Trade Facilitation and Customs Support Programme (Tasdeer)

PSI High Priority Testing Labs Assessment

To Support in Assessing PSI-Operated Testing Labs

Second draft report

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Content

ABBREVIATIONS *3*

Executive Summary *4*

1.Background and Context *6*

2.0 Methodology *7*

3.0 Gap analysis *9*

3.1 Gap analysis for the existing labs under PSI **9**

3.1.1 Electrical HouseHold Appliance Laboratory : 9

3.1.2 Cement testing lab 11

3.1.2 Leather and footwear Products développement center LFPDC 12

3.2 Methodology for identifying new labs **13**

3.2.1 Avalable testing services -Accredited labs. 14

3.2.2 Identification of priority sectors 14

3.3 Gap analysis for the needed testing laboratories **15**

3.3.1 Stone and marble sector 15

3.3.3 Furniture sector 16

3.3.4 Textile sector 17

3.3.5 Paper sector 18

3.6.6 Plastic sector 18

3.3.7 Metal sector 19

3.3.8 chemical sector 19

3.3.9 Artisan and women associations products 20

4.0 Summary of findings *21*

5. Top priority labs *23*

6. Priorities for capacity building interventions and budget *25*

7. Action plan *25*

8. Annexes *33*

ABBREVIATIONS

ARAC	Arab accreditation
BMZ	German Federal Ministry for Economic Cooperation and Development (Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung)
EHHA	Electrical House Hold Appliances
EN	European Norms
EU	European Union
FPCCIA	Federation of Palestinian Chambers of Commerce, Industry and agriculture
IEC	International Electrotechnical Committee
ISO	International Organization for Standardization
LFPDC	Leather and footwear products development center
MoH	Ministry of Health
MoNE	Ministry of National Economy (in Palestine)
PALAC	Palestine Accreditation
PalPack	Palestinian Packaging Centre
PCBS	Palestinian Central Bureau of Statistics
PFI	Palestinian Federation of Industries
PFIU	Palestinian of Food Industries Union
PS	Palestinian Standard
PSDCP	Private Development Cluster Project
PSI	Palestine Standards Institution
PTB	Metrology institute of Germany , (Physicalisch-Technische Bundesanstalt)
PV	Photcell
QI	Quality Infrastructure
TR	Technical Regulation
WIU	Wood Industries Union WIU

EXECUTIVE SUMMARY

The improvement in the quality infrastructure targets the improvement in standards, certification, metrology, conformity assessment and accreditation. As part of regulating trade, it is important for a country to develop the quality infrastructure through obtaining accreditation for its testing facility as part of the conformity assessment system.

Based on the scope of ***Trade Facilitation and Customs Support Program (Tasdeer),*** the program intends to support the assessment of the current PSI laboratories and assess the needs for new testing laboratories.

This analysis was conducted with close cooperation and support with PSI management and staff. In addition, all stakeholders related to exports such as related ministries, federations of industries, chambers of commerce, accreditation bodies and testing laboratories were consulted. Moreover, Gaza and gender issues were also considered in the gap analysis.

In relation to current laboratories, this report will focus on the three PSI laboratories in Palestine which are the electrical households' appliance EHHA, cement laboratory and Leather and Footwear Development Center (LFPDC)

All information was collected through:

- Meetings and interviews with all stakeholders (private and public)
- Two workshops to validate the results of the gap analysis.
- Trade data
- Available data about testing facilities

This report will present the final findings and recommendations of the gap analysis for the existing and new laboratories.

Brief on Findings and recommendations

In summary, the findings and recommendation of the conducted assessments are as follow:

1. There is a common need to significantly invest in the human capacity that works in the testing facility in Palestine (currently functioning or intends to be established in the future).
2. With limited resources available by both the private and public sector to be invested in the testing facilities in Palestine, the following criteria should be considered in any future development plan:
    a. The priority sectors Palestine intends to develop for exporting purposes
    b. The effect of the testing services on controlling the market by the Palestinian authorities

    c. The amount of investment needed to allocate and/or upgrade the testing service in comparison with demand and/or performance of the sector (feasibility)
    d. The possibility of making new tests or testing facility to serve more than one sector (ex: Chemical lab can serve furniture, metal and chemical sector)
3. In order to maximize the benefit from the current testing services provided and any new services, PSI and all testing facilities should acquire international accreditation in the near future.

1.BACKGROUND AND CONTEXT

Accredited testing facilities play a crucial role in regulating trade and economic development as well as protection of health and safety of citizens and the environment. The authorities in Palestine considers assistance to the Palestine Standards Institution (PSI), the main organization in the Palestinian Quality Infrastructure, as one of their priorities in the process of building the capacity of the of economic institutions in the Palestine.

PSI was created in its current structure by the Standards and Measurements Law N° 6/2000. According to the law PSI was established in 1994 and started its operations in 1996 as the sole body within the Palestinian Authority (PA) responsible for issuing Palestinian standards and is also considered the focal point for Palestinian participation in the global system of harmonized standards.

The authority and PSI supported the establishment of new testing facilities for the priority sectors and upgrading the testing facilities available at the private, public and academic institutions to contribute to the economic development and enhance the quality of the testing services provided.

To progress towards obtaining international accreditation and providing an enabling quality infrastructure for Palestinian products, PSI has identified the need for a comprehensive assessment of testing labs to identify gaps. PSI considers the services provided by its labs to be critical for the private sector and in particular the exporting companies. These companies need the services of PSI labs to test the compliance of their products' quality against the local and international standards.

There are three testing labs in Palestine operated by PSI that provide services to the private sector are:

- The leather and shoes testing lab (LFPDC), located in Hebron and serving the leather and shoes industry,
- the electrical testing lab (EHHA), located in Ramallah serving importers of electrical equipment and home appliances
- The cement testing lab, located in Ramallah and serving the construction industry.

The services of the three testing labs are either directly connected to the export sector (such as the leather and shoes) or indirectly linked to the export sector by testing products that serve this sector such as the case of the electrical and the cement testing labs.

Trade Facilitation and Customs Support Program (Tasdeer) as part of its intervention plan and in coherence with the strategic view of PSI, has requested and funded an assessment of current PSI labs in addition to the process of identification of any new testing labs needed. This report is the final report prepared by the hired expert., findings and recommendations were presented

to PSI management and to other stakeholders at two workshops conducted in November 2021. Comments were incorporated in this final report.

At the local level they are also about 30 labs are accredited from the accreditation unit under the Ministry of National Economy; these labs are all involved in either construction and building materials, or food and water, fuel , detergents in addition to calibration services. These labs are accredited based on the National system developed based on ISO 17025:2017 General Requirements for the competence of testing and calibration laboratories. The accreditation unit is working to get the international recognition for its accreditation services.

2.0 METHODOLOGY

The objective of this study is to assess the capacity of PSI's existing labs in comparison with the needs and requirements of the private sector in relation to the targeted international markets. The needs assessment was carried out by the expert in close collaboration with PSI and the identified stakeholder and it focused on:

a) Assessment of the existing three laboratories under PSI.

b) Assessment of the available accredited laboratories under the private sector and academic institutions; this includes recommendations for additional testing services to be added to these laboratories

c) New testing services that is not available to answer the needs of the exporting sectors.

2.1 Identification of stakeholders Methodology

Stakeholders' identification was don't through:

1. Discussion and nomination by PSI Director General and senior staff
2. Reviewing available data related to exports;
3. Review of the export strategy and the industrial strategy.
4. consultation with exporting companies.
5. Testing laboratories Staff (private sector)
6. Private sector institution
7. Women related associations

2.2 Methodology of the identification of stakeholders needs.

Following the identification of stakeholders, meetings were conducted to assess the current testing services in Palestine (provided from both the private and public sector) and to quantify the impact of introducing new services on the export performance in Palestine.

2.3 Information Sources and data collection and analysis

The information and data during the assessment were collected from:

a) PSI labs working staff.
b) interviews with Stakeholders,
c) Available data and reports.
d) Bureau of statistics publication
e) The national export strategy 2014-2018
f) The accreditation unit under the Ministry of National Economy.
g) National and international standards.

2.4 Supporting organization

The metrology institute of Germany PTB

The metrology institute of Germany PTB started supporting the quality infrastructure in Palestine since 2012, the first stage focused on developing the national quality policy for Palestine, supporting the metrology component at PSI and support the development of quality management systems for selected medical laboratories at the Ministry of Health.

