



REPORT OF PILOT FACTORY SAFETY ASSESSMENTS IN PAKISTAN

Conducted as part of International Accord feasibility studies for expansion



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ACKNOWLEDGMENTS

The Accord team would like to acknowledge the support of signatory company representatives and their suppliers who volunteered to participate in this pilot. From the planning stage through to engaging and supporting suppliers during the pilot, these companies have made a significant contribution to the smooth running and learning that has been generated. For all suppliers who participated in this pilot, we appreciate their enthusiasm to work with the Accord, openness to rigorous safety assessments throughout their facilities, and for providing detailed feedback on remediation progress and challenges, as well as other valuable insights for the future programs.

The International Accord pilot was initiated in September 2022 with the goal of understanding the key considerations for establishing an effective safety inspection and remediation program with garment and textile suppliers in Pakistan. The main objectives of the pilot were:

- To gain first-hand information on safety conditions in different types of factories.
- To identify the common remediation challenges where support (technical, financial) may be needed.
- To do preliminary assessment of engineering capacity to conduct safety inspections and support safety remediation in the industry.

The pilot activities included 1-day safety assessments at 7 garment and textile factories in Karachi and Lahore, meetings with a range of engineering and fire safety experts in Pakistan, and follow-up discussions on remediation feasibility with participating factories.

The factory safety assessments were conducted by structural, fire, electrical and boiler safety engineers from international engineering firm Ove Arup in November and December 2022 and reports were shared with each factory in February 2023. In the following months, participating factories updated the Accord on remediation progress and advised where further guidance or support would be needed to remediate fully. The findings are non-exhaustive given the limitation of 1-day inspections at large factories. Furthermore, as only 7 factories were assessed, the findings cannot be considered representative of overall safety conditions in the garment and textile industry.

The safety assessments identified two factories with critical safety concerns in parts of the facility, meaning a severe risk to life safety which must be addressed before using that part of the facility. In all other cases, the remediation actions were ordered in priority of action i.e. immediate, within 6-weeks, or within 6-months, based on the feasibility of actions to reduce safety risks and achieve compliance within realistic timeframes. On structural safety, there were no critical concerns identified but further design checks and potential remediation were necessary in some parts of the buildings. Most factories had some safety hazards to address, such as unprotected edges and openings, but these were reported as all remediated soon after receiving the reports. Most factories reported that all structural remediation would be feasible, although one factory identified a potential challenge with financing structural remediation in a rented building.

On fire safety, there was critical concern in one factory due to a combination of factors which undermine fire alarm and fire prevention. There were significant

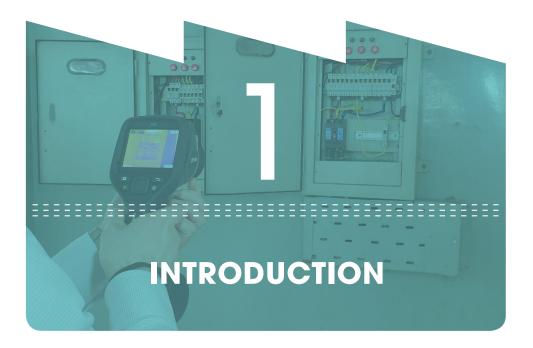
shortcomings in all other factories regarding fire separation, detection and alarm systems, and fire suppression. Several factories advised that they would need technical guidance on designing fire safety solutions and financial support to install fire protection measures.

On electrical safety, some factories had systemic issues with lack of electrical system design and poor installation, whereas other factories had generally adequate design and installation but some overlooked hazards. Many electrical issues were remediated soon after receiving the reports and factories reported no challenges with implementing the remaining electrical remediation.

On boiler safety, a critical concern was identified in one factory and significant shortcomings in the condition and operation of boilers in other factories. Nevertheless, factories reported no anticipated challenges with implementing the boiler remediation.

A consultation with engineering experts in Pakistan found that there is sufficient code knowledge in the engineering community in Pakistan to begin working with factories to remediate safety issues. Nevertheless, clear guidance will be needed on how to remediate existing buildings. With regards to building a team of engineers to inspect and monitor remediation, this report contains recommendations from the Accord's Technical Advisor for hiring and training engineers on the Accord standards and how to inspect them in the context of existing buildings.

The pilot has given some insight to safety conditions in the garment and textile industry in Pakistan and where suppliers may need most support to meet and maintain safety standards. In addition, it has given the Accord more indication of how to work with various stakeholders to develop an effective safety inspection and remediation program for all factories supplying to Accord signatory companies.



