

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: ARENA COMPOSITE & SPINNING INDUSTRIES LTD. (Building-1)
Address of the Factory	: West Gomdandi, Boalkhali, Chittagong.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 27 th August, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 27 th August, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 27 th August, 2015
BKMEA Membership No.	: 1525

BASIC INFORMATION:

There are four buildings in the factory premises of ARENA COMPOSITE & SPINNING INDUSTRIES LTD. Among these 2 buildings are RCC buildings which are used for ware house and proposed process. Other 2 buildings are pre-engineered sheds comprising of steel columns. This report represents the initial assessment report of the three storied RCC Building (Building 01). The following general information were noted:

i. Building Usage Type	: Garment Factory.
ii. Structural System	: RCC beam column frame system.
iii. Floor System	: RCC beam-slab floor system.
iv. Floor Area	: Total floor area of the shed is 11850 sft.
v. No. of Stories	: 3 storied.
vi. Construction Year	: 2008-2009
vii. Foundation Type	: Isolated footing foundation.
viii. Design Drawings	: Available: Structural drawing. Not Available: Approval plan, Machine layout plan, soil test report, floor load plan and architectural design drawing were not available.
ix. Soil Investigation Report	: Unavailable.
x. Construction Materials	: Brick aggregate. (Column and Slab)
xi. Generator	: Separate structure.

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for both Structural and Fire & Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for **Structural Safety** corrective action are:

Short Term (Immediate)	: None.
Mid Term (6-weeks)	: None.
Long Term (6-months)	: <ul style="list-style-type: none">• Building engineer to check, collect information of horizontal extension and produce accurate and complete as-built documentation.• Structural engineer to prepare soil test report, floor load plan, and prepare/update calculations showing the structural adequacy of the floor system taking into account the factory design imposed loading and the as built structure.

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The recommendations for **Fire & Electrical Safety** corrective action are:

(A): Recommendations for Fire Safety corrective actions:

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • None.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for. • Factory need to have proper testing plan & record of fire safety equipment. • Lights in storage area needed to be installed with protective covers and conduits. • Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9 m and when used as a storage facility there shall be a minimum clearance of one third the floor height from the ceiling to the top of the storage stack. • All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs.
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension. • Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire extinguisher. • All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key. • Factory needs to provide handrail on both sides of all the stairways. • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs. (Escape route). • Factory needs to have emergency backup power for critical fire safety system with sufficient capacity &

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	arrangement according to NTPA Guideline.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Fire department pre-plan needs to be developed. • Boiler room and chemical store need to be separated with dyeing section by 4 hr fire rated construction and 2 hrs rated doors/opening till to reach safe refuse area. • All the exits connecting to the staircase-1, 2 need to be protected with fire and smoke resistant enclosures with 1 hours rated enclosure and 0.75 hour rated door and provide a protected route from all though the stairway to the final exits. • Factory needs to install centralized and automatic fire detection & alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline. • The factory need to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple call boxes on all occupied floors, including other tenanted floors of the building. • Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline. • Factory needs to install proper standpipe system with having at least 75 mm dia of riser. • Install 1 riser per 1000 m² of floor area & Install adequate number of hose in floor area and the minimum hose diameter is 38 mm, or 1.5" preferably fabric hose with variable nozzle to be used in both of the stairways covering the floor area. • Factory need to ensure the minimum pressure for standpipes supplying a 50mm or larger hose shall be at least 300 Kpa. For standpipe supplying first aid hose (38mm nominal) may have a minimum pressure of 200 Kpa. • Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection. • Factory needs to have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory. • Factory needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900 ltr/min × 75 min = 142500 liters water storage tank.

(B): Recommendations for Electrical Safety corrective actions:

Immediate	<ul style="list-style-type: none"> • Find out the cause (improper cable/over current
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<p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<p>selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating (> ambient+ 40°C) and take proper action.</p>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Ensure all panel boards (including panel door) are earthed properly. • Ensure all electrical cable properly terminated at its point of termination. • Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit. • Ensure proper earthing connections at all electrical equipment • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering. • Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Post safety signage in the substation room and ensure graded rubber mats are provided in front of all panel boards. • Provide Instruction boards for first aid and artificial respiration in the substation room. • Ensure that wet type transformer is not leaking and have appropriate oil level. • Provide two separate and distinct connections of earthing for each generator. • Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth busbar of distribution boards and ensure continuous earth path is back to main building intake. • Rewire to ensure each incoming supply to an MCB/MCCB has a dedicated supply from bus-bar. Avoid the use of multiple cables on outgoing side of MC Ensure all electrical cables are sized according to capacity of circuit breakers. • Provide adequate support or mechanical guards for electrical equipment and wiring where necessary. • Ensure cable joints are made in respect of conductivity,

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	<p>insulation and mechanical strength.</p> <ul style="list-style-type: none"> • Connect all metal in the building to the building earthing system. • Ensure Lighting fixtures are supported from the structure properly. • Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating { ambient+(20⁰C-40⁰C)} and take proper action. B's/ MCCB's.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system. • Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data. • Inspect electrical panel boards on an annual basis. • Ensure the substation room has adequate fire separation from the production area. • Install security measures to ensure access to the substation is restricted. • Ensure all panel boards have no opening and all live internal components are concealed properly. • Provide dedicated & adequate size of neutral with proper identification for each circuit. • Ensure each distribution board is provided with a circuit list and means of identification is provided as per list. • Provide proper cable terminator/connector for stranded conductors at its point of termination. • Install separate distribution boards for lighting and power circuits. • Install lightning protection system on the building.