"Supporting the quality infrastructure in Palestine" project

The project "supporting the quality infrastructure in Palestine" was funded by the German Federal Ministry for Economic Cooperation and Development (BMZ). The main result achieved by this project was the development of the national quality policy which was approved by the cabinet in 2014.

The primary objective of this quality policy is to ensure that goods and services emanating from or traded in Palestine are readily accepted in the national and international markets. The implementation plan of the policy was also approved by the cabinet in 2019.

moreover, the project has an additional component which aims to strengthen the institutional and technical capacity related to Quality Infrastructure in Palestine and offers support upon request for short term activities mainly : advanced training of staff, study trips, awareness-raising events & workshops, participation in conferences, providing technical expertise among other supporting services.

3.0 GAP ANALYSIS

3.1 GAP ANALYSIS FOR THE EXISTING LABS UNDER PSI

There are three laboratories under PSI, two are owned by PSI; the laboratory for testing the electrical household appliances EHHA and the cement lab, these two laboratories are located at the headquarters of PSI.

The third lab is owned by the footwear and leather cluster in partnership with, Hebron chamber of commerce and industry, Palestine Polytechnic University, Leather Industries Federation and the Ministry of National Economy. The laboratory is operated and supervised by PSI as per the agreement signed between the related Parties on the 7th of March 2020. the lab is located in Hebron, in a building owned by Hebron Chamber of Commerce and Industry.

3.1.1 Electrical HouseHold Appliance Laboratory :

The lab was established in 2019 by the EU funded project: Modernization of the Palestinian quality infrastructure implemented from 2013- 2016 with an approximate budget of 1.5 million Euro. The lab is well equipped with all needed equipment for testing of the safety of the electrical household appliances based on the international standard IEC 60335-1; in addition to few machines that can be used for testing the performance of appliances. List of available equipment found in (Annex 2).

The lab consists of 200 meters square which is considered suitable for the needed operations. There are 6 engineers (2 women) currently working in the lab. They were able to perform some tests with a limited number of samples. However, due to COVID-19, the lab is not functional yet as the team still needs additional trainings. At present, most of the requests to test EHHA were sent to Jordan or Israel. Fortunately, the Metrology Institute of Germany PTB agreed to support the mission of the expert identified from Turkey.

Although the producers at the moment are only selling locally, there are strategic plans to target a number of international markets and that resulted in a strong support to the proposal to activate the lab to provide the required service for them locally (instead of having to send the samples to Jordan) which will result in a decrease in cost and time .

Furthermore, activating the lab will increase the control in the market and will prevent low quality products that don't comply with the local standards to enter the Palestinian market and hence create an unfair competition.

Another company in Gaza that produces cables with different diameters in addition to other electrical components emphasis on expanding the existing lab at the company to conduct the tests identified in the standard related to cables, before 2007 the company has limited export to Israel and Egypt, but nowadays the exports from Gaza is not possible. The produced cables are used for developing the infrastructure in Gaza.

3.1.1.1 Findings related to the EHHA lab

a) The EHHA lab is currently not utilized due to the limited capacity and lack of training provided to the staff. Trainings abroad and on PSI premises should be done in the short run in order to support the expansion of this emerging industry in Palestine.
b) To proceed in the development of the quality management system for the lab based on the international standard ISO 17025:2017 and to be accredited internationally by a recognized organization.

3.1.2 Cement testing lab

The cement lab was funded by Sanad construction resource company in 2016 with a cost of about 65000 $. The lab consists is 40 meter squares, and supervised and operated by 3 engineers and one technician from PSI staff (one women).

The lab was equipped with all required testing machines (Annex 3) for testing the physical parameters of cements based on the Palestinian standard PS 54 and EN 196-3. The testing machines are also designed to conduct tests based on the national and EN standards.

The lab nowadays provides the services for the importers of cements to get the compliance certificate for the imported shipments, about 20 shipments were tested by the lab in 2021 so far.

Several companies producing construction products as cement pipes, artificial building stone from concrete were consulted regarding the need for the cement testing lab; but it was found that these companies produce for the local market and they do not have any export intentions in the short term.

Few companies may produce for the Israeli market and they need a certificate for the used materials in their products. The Future Iron Pipes producing coated and lined pipes uses cement and found exporting Jordan; tests reports are provided from PSI; but there are no requirements related to the certificated of the used cement, however the company was certified from NSF National Sanitation Foundation as required by the USAID projects and the chemical certificate for the cement was also required.

Sanad construction resource company has started in 2018 operating the cement filling and packaging line in Jericho; in addition to the establishment of silos for storing bulk cement. Sanad considered the establishment of a cement mill to provide the local market with about half of the demand for cement, the mill will cost 80 million $ and with a capacity of the mill is 1.3 million ton. The mill is under construction and will include a testing lab to control the production properties and provide clients with testing report; however, a third-party testing lab is important for the mill and the users of cement mainly for the companies producing construction products.

To assess the testing capabilities in Palestine for testing cement it was found that some labs as Geotechnical and material testing lab GMT is capable of performing all physical tests and the chemical tests are conducted at Birzeit University, however the machine used for the chemical test is not as per the standard requirements. EN 196-2. The producers supported the need for the establishment the chemical testing lab for cement.

3.1.2.1 Findings related to cement lab

a) To provide a full compliance report for the imported cement and support the construction industry to be sure of the used cement in their products marketed internally or exported; a testing machine is required to conduct the chemical tests of cement and can be used for other industries- X-Ray fluorescence spectroscopy; however, the cost is considered high. (Annex4)
b) The staff needs training on conducting the tests that they were not able to perform yet. The training can be provided by a local expert with strong back ground in performing such tests or send 1 or 2 engineers to be trained at the labs of neighboring countries.
c) It was clear from that the users of cement are not aware of existing laboratory; a marketing workshop is needed to promote the lab services.
d) To proceed in the development of the quality management system for the lab based on the international standard ISO 17025:2017 to be accredited by an international accreditation body to recognize the testing reports of the lab; The development of the system is supported by Tasdeer Project. Support the international accreditation is required after developing and implementing the management systems

3.1.2 Leather and footwear Products développement center LFPDC

The Leather and footwear products development center LFPDC was established by the Private Development Cluster Project PSDCP which was funded by the French Development and being implemented by the federation of chambers in partnership with the Ministry of National Economy MoNE.

The total area of the lab is about 30 meters square and is run by 4 engineers (all men). The establishment cost was €150,000 ; €130,000 for equipment (List in Annex5) and the chamber share was about 30,000 Euro for renovation and infrastructure. The lab is run by PSI and governs by Palestine Polytechnic University Hebron, chamber of commerce and the leather manufacturing federation. The equipment was imported and operates based on the international standards from Portugal. One of the staff was trained on the testing method in Turkey and was also trained by the supplying company during the installation of the lab.

10 models are tested by staff for five manufacturers as part of the PTB support program to develop a technical file for products. The lab also provide testing services for the government to check the compliance of the provided products to the authorities mainly those related military authorities.

According to interviews with a number of exporters, the sector is currently exporting to 15 countries including USA, Europe, Korea, UAE and Jordan. The exporters face several obstacles due to the lack of testing and certification services. There is a significant importance to cover the chemical analysis tests, in addition to expand the tests to cover all requirement of the safety footwear.

3.1.2.1 Finding related to the LFPDC

a) Although LFPDC provide most of the ***physica****l* tests needed to the sector, there are still few tests related mainly to safety boots are missing which the companies are currently doing in Jordan and Israel. In order to have all the tests available, several machines are needed. (List of machines available in Annex6).
b) Some support is needed at the level of the current services as- safety cabinet for chemicals, humidity measuring devices and controlling system for the internal humidity, cupboard for keeping samples. An apparatus for distillation of water for the environmental conditioning chamber, load cell for expansion of the range of the tensile test 1000Kn, automatic safe saw.
c) The chemical tests are required by all standards and regulations as they are considered essential requirements for safety and environment protection, the space is available to install such lab. See (Annex 6), however the cost of needed chemical part of the laboratory was high and the operating cost will also be very high in addition to that the laboratory needs well qualified personnel to ensure the sustainability of the laboratory, an alternative approach can be used to cover the chemical tests by a subcontracted laboratory having the same equipment, the staff of this laboratory can be trained at an internationally recognized laboratory, the chemical lab can be established later after deep assessment for its feasibility.
d) Training is required in a country with long experience in this field such as Tunisia or Turkey as they have good experience in exporting to Europe and USA. Training for the physical part can be supported by PTB.
e) To proceed in the development of the quality management system for the lab based on the international standard ISO 17025:2017 to be accredited by an international accreditation body to recognize the testing reports of the lab; The development of the system is supported by Tasdeer Project. Support the international accreditation is required after developing and implementing the management systems

3.2 METHODOLOGY FOR IDENTIFYING NEW LABS

3.2.1 Avalable testing services -Accredited labs.

In order to identify the available testing services in Palestine, the accreditation unit PALAC[1] was consulted. There are about 29 accredited labs in Palestine. Two labs were accredited in the field of calibration of measuring devices and tools, 22 labs in the construction field and 3 are for food products (List of labs in Annex 7).