1.1 PURPOSE & OBJECTIVES OF PILOT

The International Accord Steering Committee decided in May 2022 to conduct pilot safety assessments at a small number of signatories' suppliers in Pakistan. The purpose of the pilot was to understand the key considerations for establishing effective safety programs for signatories sourcing in Pakistan. Key objectives of the pilot were to gain specific first-hand information about safety conditions at different types of manufacturers, identify the common remediation challenges where support (technical, financial) may be needed, and do a preliminary assessment of engineering capacity to inspect factories and support remediation.

1.2 PARTICIPANTS

In September 2022, the Accord Secretariat invited brands which had been most involved in the feasibility studies in 2021-22 to participate in the pilot. Seven brands agreed to participate in the pilot and worked with the Accord team to select suppliers covering a range of product types and size of facilities with half located in Punjab province and half in Sindh province. Initially, 10 suppliers were identified and agreed to participate. However, due to illness and other unforeseen circumstances, we were only able to conduct the safety assessments at 7 factories.

The pilot factories have the following profile:

- 3 garment Cut Make Trim (CMT) factories
- 2 integrated home textile CMT and fabric production facilities
- 2 fabric mills (no CMT)

The factories ranged in size from 180 to 3,500 workers and 1 single building to up to 9 buildings.

1.3 ACTIVITIES

The pilot consisted of the following activities:

- 1. Factory safety assessments (November-December 2022): A team of engineers from engineering firm Ove Arup conducted 1-day assessments at each participating factory from 28 November to 9 December 2022. The Arup team comprised two civil engineers, 2 fire safety engineers, 1 electrical engineer, and (for 3 factories only) 1 boiler safety engineer. At some factories, Accord signatory representatives observed the assessment.
- 2. Safety Assessment Reports issued to each factory (February 2023): Arup produced detailed reports for each factory outlining all observations from the safety assessment in their factory buildings. A set of immediate to longer term actions were proposed for each observation.
- 3. Meetings with each factory to review the Safety Assessment Reports (March 2023): Each factory management team had the opportunity to meet with the Arup engineers and Accord team to review the reports, clarify observations, and discuss remediation solutions.
- 4. Factories prepared Corrective Action Plans and gave feedback via pilot questionnaire (April 2023): Each factory was asked to complete a detailed corrective action plan and update the Accord on remediation progress. In addition, four factories gave feedback on remediation feasibility and key considerations for future Accord programs via a questionnaire.

1.4 SCOPE OF SAFETY ASSESSMENTS

The assessments were 1-day, non-intrusive surveys of the factory buildings and were carried out in accordance with the relevant Pakistan Building Codes¹ and international standards. All factories had fire, electrical and structural safety assessments, and three factories had an additional boiler safety assessment. The assessments were in some cases non-exhaustive because it was not possible to assess all buildings comprehensively during a 1-day visit. Furthermore, the assessments focused on identifying safety deviations from code requirements. It was not within scope to document the ways in which each factory achieved code compliance, as this would warrant significantly more time. The Accord team will examine how this can be taken into consideration in future inspection reports.

Once the Accord inspection and remediation program is established in Pakistan, full initial inspections in accordance with the finalised Pakistan Accord standard will be arranged at the pilot factories to ensure all buildings have been fully assessed and to verify remediation undertaken.

1. Pakistan Building Code (Fire Provisions) 2016 and Pakistan Building Code (Seismic Provisions) 2016.



The findings outlined below indicate the most significant areas of safety concern which warrant attention and therefore served as a useful basis to explore remediation feasibility with the participating factories. In two cases, critical safety concerns are mentioned in parts of a facility, meaning a severe risk to life safety which must be addressed before using that part of the facility.



STRUCTURAL SAFETY FINDINGS

In general, the structural engineers found the factories' building condition to be reasonable, with good concrete quality and strength, and most facilities were relatively new, purpose built, and as per the design drawings.

2.1.1 No critical structural safety concerns

In all 7 factories visited, the assessment found no structural safety concerns that were critical enough to warrant evacuation.

2.1.2 Hazards warranting immediate attention

In some factories, one or two hazards were identified which warranted immediate attention. For example, fall hazards arising from uncovered holes in external pathways or unprotected roof edges.

2.1.3 Potentially overstressed columns

In some factories, the size of columns and extent of loading gave rise to concerns of potentially overstressed columns. In these cases, remediation involves a building structural engineer reviewing the design, loads, and verifying concrete strengths to establish the safe load limits. In some cases, factories were advised to reduce existing loads until the design check has been completed and a safe loading plan agreed.

