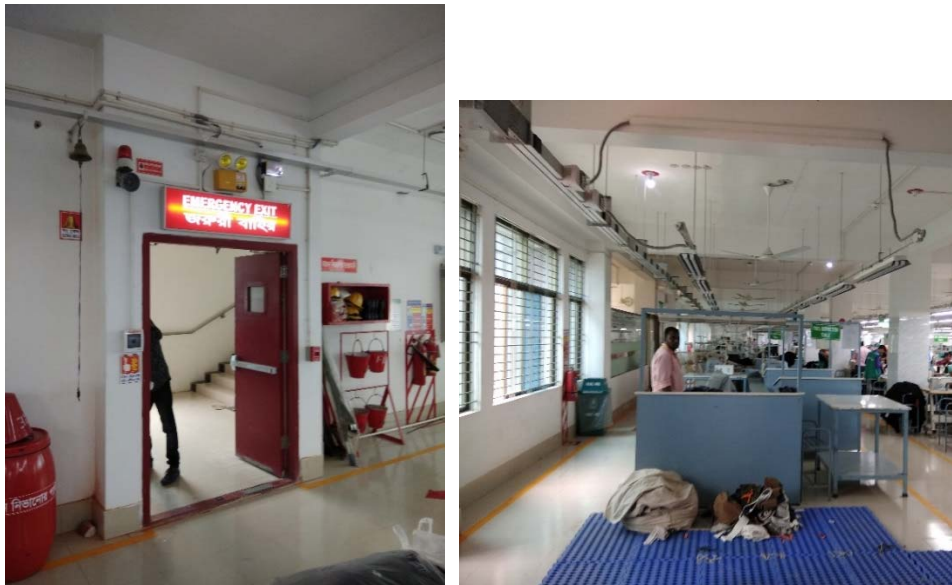


Figure 3 Emergency Lighting

The following table shows the distribution of UPS for emergency lighting.

S. No.	UPS Capacity	Floor / Area Served
1	3 kVA	CCTV
2	2 KVA	Ground floor emergency lighting
3	1.5 kVA	First floor emergency lighting
4	4 kVA	Second and Third floor emergency lighting

All above UPS has battery backup of 90 mins. (As informed by factory representative).

3.3 Fire Detection and Alarm System

Fire Detection	All three buildings of the factory; the main Production building, Warehouse and Boiler building are provided with smoke detectors. Manual activation by Manual Call Points (MCP) at all floor exits
Fire Alarm	Alarm sounders are located over all floors Alarm system is activated automatically by smoke detectors, and activated manually by MCPs at exit doors in all areas. Fire Alarm Panel backed by in built batteries (90 mins. backup time as informed by maintenance staff) is located in fire control room in a separate ground structure in front of main production building. The fire alarm of Well Lord Knitwear is integrated with adjacent factory name Arabi Fashion fire alarm panel. The generators which provides power backup to fire alarm panels had manual starting. In addition to automatic fire alarm notification, a manual metal bell is provided at exit door. The following figure shows the manual bell arrangement.  Figure 4 Manual bell point

Testing /witnessing the operation of the fire alarm panel for Well Lord Knitwears factory was carried out and found to be operational. The integration of fire alarm panels of the two factories could not be checked because the Well Lord Knitwears fire alarm panel has not been commissioned yet.

3.4 Earthing and Bonding

Earthing of metalwork (machines, electrical panels) was clearly evident. The factory premises have three number of earth pits, two pits for main LT panel and one pit near main gate.

3.5 Power

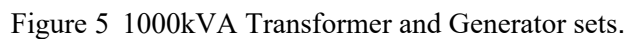
Power enters the Well Lord Knitwears Factory via 415V underground cables from Arabi Fashion Ltd site. The Arabi Fashion Ltd site receives power from REB (Rural Electric Board) at 11kV. This power is stepped down to 415V by 1000kVA oil cooled transformer. The replacement of this 1000kVA transformer with 2000kVA oil cooled transformer is underway, and when commissioned, both factories will draw power from this 2000kVA transformer.

The SLD of factory shows total load of 1313 Kw.

The factory representative informed that the drawdown of power from the adjacent factory is permitted by the Electrical authority.