3.2.2 Identification of priority sectors

Identification of priority sector should be done through analyzing the latest available trade data of Palestine. Based on the Palestinian Bureau of Statistics PCBS trade data for 2019; the top 10 exporting commodities are:

Table 1 – Top 10 exporting commodities 2019

No	HS code	Item	Value 1000$
1	68022900	Building Stone	143,846
2	39232100	Sacks and bags	55,626
3	15091000	Virgin olive oil	52,827
4	94016100	Upholstered seats	38,266
5	08041000	Dates	37,570
6	72043000	Scrap of iron	36,355
7	68022100	Marble and travertine	30,061
8	25171000	Gravel	29,670
9	94035000	Wooden furniture for bedrooms	25,984
10	64042000	Footwear leather	25,674

Most of these products as stone, footwear and leather, furniture, olive oil was also identified as top priority products in the national export strategy 2014-2018.

[1] The unit was established in June 2014 under the MoNE after releasing this authority from PSI to handle the conflict of interest of having it under PSI as PSI was planning to establish their testing labs funded by the EU. The accreditation services were under PSI since established in 1996.

3.3 GAP ANALYSIS FOR THE NEEDED TESTING LABORATORIES

3.3.1 Stone and marble sector

Since the importance of the Stone and marble sector based on the trade data cant be questioned, it is fortunate that there is already in Palestine 22 accredited labs for the construction materials, most of them can perform the tests related to stone and marble products.

The major exporting companies were consulted about the existing testing services and confirm that all tests are available in the country; however, few tests were identified that are requested by some countries as resistance to salt crystallization, freezing and microstructure. Although these tests are available locally, the fact that there is no lab that is accredited internationally, companies are advised to send samples to Europe for testing.

Based on the data collected from the stone and marble companies, the missing test has no significant effect on the performance of the export activities of the sector and hence there is no urgency to allocate them locally in the short term.

3.3.2 Food sector

The food sector was always a main sector for exporting Palestinian products. commodities such as olive oil, processes meat, dates; fresh herbs, vegetables and fruits were identified in the export data and in the national export strategy.

Based on the information provided by Palestinian of Food Industries Union PFIU and several producers of the above commodities, there was a confirmation that almost all required test for export were available.

Interviewed companies confirmed that all required test by external markets is available, however the main obstacle was related to the international accreditation of these labs which force them to send samples to the Israeli laboratories to obtain certificates that are accepted internationally, these tests are mainly related to pesticides residues. Other special tests that can be done locally are currently not available due to the low demand for them.

At the level of testing facilities they are four testing laboratories in the Westbank that are accredited by the accreditation unit PALAC ; the three main laboratories with a wide range of testing services are:

- The Centre of Birzeit University Testing Laboratories,
- Centre Public Health Laboratory at the Ministry of Health,
- Analysis, Poison Control & Calibration Centre- Biological & Chemical Analysis Unit at An-Najah University
- Scientific Centre for Food & Drug Analysis Lab. ***(Private)***

For the laboratories in Gaza they suffer from the lack of reagents and chemicals in addition to the deterioration of the instrumental analysis machines as they were not updated since 2007; these machines are necessary for testing the pesticide residues for the exported strawberry and fresh produced; in addition to being also necessary for testing of the food additives and fortified products. Moreover, the lab accreditation system active in the northern governorates is not functioning in Gaza; causing a negative impact on the credibility of the test results.

3.2.2.1 findings

a) All testing services are available or can be added to the available testing facilities
b) Recognition through obtaining international accreditation certificates is .
c) needed to improve the testing service from this sector
d) It is necessary to find another testing machines for testing the heavy metals and pesticide residues and include the testing of food grade contact materials in the Northern governates.
e) It is necessary to reactive the lab accreditation system in Gaza and support some labs to update their quality management system
f) A calibration lab is necessary in Gaza to provide the calibration services for the testing labs and industry (Annex 8).
g) Needs are identified for the food testing lab in Gaza but the cost is high, one machine for testing Pesticide residues can be supported (Annex 18).

3.3.3 Furniture sector

The furniture sector was identified in the list of top exporting commodities and was also included in the national export strategy as a priority sector; most of the exports are going to Israel; additional markets such as the EU, United States and Arab countries have been identified as potential target markets for Palestinian furniture.

Through the ***Private Development Cluster Project PSDCP,*** a study to establish an innovation center that provides training, design, information and testing was completed.

Based on the Wood Industries Union WIU, the establishment of a testing lab that will support the manufacturers in testing the used materials and products before exporting to potential market is very essential.

The furniture sector in Gaza was prosperous before 2001, and had achieved noticed results in production and exporting; nowadays the sector suffer a lot due to closure, the high prices of energy, competition from Turkey and the obstacles to import materials and accessories. The

sector has limited export to Israel nowadays. The sector includes 700 premises employing about 10000 employees. The producers also emphasis of the importance of networking and participation in exhibitions.

3.2.3.1 Findings

a) Establish a testing lab for furniture that supports the manufacturers; (List in Annex 9).
b) The sector requested to focus on networking and participation in international exhibitions

3.3.4 Textile sector

The textile sector was identified in the national export strategy as a priority sector. The textile and garment sector are composed mainly of textile, garment and clothing production, dyeing, wool wear, and other accessories; the Israeli market is the main market for the textile and garment industries; there are about 43 members in the union of the Palestinian Textile Industries in addition to many subcontracted micro enterprises.

The workforce in the sector decreased from 40000 to 18000 due to the imports from China and Turkey and the limited competitiveness advantages due to the high cost of energy and labor in Palestine. Most of the parties working in this sector work as subcontractor to the Israeli market and most the workers in this sector are from women. The main producer for textile employs 75 workers 50% of them are women and has a pool of subcontracted enterprises most of them are run by women.

The union is looking to export to international market and to be able to penetrate this market; the union emphasis on the establishment of a testing lab that will support in testing the produces textiles and the garments products.

3.2.4.1 Findings

a) There is a need to establish a testing lab for testing textile and garment that supports the manufacturers; there is no lab can provide tests for such products in Palestine. (Annex 10)

3.3.5 Paper sector

Currently, the Paper sector exports mainly to Israel; Jordan and Saudi Arabia.

Under the umbrella of the Palestinian Federation of Industries PFI, The Palestinian packaging center (PalPack) was established; with several equipment and tools were allocated that can be used to support the packaging industries; most of the equipment are designed to test paper, carton and plastic film. (Annex 11).

The center will also have a positive impact on the traditional industries and small businesses by supporting them in producing small size batch of packaging materials which will reduce the packaging cost.

Exporting companies for paper and carton realized the importance of having this lab in the country; the companies export to Jordan and Saudi Arabi however, the main requirements for these markets are the certificates related management systems as ISO 9001 and ISO 14001.

3.2.5.1 Findings

b) To accept the testing results of the PalPack center the lab shall be accredited for ISO 17025 by the accreditation unit PALAC; to be accredited there is an essential need to support this lab by developing the management system based on this international standard.

3.6.6 Plastic sector

The plastic sector includes several products as plastic pipes, fittings, water tanks, mattresses, sacks and plastic sheets in addition to plastic furniture.

The sacks and bags sector were identified in the list of top exporting commodities. Several producers were interviewed from this sector and it was clear that there are no strict requirements for testing certificates for those producing sacks and sheets; however, they can use the PalPack lab for testing the physical properties of their products.

Companies producing pipes, fittings and tanks have their own lab covering the requirements of the national standards, however the main company in Gaza identified few required equipment for testing their products – (Annex 13)

One company in the west Bank produces plastic furniture used to export to Europe and Arab countries and they rely on a third-party testing lab; however, **the establishment of a furniture lab can also serve this sector**.

The producers of mattresses mainly exporting to Israel do not face strict requirements for testing certificates for their products but they have their own lab for testing the strength of foam, sometimes testing of the used garment is required by clients and they rely on the certificate from the supplier.