2.1.4 Column or beam cracking needing further investigation

The assessments identified specific locations where cracks in walls, beams or columns should be monitored and further investigated to check if the cracks penetrate the structure and to identify the cause of cracking.

2.1.5 Inadequate lateral stability system

In one steel framed factory building, there was no apparent lateral stability system and the factory was advised to install an appropriate lateral stability system in this building.

2.1.6 Incomplete as-built drawings

In some factories, the design drawings did not match the as-built structure. These factories were advised to have a structural engineer produce accurate and complete as-built drawings and documentation.



2 FIRE SAFETY FINDINGS

In general, there were multiple concerns with fire safety in all factories and the main issues are outlined here.

2.2.1 One factory with critical fire safety concern

One of the factories assessed presented critical fire safety concern for part of the building due to a combination of factors, namely an inoperable fire alarm and detection system coupled with lack of fire separation, unprotected exit stairs, and stairs exiting internally. The factory was advised to vacate that part of the building until adequate fire detection, alarm and fire separation is in place.

2.2.2 Multiple issues affecting automated fire alarm and detection systems

All factories had automated alarm and detection systems installed but their effectiveness was undermined by a range of issues in each factory e.g., missing detectors, alarms being barely audible in some areas, non-fire-rated cables, and in one case, no fire alarm panel (making the system entirely inoperable). Each factory was advised of the examples of deficiencies in the system which need resolving to ensure the alarm and detection system will operate in case of fire. Factories were advised to ensure compliance with the NFPA 72 standard, as per BCP Clause 9.7.1.1.

2.2.3 Multiple issues affecting reliability of water supply from fire pumps

The reliability of fire pumps was compromised in most factories due to a range of issues including:

- The fire pump room not being protected from weather and therefore at risk of damage.
- Lack of pressure relief valve which can lead to overpressure.
- The automated start-up of the pump was disabled, making the system reliant on manual activation.
- Indication of leaks in the system.
- Fire hydrants being kept locked and not maintained.

2.2.4 Multiple issues affecting safe egress

Safe egress in case of fire was compromised in all factories due to a range of issues including:

- Gaps in fire separation of egress routes and unprotected exit stairs.
- Missing or inadequate signage to indicate the safe exit routes.
- Insufficient emergency lighting to ensure exit routes can be seen.
- Storage blocking exit routes (in a few cases only).

In all factories, achieving adequate fire separation will require installation of 90-minute fire doors with self-closers, certified to an internationally recognized standard (UL listed).

In one case, exit doors were kept locked and were not available for escape until security staff were requested to unlock them. This factory was advised to remove all locks on escape doors immediately.

2.2.5 Lack of fire separation for hazardous areas

In each factory there were some higher hazard areas which pose greater risk in case of fire and should be fire separated from other parts of the factory including:

- Electrical rooms.
- Storage areas.
- Generator and fuel storage areas.
- Chemical storage areas.

In one case, excessive diesel fuel storage was observed and the factory has since reported to have reduced the volume to within the legal limit.

2.2.6 Code requirement for sprinkler systems is not met

Based on the Building Code of Pakistan (Fire Provisions) 2016, all 7 factories in the pilot require sprinkler protection on the basis that they are 3 or more stories high, or the fire area exceeds 1,115 sq.m. However, these factories have not yet installed sprinkler systems and so the requirement of BCP Clause 9.3.2.27 was noted in the reports.

2.

ELECTRICAL SAFETY FINDINGS

The quality of electrical design and maintenance varied quite significantly across factories, from good electrical design, well organised electrical control panels and only a few electrical safety issues in some factories to no electrical layout plan, unplanned changes, no earthing, and hotspots in other factories. The range of electrical safety concerns identified are outlined below.

2.3.1 No critical electrical safety concerns

In all 7 factories visited, the assessment found no electrical safety concerns that were critical enough to warrant discontinuation of production.

2.3.2 Multiple issues concerning cross-circuiting

At all factories visited, the assessment found instances of cross-circuiting in the circuit boards. The factories were all advised to modify the installations to ensure circuits do not share breakers in all distribution boards.

2.3.3 Combustible materials found around electrical panels, cabling, and in electrical rooms

At all factories visited, the assessment found dust & fluff in the majority of electrical panels and within cable trays around the factory. All factories were advised to establish a more regular or rigorous cleaning schedule. In some factories, combustible materials like wood were stored on electrical panels or in the transformer room.