The Arabi Fashion limited has three 415V gas based generators with sizes 675kV, 500kVA and 638kVA, located on ground floor of the Arabi Fashion Limited building. The 638kVA generator is dedicated to Well Lord Knitwears factory and the fire pumps serving both factories, located in the Arabi Fashion Limited site.

Inspection of the electrical installation setup in Arabi Fashion Ltd did not form part of this inspection.



The main LT panel for Well Lord Knitwears is located on Ground floor and this panel feeds power to panels on all floors. The power supply to this panel is received from Arabi Fashion Ltd site.



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1. We have been informed that as per the local fire authority rules, any electrical items like power sockets, light fixtures are not allowed to be installed inside a warehouse.
2. We have been informed that as per local fire authority rules, the exhaust fan (intended for environmental ventilation) should be switched off by fire alarm panel during fire conditions.

The lightning protection is not yet installed as the building is still under construction. Factory maintenance staff informed that the plan for installation of lightning protection system is in place and will be installed once the top floor is completed.

The drawings for lightning protection were not available for review.

3.7 Maintenance and Records

Factory maintained various maintenance records for electrical system in the form of a register. The maintenance staff records maintenance activity carried out on various equipment in the register.

The some of the maintenance records are IPS (UPS) record, Electrical Panels record, Fire Alarm Panel Record.

During the inspection, it is found that there were 62 faults displayed on main fire panel and the same were not seen on register. It was informed to us that the fire alarm panel is still at commissioning stage, so the faults were not recorded.

4 Observations and Actions

Each recommendation has been categorised using the following logic;

Priority	Logic	Timeline
EP 1	Non-conformances that pose an immediate danger to life or immediate risk of causing a fire. Examples; exposed live conductor(s), insufficient or no protection via circuit breaker.	Immediately
EP 2	Similar to item 1 above, however requires two or more non-conformances / recommendation to contribute to the start of a fire or electrocution. Example; inflammable materials surrounding electrical installation.	1 Month
EP 3	The item(s) pose a lower risk to life and causing a fire.	3 Months
EP 4	The recommendation will help to ensure that equipment remains fit for purpose, and reduces the risk to life safety.	6 Months

Below are some of the major electrical safety issues witnessed during the visual electrical inspection.

Ref No.	Issue Type	Sub-header
E-1	Distribution	Exposed live part
Observation: The transformer live part are exposed, there is no locked fencing around transformer.		
		
Figure 7 Exposed live terminals of transformer.		
Recommended Action		
The live part of the transformer terminal must be enclosed inside an enclosure. The transformer room must have controlled access, so that no authorised person can enter into the transformer area.		

Ref No.	Issue Type	Sub-Header
E-2	Distribution	Flammable material storage
Observations: Exposed main electrical panel, no restricted access. Combustible material Storage near main LT panel.		
		
Figure 8 Exposed main Electrical panels and storage.		
Recommended Action		
The main LT panel shall be provided with dedicated room and shall have controlled access to this room. The storage near main LT panel shall be removed and shall be kept in a dedicated store rooms.		

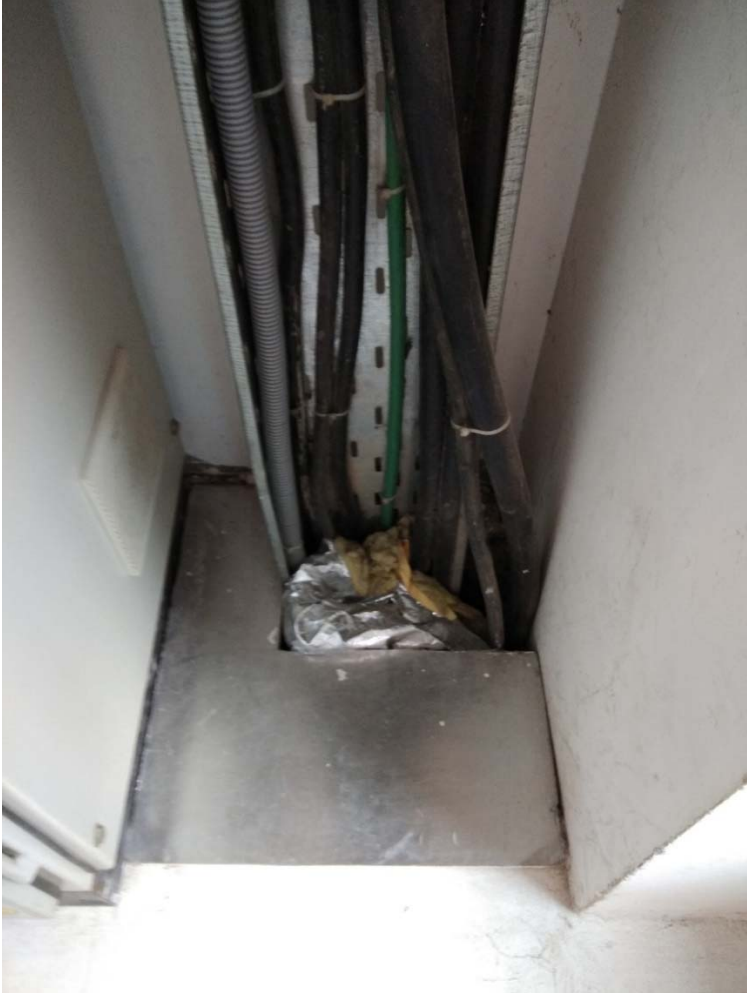
Ref No.	Issue Type	Sub-Header
E-3	Distribution	Electrical panel board
Observation: The presence of all incoming and outgoing switchgear, busbars and cables are in a single compartment which presents a risk to an electrician working on a panel for maintenance.		
		