3.3.7 Metal sector

The metal sector includes several products under its umbrella such as aluminum profiles, solar heaters, fire resistance and safety doors, metal works and cutting discs. Although there some exports from this sector but they were not listed from the top commodities. The aluminum profile companies has their own lab while the producers of the doors, cutting discs have already started to establish their own labs.

The producers stressed on the need of having a national lab to test the imported products since some low-quality products which are being imported are affecting their competitiveness in the local markets.

On the other hand, establishing a testing lab for solar and PV systems and fire resistance and safety doors will support the export potentials of these products.

3.2.7.1 Findings.

The following labs are needed in the country to support the related producers:

a–Testing lab for solar heating and PV systems (Annex 12).

b- Testing lab for safety doors (Annex 13).

c - material testing lab-detailed List is available at PSI

3.3.8 chemical sector

The chemical sector includes several products such as detergents and paints. There is currently limited export activities in this sector. The main producers in this sector have their own labs which are accredited for testing of detergents but not for the paint sector.

Organized by an agreement, PSI uses the testing lab on a local company for conducting the needed tests for certification of paints products. The paints products are used in the production process for several products including the products that are exported as furniture. PSI is welling to have an independent lab to support this industry.

3.2.8.1 Findings

- Establishing a laboratory for testing paints as it is important for other industries using paints (Annex 14).

3.3.9 Artisan and women associations products

This sector was selected as its employs a large workforce from family's workshop that the women is considered the main beneficiaries of it. It was realized that most of the exports from this sector are in the form of gifts that do not need testing certificates as per the export procedures.

The exports include food products, embroidery, ceramic, soap, cosmetics. Almost all these products can be tested at national laboratories for testing of food, chemicals and ceramic, however these associations suffer from the high testing prices. It was also realized that most of these associations do not have a quality system to assure the consistency of their products.

The Federation of Palestinian Chambers of Commerce, Industry and Agriculture, the Business Women Forum BWF was interviewed in addition to another organization dealing with the artisan products; Bethlehem fare trade artisan BFTA. BFTA is non-profit NGO works to link Palestinian producers to the global fare trade markets aiming to develop the local economy by creating more opportunities to the most marginalize producers creating sustainable livelihoods. It works with producers specializing in olive wood, embroidery, mother of pearl, olive oil soap, felt wool, and recycled products.

The organization with family workshops creating more than 2000 direct jobs in addition to 3000 in direct jobs, women represent about 40% of this workforce. 42 workshops are working in the field of olive oil wood products that is well recognized as a Palestinian product. All types of products directed to export and part are sold at the local market and directed to tourism.

When exported to external markets the organization face the problem related to the testing certificate of products, mainly ceramic products. The main parameters to be tests are related to heavy metals to be sure that the products are safe mainly if used for food. The producers used to get the certificates from Israel labs as they are accredited by an international recognized system. The cost of the test is considered high.

3.2.9.1 Findings

a) To support the producers in getting a reasonable price for the requested tests by the international markets
b) Provide training for women associations about quality to produce consistent products.

4.0 SUMMARY OF FINDINGS

The findings identified for the existing labs and needed labs for each sector can be summarized as follows:

4.1 **Capacity building**: training of the testing staff and system development

4.1.1 **Training for the staff**

a) Training to EHHA staff
b) The cement lab staff needs training on conducting tests that are still not available in local labs. training can be done through on-the-job training or abroad.
c) Training LFPDC staff in countries such as Turkey and/or Tunisia since they have previous experience in exporting to international markets. Trainings should be in both physical and chemical tests.

4.1.2 **System development and accreditation**

a) To proceed in the development of the quality management system for the existing labs based on the international standard ISO 17025:2017.
b) Aquire accreditation by an international accreditation body for the ISO 17025:2017. *(The development of the system is supported by Tasdeer Project).*
c) Support at least one laboratory in each priority sectors to upgrade their system to be accredited by an international accreditation body
d) Reactivate the lab accreditation system in Gaza and support a lab to update its quality management system to be accredited at the national and international level.
e) Develop PalPack management system based on international standard accreditation for ISO 17025.

4.2 **Needed testing facilities**

4.2.1 existing labs.

a) To provide a full compliance report for the imported cement and support the construction industry to be sure of the used cement in their products marketed internally or exported; the laboratory's services to be expanded to include the chemical tests of cement (X-Ray fluorescence spectroscopy), the cost is considered high. (Annex 4)
b) Provide LFPDC with the needed machines to be able to complete all physical tests required by the sector(Annex 6).
c) Develpe LFPDC center to include the chemical tests. Development process include providing the lab with the needed machines and capacity building program for the staff;
d) PSI should consider a development plan for all established laboratories based on

a. common tests between the different sectors,
b. priority markets which Palestine (private and public sectors) aims to target
c. size of investment
d. needs to improve market control and surveillance

d) To increase the percentage of women in the staff of the LFPDC lab, all labs to consider the employment of special needs personnel.

4.2.2 new laboratories

a) Establish a Testing lab for Furniture sector (Annex 9). This is considered a priority for the Palestinian government since it overlap with various other sectors such as chemicals, heavy metals and textile among others
a) Work on integrating Textile and Garments tests in the Current LFPDC (Annex 10).
b) Establish a calibration Lab in Gaza as a first step to revive the testing labs which were affected by more than 10 years of closure (Annex 8).
c) A laboratory for testing solar heating and PV systems (Annex 12)
d) Establish a lab for testing (Annex 13) fire resistance and safety doors.
e) A laboratory for testing paints is required to have an independent testing facility, as PSI is using the laboratory of a producing company, the lab will support other industries. (Annex 14).
f) Develop a maintenance and upgrading plan for all labs located in Gaza
g) A lab for materials such as aluminum and iron is required in the country, the lab can be established later as there are several testing labs that provide the required testing services, this lab can be a reference lab in the country.
h) Gender and special needs group should be considered in future development plans

General Findings:

1. Detailed assessment for each lab that identify the following:
    a. Assess of the current equipment status
    b. Tests available
    c. Human capacity available and needs
2. Special pricing for MSMEs
3. Focus on inter laboratory comparison and proficiency testing

5. TOP PRIORITY LABS

Based on the collected data from the reference mentioned in cluse 2.3 and interviews with stakeholders the following priorities were concluded:

a-The first priority was identified for labs supporting the current exports as the LFPDC, Textile , furniture, fire resistance and safety of doors in addition to the calibration lab for Gaza as it supports all exporting sectors. The list can include the Pesticide residue testing machine in the food lab in Gaza and in the northern governorates as the available machine is out of order.

b-The second priority was allocated for the important labs as the solar lab due to its impact on all sectors as it increases the competitive advantage of producers; however, the lab can be listed in the list of first priority labs due to its importance to the producers.

c- The third priority is allocated for the labs that exists in companies or the export is limited as the paints lab, the cement lab (chemical tests), and the material testing lab, however they are considered important to PSI.

When considering the cost and demand on the testing services performed outside the country the following labs can be considered the top priority labs that needs urgent support (Table 2), The cost of these labs is detailed in cluse 6.3 & 6.4

a-Footwear and leather development center and Textile lab : Several markets including Arab countries requested tests certificate for the exported products, the estimated annual cost of conducting tests outside the country is about 20000$for the physical tests for footwear and 20000 for textiles. In the next year the demand on these services is expected to be double or tribble the current demand. If possible and as the space is available at the LFPDC, the textile lab can be integrated with the LFPDC lab. The total cost of the lab is 122100$.

The chemical tests lab can be established later; meanwhile the testing services can be arranged with a lab with the same equipment.

b- Fire resistance and safety doors: the demand on testing these products is increasing and the cost is high; testing of one unit cost from 6000-10000 $, the estimated total cost for testing is about 140000$ and expected to be double the current demand in the next year. The cost of the lab is 350000$.

c-The calibration lab for Gaza: This lab will support all sectors and the cost of calibration outside Gaza is about 20000$.The cost of the lab is 40000$.

d -Food lab Pesticide Residues : The demand on the testing services is high and the cost of testing in Israeli labs is about 50000$ for Gaza framers, in the norther governates the demand is also high(15000$)and the only available machine is out of order. Cost of machine is 180000$.

e-Furniture: The furniture sector conducted a business plan through the cluster and realized that the testing lab is necessary for the sector when exporting to European countries and other countries, data is not available about the demand and cost of testing services. Cost of the lab 281000$.

g- The solar lab is considered 2nd Priority for export, 1st priority for producers. The cost is about 111000$.