2.3.4 Various issues concerning proper installation of electrical cables

At some factories, the assessment found instances of external electrical connections without protection from water ingress. At some factories, cables were not properly installed with glands and secured to protect the cables, or were maintained with tape and needing replacement with new cables.

2.3.5 Missing earth connections

At all factories there were some instances of unearthed electrical equipment. Factories were advised to provide separate earthing connections for all electrical equipment.

2.3.6 Signs of overloading and abnormal temperatures

At some factories, thermographic scanning indicated areas of abnormal temperatures and factories were advised to disconnect those loads and make necessary repairs to avoid overheating.

2.3.7 Not all necessary drawings & diagrams were in place or updated

In some factories, the wiring diagrams with proper current ratings needed to be updated and made available at every distribution board.

In all factories, the Single Line Diagram needed updating to include all sub-panels, protective devices, and cabling, and then approved by the engineer-in-charge.

In some factories, the as-built Electrical Layout Drawings needed updating to indicate actual location of all outlets.

In some factories, there was no power balance schedule, and these factories were advised to produce the power balance schedule based on current loads in the building.

2.3.8 Lightening Protection System needed in line with code requirements

One factory had no Lightening Protection System where required. In another factory, it was unclear whether the Lightening Protection System was code compliant, and so this needed checking against the latest code requirements.



BOILER SAFETY FINDINGS

Boiler safety was assessed in three of the pilot factories and gave a general impression that boiler safety was not given sufficient attention and several concerns were identified with either boiler maintenance or the surrounding system of fuel supply and steam distribution. Specific issues are outlined below.

2.4.1 One point of critical boiler safety concern

One of the factories assessed presented critical boiler safety concerns for one of the boiler systems due to a combination of factors, including an inoperable control system, exposed and faulty wiring, and missing parts from steam and gas pipes. The factory was advised not to operate that boiler until remediation had taken place.

2.4.2 Safety issues with pipework and valves

In all three factories, there were concerns with the gas and steam pipework including missing valves and bolts, open ended pipework, and in one case, poor condition of the pipework welding. All factories were advised to replace missing valves and bolts, repair pipework and leaks, and seal open ends.

2.4.3 Incorrect installation of wiring to controls and power

In some factories, the wiring to the controls and power was not properly installed and this needed repair in accordance with code requirements.

2.4.4 Unsafe access to boilers

In some factories, lack of handrails on stairs and holes in walkways to access boilers posed a fall hazard.

2.4.5 Fuel spills and leaks

Factories were advised to provide drains to capture fuel spills and to repair leaks.

2.4.6 Provide adequate supports for pipework and chimneys

In some factories, there was unsupported pipework and chimneys, and they were advised to install adequate supports where needed.

2.4.7 Old boiler with no record of internal inspection

In one factory, a boiler over 40 years old was in use and had no record of internal inspection. This factory was advised to arrange a full internal inspection of the boiler.

2.4.8 Unsafe fuel storage posing environmental and fire risk

In some factories, fuel oil tanks had no bunding (a constructed retaining wall around the tank) and were located in the boiler room without fire separation. In one factory, liquefied petroleum gas bottles were stored in working areas and connected using flexible hose. Factories were advised to install bunding as per regulations and store fuel in a fire separated location as per fire regulations.

2.4.9 Lack of operating and maintenance information for boiler and steam systems

All factories were advised to provide operating manuals for the control systems for boilers and steam systems, including plant operating information and drawings showing distribution and valve locations.

2.4.10 Actions recommended on inspection certificate not implemented

Each factory had a boiler inspection certificate which included recommendations, but they had not been implemented. Each factory was advised to implement those recommendations, which included submitting hydraulic test reports, calibrating all instrumentation and safety controls, and maintaining feed water quality and chemical dosing.

2.5 SAFETY MANAGEMENT OBSERVATIONS

The engineers conducting the safety assessments made some general observations concerning the management of safety in the factories. Firstly, most buildings were owner-occupied which makes safety upgrades less complicated than in rented buildings. Secondly, whilst most factories had their own qualified engineers or technicians (electrical, structural, boiler), in some cases specialist training was needed for some systems and additional staff was likely needed for maintaining the scale of systems. Thirdly, the factory teams involved were keen to have the Accord pilot assessment to learn more how they can improve their safety management, which indicates strong motivation and willingness of staff to improve the culture of safety in their workplace.