Figure 9 No compartment for various panel component.		
Recommended Action As per IEC 61439 (International Electrotechnical Commission) the electrical panel board shall have separation. The level of separation is further classified as Form 1, Form 2, Form 3 and Form 4. Forms 2, 3 and 4 are further broken down into Form 2a, 2b, 3a, 3b, 4a and 4b. Apply local code requirement for separation.		

Ref No.	Issue Type	Sub-header
E-4	Distribution	Dust particles
Observation: Presence of dust particles on light fixtures and cable trunking.		
		
Figure 10 Dust accumulation of electrical installations.		
Recommended Action		
The fomration of dust must be removed from all electrical light fixtures, cable tray, trunking and other electrical items.		

Ref No.	Issue Type	Sub-Header
E-5	Distribution	Inadequate support
Observation: The distance between the cable tray supports is very large. At some places, the cable trays are supported at every column and there is no intermediate support.		
		
Figure 11 Improper cable tray support		
Recommended Action		
The main trunking has improper support, the cable trunking support shall be at least between 1 to 1.5 m apart based on loading of the trunking.		

Ref No.	Issue Type	Sub-Header
E-6	Distribution	Insufficient lighting
Observation: There is no general lighting provided in the double height area of boiler room.		
		
Figure 12 No general lighting inside boiler room		
Recommended Action		
The double height boiler room doesn't have any localised lighting. A dedicated lighting with emergency lighting (10 Lux minimum) shall be provided.		

Ref No.	Issue Type	Sub-Header
E-7	Earthing and bonding	Improper earthing
Observation: The metal table of the dryer machine is earthed but the moving platform is not connected to earth. The dryer platform has power box and three phase power supply.		
		
Figure 13 No earthing on dryer platform		
Recommended Action A proper dedicated body earthing to be provided for all metal part of the machine.		

Ref No.	Issue Type	Sub-Header
E-8	Fire	See Fire Safety report
Observation: Penetrations in the floor of the electrical shaft have been partially sealed.		
		
Figure 14 Inter-floor shaft opening		
Recommended Action		
The interfloor opening for all the shaft must be closed properly by using proper sealant.		

Ref No.	Issue Type	Sub-Header
E-9	Distribution	Insufficient lighting
Observation: The internal approach road to main production building and warehouse has insufficient lighting.		
		
Figure 15 Insufficient road lighting		
Recommended Action		
A proper internal road lighting must be designed and installed.		