Table 2 Top priority needed labs

Lab	Testing service	Volume of demand, current	Cost of service $	Total cost $, 2021	Total for all types of tests $	Cost of the lab $	Priority
Footwear lab LFPDC, Textile	Footwear physical tests	20	1000	20000	40000	82100	1, cost of the combined lab 122100
	Textile	25	800	20000		40000	
	Footwear Chemical tests	20	1200	24000	24000	300000	1, can be subcontracted at this stage
Fire resistance and safety doors	Fire resistance	8	10000	80000	140000	350000	1
	Safety doors	10	6000	60000			
Calibration for Gaza	Requested by certified companies , about 20 company	100	200	20000	20000	40000	1
Food lab Pesticide Residues for Gaza	Needed by Global gap certified association 200 farmers	200	250	50000	50000	180000	1
Food lab-Pesticide Residues machine -	Needed by Global gap & organic	60	250	15000	15000	180000	1

Northern governorates	certified premises						

Aside from the cost of testing services outside the country there are other benefits from having these labs in the country as the normal practice nowadays is to send shipment waiting for the approval of the importing country that may takes a long time, and will have a negative impact on the exports if the tests results were not incompliance with standards. The availability of labs will increase the confidence of producers about the quality of their products and make use of any possible opportunity for exports.

6. PRIORITIES FOR CAPACITY BUILDING INTERVENTIONS AND BUDGET

The priority labs were described in clause 5 and the related cost was described in clause 6.3 and 6.4. other interventions as training and system development and accreditation were discussed in clause 6.1 and 6.2.

The budget was developed taking into consideration the priority sectors in addition to the possible support by other projects as the PTB project- “supporting the quality infrastructure in Palestine.

7. ACTION PLAN

Based on the findings and budget a detailed action plan for addressing the main priority issues was developed.

6. Priorities for interventions and budget

6.1-Capacity Building -training for exiting lab

Lab	Priority for			Training of staff	Estimated cost for training $	Intervention by other projects	Potential Intervention by Tasdeer	Total cost to be covered 4
	Exporters	Local producers	Importers					-
EHHA lab	No exporters	Yes	Yes	Required	-	Yes, by PTB	Not required	-
Cement Lab	No exporters	Yes	Yes	Required	4000	No	Yes	4000
Footwear lab	Yes	Yes	-	Required	-	No	Yes ,Support training on chemical and physical testing	20000
								24000

6.2- Accreditation for new labs – Based on ISO 17025(Existing labs are under development by the project)

Lab	Priority for			System development	National accreditation	International accreditation	Potential Intervention by Tasdeer	Total cost to be covered $
	Exporters	Local producers	Importers					-
A Food testing lab	Yes	Yes	-	-upgrade the system	Already accredited	Required	Required	15000
Food lab in Gaza	Yes	Yes	-	Required	Required	-	Required	12000
Palpack	Yes	Yes	-	Required	Required	-	Required	12000
Existing labs EHHA, Cement & Footwear lab	Yes	Yes		Under supported by Tasdeer,	-	Required , to get the international accreditation	Required	30000

6.3-Equipment – existing labs

Lab	Priority for			Level of priority for export	Cost of the required lab $	Evaluation	Potential Intervention by Tasdeer	Total cost to be covered $ -
	Exporters	Local producers	Importers					
EHHA lab	No exporters	Yes	Yes	3rd	-	-	-	-
Cement Lab	No exporters	Yes	Yes	3rd	440000 for the chemical tests	High cost	-	-
Footwear lab	Yes	Yes	-	1st Priority for physical tests	82100- upgrade the physical test		Yes	82100
				2nd priority for the chemical lab	300000 for the chemical lab	At the current stage to assess if tests can be covered by available accredited labs agreement can be developed among related stakeholders. The lab can be established at a later stage	-Support training	

6.4- new labs

Lab	Priority for			Level of priority for export	Cost of the required lab	Evaluation	Potential Intervention by Tasdeer	Total cost to be covered $
	Exporters	Local producers	Importers					
Furniture	Yes	Yes	-	1st priority	281000	Can be divided at stages the first stage	Yes, support important equipment	281000
Textile	Yes	Yes	-	1st priority	40000	Can be combined with the footwear lab	Yes	40000
Solar and PV	No exports	Yes	-	2nd Priority for export, 1st priority for producers	111000	-	Yes	111000
Material :safety doors	Yes	Yes	-	1st priority	350000	Cost is high for one unit	Yes	350000
Materials lab excluding safety door	Yes	Yes	-	3rd	800000	-	-	-
Paints	No exports	Yes	-	3rd Priority	80000	-	-	-
Calibration lab for Gaza	Yes	Yes	-	1st priority	40000	--	Yes	40000
Food lab	Yes	Yes	Yes	1st priority	Additional machines For pesticides residue		Yes	180000
Food lab in Gaza	Yes	Yes	Yes	1st priority,	812000, cost is very high	Support that Most important machine related to testing of pesticides	Yes	180000

7.1 . Action plan-Training

Date / Activity	Year 2022												Year 2023												Year 2024											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Training																																				
A-Cement lab																																				
A.1-Develop the TOR for trainer for the cement lab		→	→																																	
A.2-Subcontracting process			→	→	→																															
A.3 -Delivering the training					→	→																														
B-Leather and Footwear Development centre LFDC																																				
B.1-Agreement between Parties developed and signed for chemical tests		→	→	→	→																															
B.2-Develop the TOR for training Course for the lab			→	→	→																															
B.3-Subcontracting a training centre process					→	→	→																													
B.4 -Delivering the training						→	→	→																												

6.2. Action plan-Accreditation

Date / Activity	Year 2022												Year 2023												Year 2024											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
A-International accreditation																																				
A.1- Selection of the potential lab		→	→																																	
A.2- Agreement with the lab			→	→																																
A.3- Selection of the accreditation body			→	→	→																															
A.4- Upgrade of the system					→	→	→																													
A.5- Apply for the accreditation						→	→	→																												
B. System development																																				
B.1- Identify labs(PalPack, Gaza food testing)			→	→	→																															
B.2- Agreement with labs					→	→																														
B.3- TOR development for consultant to develop the system						→	→																													
B.4- System development							→	→	→	→	→																									
B.5- Apply for accreditation										→	→	→																								

7.3. Action plan-Equipment

Date / Activity	Year 2022												Year 2023												Year 2024											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Identification of the priority labs to be supports	→	→																																		
Approval of the budget		→	→																																	
Agreement with stake holders			→	→	→																															
Allocation of the space			→	→	→																															
Developing the Tender Dossier				→	→	→																														
Tendering process						→	→	→																												
Receiving of equipment								→	→	→	→	→	→	→																						
Installation and training											→	→	→	→	→	→																				

8. ANNEXES

Annex 1

Consulted stakeholder

PSI management and Directors	Mr Haider Hajjeh Mr Ahmed Al Ahmed Mr Haitham Abu Rayan Tagreed Mohammed Abeer AbuHejleh
PSI lab team	Ibrahim Jabarin Murad Doaik Mahmoud Abu Khaizaran Tahseen Suliman
Hebron Chamber of Commerce and Industry	Mohammed Husein
Camel Company for Footwear	Hejaze Al Zatare
Demonte Company- footwear	Mr Ghaleb Abu Omer
Palestinian Construction Company	Mr Ayman Anabtawe Mr Mohammed Nori
Palestinian Company for Infrastructure	Mr Waleed Al Kahteeb
PUC Stone- Premium United for Stone – Artificial	Mr Ayman Alkalili
Future Iron Pipes	Mr Ali Shaban
Bisan Air Conditioning	Mr Amjad Esale
Al-Hadad Brothers Company – Gaza	Hadad
Deputy Minister -MoNE	Mrs Manal Farhan
Geotechnical & Material Testing Center GMT - Testing lab	Dr. Mahmoud Shakarneh
Stone and Marable Quality Centre	Mr Jawad AlHaj
International Centre for Geotechnical & Engineering Studies	Eng Abdallah Aqel
Nassar stone	Mr Mohammed Qasrawi
Al Anan Stone and Marble	Mr Mohammed AlAtrash
Accreditation Unit- Ministry of National Economy	Mr Abedelrahman Ishtayh Mr Saed Abu Ali
Palestinian of Food Industries Union PFIU	Mr Bassam Abi Ghalyoun Mohammed Ayiesh - Gaza
Siniora Food Industries	Mr Tawfeq Odeh
Qitaf Company for Investment and Agricultural Marketing	Ms Fatemeh Eshtaieh
Alreef Company for Investment and Agricultural Marketing	Mr Mohammed Hmedat
Centre of Birzeit University Testing Laboratories	Mr Qusai Atteli Ms Lina Jarar