This section gives a summary of remediation status as reported by four of the factories which had provided detailed updates by the end of April 2023. It must be noted that the reported remediation was not verified by the Accord. Once the Accord inspection and remediation program is established in Pakistan, full initial inspections in accordance with the finalised Pakistan Accord standard will be arranged at the pilot factories to ensure all buildings have been fully assessed and to verify remediation undertaken.

STRUCTURAL REMEDIATION

3.1.1 Remediation reported as completed

Factories reported that all immediate and short-term (6 weeks) structural remediation had been completed: e.g., addressing fall hazards; removing plaster to check extent of cracks and repairing surface level cracks. Some factories also reported completing design reviews to check column strength and producing load plans.

3.1.2 Remediation underway

For medium term remediation (6 months), action plans were provided with completion dates of May to October 2023 e.g., contracting a building engineer to conduct design checks and propose remedial works, preparing load plans, repairing steelwork.

3.1.3 Potential remediation challenges

One factory building was rented by the supplier and structural design checks could only be done subject to availability of funds and agreement of the building owner. No other challenges were raised regarding structural remediation specifically.



FIRE SAFETY REMEDIATION

.2.1 Remediation reported as completed

Where fire wardens were advised as an immediate interim safety measure, factories reported (with pictorial evidence) appointing and training fire wardens and monitoring non-separated storage areas for fire risk. Other immediate and short term (4 - 6 weeks) actions reportedly completed include removing locking features, installing repaired fire alarm panel, repairing a fire pump, relocating excessive fuel storage, unlocking fire hydrant cabinets, providing adequate emergency lighting and exit signage, installing fire resistant cables.

3.2.2 Remediation underway

For medium term remediation (6 months), action plans were provided and completion dates of March to December 2023 e.g., designing an NFPA-24 compliant fire hydrant system, installation of NFPA-20 compliant water pump, fire compartmentation including fire door installation.

3.2.3 Potential remediation challenges

All factories commented that they will await finalisation of the Pakistan Accord Building Standard before completing the design of fire alarm and detection and sprinkler systems.

One factory advised that the required fire separation would adversely affect natural lighting and ventilation which is important for LEED platinum certification and therefore needs further discussion with the Accord.

One factory noted needing expert guidance on the specification and drawings for fire doors, fire alarm and detection system, and fire suppression system.

One factory noted needing capacity building support for workers to act as fire wardens and use radios to communicate (interim measure prior to installing automated fire alarm & detection system).

Three factories advised that they would need financial support to purchase fire alarm and suppression systems.



ELECTRICAL SAFETY REMEDIATION

3.3.1 Remediation reported as completed

Most immediate and short-term (3-6 weeks) issues were reported to be remediated e.g., replacing breakers, fixing cabling issues, and making repairs to resolve overheating issues. Some longer term (6 month) issues had also been remediated e.g., making earth connections.

3.3.2 Remediation underway

Other electrical remediation was reported to be underway with completion dates between May and October 2023, e.g., resolving cross-circuiting issues, producing a power balance schedule based on current loads, updating the electrical Single Line Diagram, and preparing as built electrical layout drawings.

3.3.3 Potential remediation challenges

In one factory which is in a rented building, providing a separate room for the generator can only be done in consultation with the building owner which could pose a challenge.

Another factory advised that they would want expert guidance to review their SLD and electrical layout diagrams.



4 **BOILER SAFETY REMEDIATION**

.4.1 Remediation reported as completed

The critical boiler safety concerns identified in one factory were immediately addressed by decommissioning the boiler of concern until repairs were made.

Some immediate issues were reported to be remediated, e.g., replacing valve heads, plugging open ended pipework, installing supports for pipework, and replacing corroded pipework.

One factory reported it had completed all issues in the boiler CAP.

3.4.2 Remediation underway

At another factory, all other issues were reported underway with timelines between May and September 2023.

3.4.3 Potential remediation challenges

No specific boiler safety remediation challenges were noted by the factories.

3.5 GENERAL FEEDBACK FROM FACTORIES

All pilot factories were invited to provide feedback about remediation feasibility, benefits and concerns from participating in the pilot, and points for the Accord to consider in rolling out inspections and remediation. Four factories completed the questionnaire, providing detailed feedback which is summarised below.

3.5.1 Benefits from participating in the safety assessment

Factories reported finding the safety assessment valuable for enhancing their team's expertise regarding the Accord program and raising awareness of means of improving workplace safety.

The engineering experts were thorough and professional, and the report comments and observations served as a good guideline for the remediation.