5 Summary of Priority Actions

Item No	Accord Inspection Observation	Accord Action Plan	Accord Timeline
E-1 Distribution	The transformer live part are exposed, there is no locked fencing around transformer.	The live part of the transformer terminal must be enclosed inside an enclosure. The transformer room must have controlled access, so that no authorized person can enter into the transformer area	Immediate
E-2 Distribution	Exposed main electrical panel, no restricted access. Combustible material Storage near main LT panel	The main LT panel shall be provided with dedicated room and shall have controlled access to this room. The storage near main LT panel shall be removed and shall be kept in a dedicated store rooms.	Within 1 Month
E-3 Distribution	The presence of all incoming and outgoing switchgear, busbars and cables are in a single compartment which presents a risk to an electrician working on a panel for maintenance.	As per IEC 61439 (International Electrotechnical Commission) the electrical panel board shall have separation. The level of separation is further classified as Form 1, Form 2, Form 3 and Form 4. Forms 2, 3 and 4 are further broken down into Form 2a, 2b, 3a, 3b, 4a and 4b. Apply local code requirement for separation.	Within 6 Month
E-4 Distribution	Presence of dust particles on light fixtures and cable trunking.	The formation of dust must be removed from all electrical light fixtures, cable tray, trunking and other electrical items.	Within 1 Month
E-5 Distribution	The distance between the cable try supports is very large. At some places, the cable trays are supported at every column and there is no intermediate support.	The main trunking has improper support, the cable trunking support shall be at least between 1 to 1.5 m apart based on loading of the trunking.	Within 1 Month
E-6 Distribution	There is no general lighting provided in the double height area of boiler room.	The double height boiler room doesn't have any localized lighting. A dedicated lighting with emergency lighting (10 Lux minimum) shall be provided.	Within 1 Month
E-7 Distribution	The metal table of the dryer machine is earthed but the moving platform is not connected to earth. The dryer platform has power box and three phase power supply.	A proper dedicated body earthing to be provided for all metal part of the machine.	Immediate

Item No	Accord Inspection Observation	Accord Action Plan	Accord Timeline
E-8 Fire	Penetrations in the floor of the electrical shaft have been partially sealed.	The interfloor opening for all the shaft must be closed properly by using proper sealant.	Within 3 Month
E-9 Distribution	The internal approach road to main production building and warehouse has insufficient lighting.	A proper internal road lighting must be designed and installed.	Within 6 Month

6 Assumptions and Limitations

This report is for the private and confidential use of Well Lord Factory for whom it was prepared together with their professional advisors as appropriate. It should not be reproduced in whole or in part or relied upon by third parties for any use without the express written permission of Arup.

This report can be used in discussion with the supplier or factory owner as a means to rectify or address any observations made. The report is not comprehensive and is limited to what could be observed during a visual inspection of the building.

This Report is not intended to be treated as a generalised inspection and does not cover the deterioration of electrical safety construction measures or electrical safety systems through lack of maintenance. Other aspects of the building that do not affect the safety of the occupants of the Production buildings have not been assessed in this survey.

Except as otherwise noted, other services were not viewed or tested during our inspection and are therefore similarly excluded from this Report. We have not inspected any parts of the building which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect.

External inspection of the façade walls has generally been carried out from ground level only by visual sighting. No opening up works were carried out (except as noted (and we rely on the Architects and Engineers drawings provided to us for our views on concealed parts of the building. Performance testing of electrical safety systems do not form part of these inspections and we recommend that the factory owners' Building Engineer carries out standard testing and maintenance of these systems to satisfy themselves of their proper functioning.

Recommendations, where given, are for the purpose of providing indicative advice only, are not exhaustive, relate solely to identifying key and obvious electrical defects as identified in this Report, and do not take the form of or constitute a specification for works. We take no responsibility for the works as constructed.

This report does not interfere with the factory owners' Building Engineers responsibility for the electrical safety performance of this building, The Building Engineer remains fully responsible for the electrical safety of the building.

The information in this Electrical Safety Inspection Report was obtained during a one-day site visit to the factory, where we carried out interviews with local factory management and reviewed design and permit documentation presented at that meeting. It has not been possible to provide independent verification for all the information and data collected, and, therefore Arup cannot accept general

responsibility for omissions or errors arising from inaccuracies in this report from the information obtained.

The observations and recommendations in this report are not intended to imply, guarantee, ensure or warrant compliance with any National Codes or Government Regulations. The site inspection and this Report are carried out as a parallel exercise to design approval and inspections carried out by the Authorities as part of the established state enforcement process.

Additionally, the results do not imply in any way that compliance with the observations or recommendations as stated in this report will eliminate all hazards, risks or exposures or that hazards, risks or exposures not referred to in this report do not exist.

Implementation of the recommendations stated in this report does not relieve the factory owner from any obligation to comply with specific project requirements, industry standards, or the provisions of any local government regulations.