Analysis, Poison control and Calibration Centre- An-Najah University	Dr Abelfatah Al Malah
Al Aazher University Testing Lab	Dr Abd Alraziq Salama
Wood industries Union	Mr Rezik Mare – chairman Mr- Waleed Damara- Member MR- Khaled Mahbobeh – Director
	Mr Mujaged Al Sosi- Gaza
Union of the Palestinian Textile Industries	Mr Kahled Al-Arja
Arja Textile company	Mr Kahled Al-Arja
Ahlia Boxes	Mr Safout Al Herbawi
Paper Industries Co	Mr Omer AlHerbawi
Palestinian Federations of Industries Palestinian Centre for Packaging – PALPACK	Dr Odeh Shhadeh Israa Daswqi
Royal industrial Trading Co	Emad Rjob
Bashir Siksik Com	Ibraheem Haonah
Universal Mattresses Co	Ahmed Tamimi
Biozmz for Plastic Industries	Mohamed Karajeh
Althana Company	Shahed AbuBaker
Taqadom Scales Co Ltd	Ayman Neirouhkh , Anas Neiroukh
Alitimad Heaters Co	Abd Al-Hakim Al-Shine
Super Nimer	Ahmed Alamleh
Green Valley Co	Mr Treq Hmza
National Aluminum & Profile Co.	Mr Hasam Arman
AlRajeh Detergents	Mr Zuhair AlRajeh
National Paints	Mr Ayman Daraghmeh
Federation of Palestinian chambers of commerce, Industry and Agriculture	Mr Nazeh Mardawi
Besco consultant	Issa Beitune
ISO plus, consultant	MrMosa AlAstal
Bethlehem Fairtrade Artisans	Ms Suzan Sahory
Business Women Forum	Ms Jumana Salous

Annex 2

Electrical House hold Appliance lab

Clause	Measurement/testing	Testing / measuring equipment / material needed
7	Marking and instructions	Petroleum spirit
8	Protection against access to live parts	Test probe B, 13 and 41 of IEC 61032, voltmeter, mill-ammeter, oscilloscope,force gauges, 2200ohm non-inductive resistor, energymeter
10	Power input and current	Voltmeter, ammeter, wattmeter
11, 17	Heating, Overload protection of transformers and associated circuits	Temperature controlled room,Temperature Recorder, Fine wire thermocouples, Test corners,Winding resistance measurement system, Probe for measurement of surface temperature
13	Leakage current and electric strength at operating temperature	Metal foil, Leakage current meter, Isolation transformer, HV test supply, Network (Fig.4 of IEC60990)
14	Transient overvoltages	Impulse voltage test generator & monitor(oscilloscope)
15	Moisture resistance	IP test equipment, Measurement beaker, Spray nozzle (for testing appliances that cannot be placed under the oscillating tube specified in IEC 60529) as appropriate according to the requirement of Part 2s(Only when the second numeral more than “0” is given) Rinsing agent (date expired).Humidity cabinet.
16	Leakage current and electric strength	Metal foil, Low impedance ammeter, HV test supply
20	Stability and mechanical hazards	Inclined plane, masses, force gauges, test probe similar to test probe B of IEC 61032 with circular stop face 50 mm Ø
21	Mechanical strength	Spring hammer, Hardened steel pin, Force gauges, Abrasion test apparatus (**T4-75**), Rotating Drum ”refered to standard IEC 60068-2-31”.

Clause	Measurement/testing	Testing / measuring equipment / material needed
22	Construction	Test rig for torque on pin supported appliance, Heating cabinet (70°C ±2°C), Test probe 11 of IEC61032,Test fingernail (Figure 7), Force gauge, Oscilloscope, Pressure test apparatus Automatic cord reel test apparatus
23	Internal wiring	Flexing test apparatus
25	Supply connection and external flexible cords	Flexing test apparatus, Cord anchorage force & torque tester
26	Terminals for external conductors	Torque screwdriver and Torsion test apparatus (T3-10)
27	Provision for earthing	Earth continuity tester.
29	Clearances,creepage distances and solid insulation	Mechanical measurement tools, Rod or ball gauges, Proof tracking test apparatus
30	Resistance to heat and fire	Ball Pressure test apparatus, Glow wire & Needle flame test apparatus. Horizontal and vertical burning test apparatus, Safety Cabinet

Annex 3

Cement testing lab machines and tools

No	Testing Machine/tool	Reference standard
1	Full automatic blain air permeability apparatus	EN 196-6
2	Vicatronic and accessories	EN196-3 EN 13279-2 EN480-2
3	Le Chatelier bath and accessories - soundness tests	E196-3
4	Calorimeter and accessories – Heat of hydration of cement	EN196-8
5	Flow table and accessories- workability test of mortar and lime	EN-459-2 EN1015-3
6	Air content meter	EN459-2
7	Bulk density of lime	EN459-2
8	Flow cone apparatus and accessories- viscosity and fluidity determination of cement	EN445
9	Curing cabinet	EN 196-1
10	Water bath 200 liters	EN 196-1
11	Ventilation oven	EN 196-1
12	Le Chatelier flask and accessories	EN 196-6
13	Compression and flexural teat machine and accessories	EN 196-1
14	Jolting machine	EN 196-1
15	Mortar mixer	EN 196-1
16	Digital balance 6kg, 0.1g	-
17	Digital balance 220g, 4 digits accuracy	-

Annex 4

Cement Chemical Lab.

No	Testing Machine/tool	Specifications	Units	Price /unit $	Total cost $
1	XFR-Sequential-WDXRF spectrometer	EN 196-2, ISO 29581-2	1	300000	300000
2	Glass bead fusion machine with platinum crucibl	EN 196-2, ISO 29581-2	1	80000	80000
3	Grinding Mill	EN 196-2, ISO 29581-2	1	20000	20000
4	Analytical balance	EN 196-2, ISO 29581-2	1	3000	3000
5	Drying oven	EN 196-2, ISO 29581-2	1	2000	2000
6	Furnace 1000 C	EN 196-2, ISO 29581-2	1	4000	4000
7	Lithium borate & other chemicals	EN 196-2, ISO 29581-2	1	10000	10000
8	Certified reference materials (Cement kit)	EN 196-2, ISO 29581-2	1	10000	10000
9	Training & XRF analytical curves setup		-	10000	10000
10	Tools & consumables (brushes, Desiccators, spoons,…etc)		-	3000	3000
	Total				442000

Annex 5

Leather testing machine at the leather center

No	Testing Machine/tool	Reference standard
1	Dynamometer (Tensile Testing Machine)	ISO 11644, :2009 , ISO 3376:2011, ISO 3377-1 :2011, ISO 3377-2 :2016 ISO 17708 :2003, ISO 17697:2016 (Method A), ISO 20872:2001 ISO 20874:2001, ISO 22654:2002 ISO 22650 :2002, SATRA TM118 :1992 , SATRA TM150 : 1999, SATRA TM 108 SATRA TM 117, SATRA TM 149 BS 5131-5.11, SATRA TM120:1992
2	Slip Resistance Tester	ISO 13287 :2012
3	Thickness meter	ISO 2589:2016
4	Penetrometer	ISO 5403-1:2011 ISO 17702:2003 ISO 20344-6.13:2011
5	Bally Flexometer	ISO 5402-1:2011 ISO 17694:2016
6	Stiffness tester	ISO 5402-1:2011
7	Bennewart" Sole Flexing Tester	ISO 17707:2005
8	outsole "Bennewart" Sole Flexing Tester, rigidity tester for soles.	ISO 20344-8.4 :2011
9	Hand Held Lastometer	Manual of the manufactures
10	Taber Abrasion Tester	ISO 5470-1:2016 ISO 17076-1:2012
11	Circular Rub, Fastness Tester	ISO 17700 :2004 (Method B)
12	Crockmeter	ISO 20433:2012
13	Toe & Heel Adhesion Tester	SATRA TM404:1992
14	Balance (with density kit)	ISO 2781 :2008 +A1:2010 (Method A)
15	Hardness Digital Tester	ISO 868:2003
16	Climatic chamber	Manual of the manufactures
17	Bench mounted hand press	Manual of the manufactures
18	Labolan	Manual of the manufactures
19	Multilight chamber	Manual of the manufactures
20	Balance	Manual of the manufactures