3.5.2 Concerns from participating in the safety assessment

Two factories raised the concern that the investment required to remediate may be high relative to the business opportunity. One factory was concerned that the assessment was broader than expected, covering the whole premises, not only one building.

3.5.3 Suggestions for running effective inspections & remediation programs

Factories made several suggestions to ensure Accord programs are effective, including:

- Share the Accord standard and inspection checklist prior to conducting inspections.
- Hold meetings with the factory team, customer representative and Accord expert before inspection.
- Monthly meetings on CAP remediation.
- Conduct training for factory teams.
- Conduct safety education sessions at all levels in the factory.
- Ensure financial support for factories where needed, especially in case of low business levels.
- Maintain transparency and good communication throughout the process.
- Set remediation timelines taking account of resources, weather, governmental issues etc.
- Provide incentives for timely and good actions.
- Award recognition to factories and teams for achieving and maintaining safety standards.
- Respect the local values, ethics, customs, and traditions.



One objective of this pilot was to undertake a preliminary assessment of the engineering capacity in Pakistan as it relates to the Accord's work. The two aspects of engineering capacity of importance for Accord programs are:

- i. Industry knowledge to effectively remediate factories (design, equipment procurement, installation, construction monitoring, testing, and commissioning, maintenance).
- **ii.** Training and experience of engineering community to conduct inspections and monitor remediation.

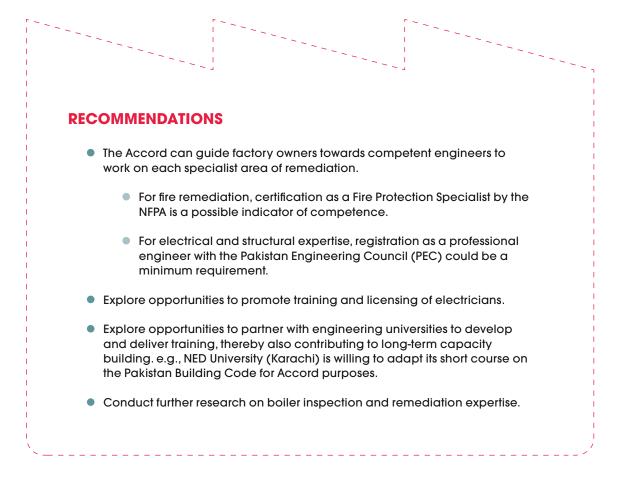
4.1 FINDINGS

The Accord's Technical Advisor and Pakistan Consultant met with several engineering industry representatives and academic experts in Karachi and Lahore during December 2022. They found that there is largely sufficient knowledge within the engineering design and construction management community to begin implementing the anticipated fire and structural remediation work in factories.

On fire safety, members of the Fire Protection Association of Pakistan (FPAP) who participated in the consultation had in-depth knowledge of National Fire Protection Association (NFPA) standards and fire protection service providers were very familiar with requirements such as listing and labelling of fire equipment.

On structural and electrical safety, firms who participated in the consultation had good design engineering and code knowledge. On electrical, there seems to be weaker capacity in electrical code knowledge at the installation level. Certification and licensing of electricians is not common and could be an area to work with relevant authorities to promote this capacity in the industry.

From all meetings, there were no boiler safety experts and so this is an area for further research.





The pilot safety assessments have given insight to the fire and building safety issues which may be found at factories supplying Accord company signatories. Although the small sample size means the findings cannot be considered representative of safety conditions in the industry, it is noteworthy that some safety concerns were found at all factories, such as deficiencies in the fire alarm and detection systems, gaps in fire separation, obstructions to safe egress in case of fire, and non-compliant electrical installation and maintenance. On the one hand, factories gave feedback that they expect to remediate many safety issues without any challenges. On the other hand, most factories anticipate needing some technical or financial support in a few areas, particularly fire safety systems.

The preliminary assessment of engineering capacity found that there is sufficient code knowledge related to the Accord standards to build a team for inspections and support factories to remediate. The engagement with engineering experts in Pakistan also generated ideas for potential collaboration to further develop capacity in the industry to meet and maintain safety standards.

Following this pilot, the Accord intends to finalise the Pakistan Accord Building Standard through consultation with engineering experts in Pakistan and thereafter conduct full initial inspections at the pilot factories with reference to the finalised standard. Thereafter, the Accord will prepare to establish an inspection and remediation program to cover all factories supplying to Accord company signatories.



for Health and Safety in the Textile and Garment Industry