Annex 6

Needed equipment for the footwear and leather center- Physical tests

1	Testing Machine/tool	Reference standard /specifications	No of Units	Cost/unit $	Total cost S
1	Toe Caps Impact Tester	EN ISO 20344:5.4; EN ISO 22568-1; EN ISO 22568-2 Including: - Device to make plasticine cylinders; - 6 (six) pack of plasticine; - Dial gauge to measure the height of the plasticine; - Device for internal toecap length measurement, HILA HD08 - Clamping fork according to EN ISO 20344:5.4 and EN ISO 22568; - Impact striker according to EN ISO 20344:5.4 and EN ISO 22568;	1	12000	12000
2	Toe Compression Device,	EN ISO 20344 and EN ISO 22568;	1	1000	1000
3	Leak proofness Tester	, EN ISO 20344:5.7	1	4200	4200
4	Water Vapour Permeability Tester	EN ISO 20344; EN ISO 14268; EN 13515; ISO 17699; TM172; EN 420:6.3 Including: - 01 (one) Standard Cutting Die. - 03 (three) Kg of Standard Silica Gel; - 06 (six) Standard Glass Bottles.	1	5000	5000
5	Water Vapour Absorption Tester,	according to EN ISO 203446.7 Including: - 01 (one) Standard Cutting Die	1	2000	2000
6	“VAMP” Flexing Tester, with 12 stations	, ISO 5402-2; ISO 4643; ISO 5423; SATRA TM25	1	7000	7000

		Including: 01 (one) Sample cutting die			
7	ROSS" flexometer,	ISO 4643; ISO 5423; TM60 Including: 01 (one) Standard chisel;	1	6500	6500
8	“MARTINDALE” Abrasion Tester,	with 4 stations according to ISO 12945-2; EN ISO 5470-2; EN ISO 20344:6.12; EN 13520; EN ISO 17704; ISO 12947-1; EN 530; TM 31. Including: - 01 (one) Cutting dies for samples and reference abradant cloth; - 01 (one) set of standard sample holders and weights for 12 kPa pressure; - 01 (one) set of standard sample holders and weights for 09 kPa pressure; - 01 (one) Auxiliary weight (Ø 120 mm and 2,5 Kg); - 20 (twenty) Standard felt discs; - 40 (forty) Standard abradant fabric.		8500	8500
9	Sole Abrasion Tester	, ISO 4649; ISO 20871; SATRA TM 174 Including: - 01 (one) Sample cutting die	1	7000	7000
10	Electrical Conductivity Tester	EN ISO 20344:5.10 and IEC 61340-4-3	1	5000	5000
11	Penetration Resistance Device,	for non-metallic inserts, EN ISO 22568-4:5.1 (Annex A)	1	2000	2000
12	Device for Penetration Resistance of Footwear	, EN ISO 20344:5.8.2	1	1000	1000
13	seat Region Energy Absorption Device,	EN ISO 20344:5.14	1	2200	2200
14	Consumable materials	For one year use	1	2500	2500
15	Installation and training	Training on sample and travel cost	1	7200	7200
16	Other tools for the avaliable equipment	Load cell, plastic plates , environment metre	1	3000	3000
17	Office equipment and furniture		1	6000	6000
					82100

Needed equipment for the footwear and leather center- chemical tests

C	Testing Machine/tool	Reference standard	No of Units	Cost/unit	Total cost
1	HPLC-DAD	ISO 17234,ISO 17226, Testing of AZO dyes, & formaldehyde	1	65000	65000
2	GC-MS	ISO 16181, ISO 16186 for testing phthalates &Dimethyl Fumarate,	1	60,000	60000
3	UV Spectrophotometer	ISO 17075, for testing Chromium VI	1	10000	10000
4	ICP-OES	ISO EN 1811, for testing Nickle release, lead test	1	100000	100000
5	Vacuum rotary evaporator	with vacuum control and water bath	1	5000	5000
6	mechanical orbital shaker,	(100 ± 10) min−1.		3000	3000
7	Water Bath	Flask shaker	1	1500	15000
8	Analytical balance	0.01mg, 100g	1	6000	6000
9	Analytical balance	0.1 mg, 200g	1	2000	2000
10	Analytical balance	0.1g , 200g	1	1000	1000
11	Ultrasonic bath	Temperature adjustable 60 c	1	3500	3500
12	Oven	100 c	1	3500	3500
13	Ph meter		1	1000	1000
14	Auxiliary items and reagents	Polypropylene or glass column, Membrane filter, PTFE-membrane filter, PTFE-membrane filter, Glass, GC Vials, amber glass vials, Activated magnesium silicate cartridge, chemicals and reagents		10000	10000
15	RO	Water Purification	1	5000	5000
	Total				300000

Annex 7

Accredited labs

#	Name of Accredited Laboratory & Address	No. of Accreditation Certificate	Scope of Accreditation
1	Hijjawi Construction Labs-Nablus	LAC-002	Constructions & Building Materials
2	AL-Meezan Engineering Co Lab-Nablus	LAC-003	Constructions & Building Materials
3	Ramallah Material Testing Lab-Ramallah	LAC-004	Constructions & Building Materials
4	ACES CO. for Engineering Laboratories –Salfeet	LAC-008	Constructions & Building Materials
5	Center of Birzeit University Testing Laboratories- Food & water testing unit	LAC-009-A	Food, Water & Detergent
6	Center of Birzeit University Testing Laboratories- Petrol testing unit	LAC-009-B	Petroleum products
7	Jenin Center for Engineering Test Lab-Jenin	LAC-013	Constructions & Building Materials
8	Geotechnical& Material Testing Center Lab-Ramallah	LAC-014	Constructions & Building Materials
9	Scientific Center for Food & Drug Analysis Lab-Nablus	LAC-015	Food, Water & Detergent

#	Name of Accredited Laboratory & Address	No. of Accreditation Certificate	Scope of Accreditation
10	Analysis, Poison Control & Calibration Center- Biological & Chemical Analysis Unit An-Najah University	LAC-016	Food, Water & Detergent
11	Construction &Transportation Research Center Lab- AL Najah University.	LAC-018	Constructions & Building Materials
12	Center Public Health Laboratory - Ministry of Health – Ramallah	LAC-021	Food, Water & Detergent
13	ALetemad Eng.& Material Testing Center Lab- Jenin	LAC-022-A	Constructions & Building Materials
14	Palestine Center for Engineering Studies Lab- Qalquilia	LAC-023	Constrictions & Building Materials
15	The Lab. of Calibration Technology Center – Neiroukh Bros.- Hebron	LAC-025	Calibration
16	The Lab of Department of Service & Engineering Consultation Lab Palestine Polytechnic University -Hebron	LAC-026	Constrictions & Building Materials
17	The Lab of Emar Center for Engineering Studies Lab -AL –Bireh	LAC-030	Constrictions & Building Materials
18	Analysis, Poison Control & Calibration Center- Calibration Unit An-Najah University	LAC-031	Calibration

#	Name of Accredited Laboratory & Address	No. of Accreditation Certificate	Scope of Accreditation
19	Shadeed Lab. For Engineering Tests- Tulkarm	LAC-032	Constrictions & Building Materials
20	Al-Shamal Construction Labs- Tubas	LAC-033	Constrictions & Building Materials
21	National Center Company for Material Testing & Geotechnical Studies- Huwwarah-Nablus	LAC-034	Constrictions & Building Materials
22	Stones and Marble Quality Testing Lab. – Palestine Polytechnic University – Hebron	LAC-035	Constrictions & Building Materials
23	Akka for Civil Engineering studies & Testing Lab- AlBerih	LAC-038	Constrictions & Building Materials
24	Matrix Laboratory- Tulkarm	LAC-039	Constrictions & Building Materials
25	Kafaa Lab. For Quality & Excellence – Tulkarm	LAC-040	Constrictions & Building Materials
26	Al-Jinan Center for studies and Engineering Tests- Jenin	LAC-042	Constrictions & Building Materials
27	Attamayouz Lab. for construction materials testing – Qalquilia	LAC-043	Constrictions & Building Materials
28	Horizon center for engineering studies - Beit Lahem	LAC-044	Constrictions & Building Materials
29	Newtest lab. company – Hebron	LAC-045	Constrictions & Building Materials

Annex 8

Needed calibration equipment for Gaza.

No	Testing Machine/tool	Specifications Range /resolution	Units	Price /unit $	Total cost $
1	Mass Comparator	5100g/0.mg	1	`5000	5500
2	Balance 220g	220g/0.01mg	1	3000	3300
3	Set of weights	F1 range :1mg-20kg	1	2000	2200
4	Set of weights	M1 range :1mg-20kg	1	2000	2200
5	Temperature dry well calibrator	(-35 to 165)°C/0.01 °C	1	10000	11000
6	Digital Thermometer	(-200 to 1371)/ 0.1 °C		1000	1100
7	Digital Pressure Indicator with manual pump for field work up to 700 bar (water) Minerva	(0 to 700) bar	1	3000	3300
8	Digital Reference Pressure Gauge	(0 to 700) bar, 0.01 Bar	1	1000	1100
9	Set of block gauges	(1-100) mm/1mm	1	1000	1100
10	Individual block gauges	(200-600) mm/1mm	1	1000	1100
11	Digital Caliper	(0 - 300)mm/0.01mm	1	200	250
12	Digital Micrometer	(0 - 25)mm/0.001mm	1	200	250
13	Micrometer	(25 - 50)mm/0.01mm	1	200	250
14	Micrometer	(50 - 75)mm/0.01mm	1	200	250
15	verification glass 20 liter	glass 20 ltr	1	2000	2200
	Office equipment and Furniture				6000
	Total				40000

Annex 9

Furniture needed equipment

No	Testing Machine/tool	Specifications	Units	Price /unit $	Total cost $
1	Arm Durability test machine	EN and ISO Standards	1	19500	19500
2	Arm Sideways test machine	EN and ISO Standards	1	3000	3000
3	Chair drop test equipment	EN and ISO Standards	1	5000	5000
4	Pendulum impact hammer	EN and ISO Standards	1	3500	3500
5	Seat front edge durability test machine	EN and ISO Standards	1	32000	32000
6	Stability test equipment for seating	EN and ISO Standards	1	15000	15000
7	Upright chair test machine	EN and ISO Standards	1	33000	33000
8	Vertical impact test machine	EN and ISO Standards	1	19500	19500
9	Horizontal durability test machine	EN and ISO Standards	1	19500	19500
10	Steel impact plates - (1 set)	EN and ISO Standards	1	1500	15000
11	Steel weights	EN and ISO Standards	200	5000	5000
12	Bowmeters various size (1600 MM, 1200 MM, 800MM & 600 MM)	EN and ISO Standards	1	2000	2000
13	Vertical test machine for beds	EN and ISO Standards	1	19000	19000
14	Drawer cycling machine	EN and ISO Standards	1	7500	7500
15	Drawer slamming machine	EN and ISO Standards	1	2000	2000
16	Equipment for wall mounted and top hanging items	EN and ISO Standards	1	6000	6000
17	Single cylinder test machine	EN and ISO Standards	1	24000	24000
18	Pivoted door cycling machine	EN and ISO Standards	1	9000	9000
19	Flammability test equipment	EN and ISO Standards	1	24000	24000

20	Calibration Jack		1	5000	5000
	Installation			15000	15000
	Commissioning and calibration			12000	12000
	Training			15000	15000
	Shipment			10000	10000
	Total equipment				315500

No	Testing Machine/tool	Specifications	Units	Price /unit $	Total cost $
1	Compressed air supply		1	2000	2000
2	Supply of gas		1	1000	1000
3	Furniture including shelves, office	10 m square shelves , 2 offices	1	6000	6000
4	Office equipment Computer	Desk top	2	1500	3000
5	Air condition	1.5 ton	2	1500	3000
	Total supplies				15000
	Total for the lab				330500

Most important machines items, 3,4,8,10,11,12,17,19,20 plus – training and instillation-about 150000 $

Annex 10

Textile laboratory

No	Testing machine	**Specifications**	No of units	Unit price	Price US $
1	Laboratory dyeing machine- ECO dryer	18 pieces of 300cc pot, electric heat conducting type laboratory dyeing machine which offers advantages of a Glycerin type dyeing machine, and also provides features of an infrared type dyeing machine, provides improvements on the two conventional designs. Touch screen controller.	1	7000	7000
2	Laboratory drum dyeing testing machine,	Drum color , single compartment using for shrinkage test fixing color test and repairing dyed material.	1	6000	6000
3	Laboratory oscillating dyeing machine.	Single bath type, standard type Suitable for laboratory applications under atmospheric temperature, such as recipe dyeing test, soaping, fixing, bleaching test etc. after treat process	1	2000	2000
4	Laboratory hot air drying oven	For -drying samples after centrifuging, with standard accessories	1	2000	2000
5	Multi-light color assessment cabinet.	6 light ,Specially designed to supply standard, objective light for further precisely control Q.C. and contrast of material, 1color of products.	1	1000	1000
6	Laboratory stirrer	Magnetically coupled stirring action offers variable speeds up to Max. 720rpm, covering virtually any application. (Mixing dyestuffs). with 12 PCS of glass bottles and stirrer	1	1000	1000
7	Tensile machine	Up 1000 N	1	6000	6000
8	Balance	5kg, 0.001g		4000	4000
9	Installation and training		1	5000	5000
10	Office equipment and Furniture		1	6000	6000
	Total				40000

Annex 11

Packaging center testing machine

No	Testing machine	Conducted tests	Use
1	Enamel tester	measure the integrality of internal coating of containers	Cans
2	Gloss meter	measure the specular reflection of a surface such as gloss	texture, plastic, card, paper
3	Brightness meter	measure the whiteness of flat surfaces or powders	textile prints, dyes, building materials, cardboard and paper as well as plastics.
4	Ink rub tester	abrasion resistance test of printing works	cardboard and paper
5	Smooth tester	determination of smoothness	cardboard and paper
6	Bendtsen Permeability tester	measuring the air permeability and surface roughness according to Bendtsen method.	Paper
7	Pneumatic bursting strength tester	determination of bursting strength and bursting distension	textile fabrics, knitted fabrics, woven fabrics, nonwoven fabrics, laminated fabrics
8	Tensile strength tester	find out how strong a material is and also how much it can be stretched before it breaks	plastics, rubber and elastomers industry
9	Cobb test	determines the amount of water absorbed into the surface	paper, paperboard
10	Crush tester	crush tester	corrugated board, tubes, paper and plastics
11	Elmendorf tearing strength tester	describe how well a material can withstand the effects of tearing	plastic film, paper and textile industries
12	Short Span compression tester	measure the compression strength	paper and board
13	Box compression tester	determination of the compression strength	cardboard and paper
14	Corrugated board puncture tester	determines the board's resistance to penetration by sharp and solid objects	cardboard and paper
15	Concora Medium fluter	determine of flat crush strength of corrugated paper	cardboard and paper
16	Porosity	test the air permeability	fabrics, paper, plastic film, metal,
17	Coefficient of friction	measure the static friction coefficient and dynamic friction coefficient	plastic films and sheets (or other similar materials), paper

18	Plastic thermal aging oven	tests the exposure conditions to which plastics should be exposed to test their resistance to oxidation or other types of degradation occurring over time	plastic materials
19	Automatic densimeter	Measures specific gravity of a wide range of substances	rubber, plastic, electric wire, hard alloy
20	Rockwell hardness tester	determining the depth of penetration of the indenter under a known load.	plastic, composite materials, friction materials, soft metals
21	Dimensional tester	2D measurement (points , lines, circles , arcs, rectangles, and other geometric elements and parts of the length)	where applicable
22	Seal integrity tester	leakage test	where applicable
23	Melt flow index	determine the melt mass-flow, the melt volume flow, the melt density of thermo resin	plastic, nylon
24	Drying oven	designed to remove moisture from the oven chamber so to dry the samples as quickly as possible	

Annex 12

Solar and PV

1.Solar Lab

No.	Item	Description	Quantity	Unit Price $	Total $
1	Pressure pump	Supply portable electric hydraulic pressure pump up to 10 bars, European made, price includes safety valve, air bleed valve, pressure gauge, non-return valve, and pressure control valve with 1 bar resolution and all other necessary accessories for the safe operation of the device.	1	2000	2000
2	Digital ambient air thermometer	Supply digital (ambient air) thermometer split-type (sensor is separated from the reader with connecting wire in between),required range of -30^{o}C to 100^{o}C and accuracy of + 0,5^{o}C price includes proper means for mounting of the sensor (clipper or holder), also data recording interface for data acquisition.	2	100	200
3	Digital water pipe thermometer	Supply digital (water pipe) thermometer split-type (sensor is separated from the reader with connecting wire in between) the sensor should be suitable for hot water pipe, temperature required range of 0 to 100^{o}C and accuracy of + 0,1^{o}C, price includes proper mounting means for the sensor on the pipe surface (clippers, holding cylinders …etc) also data recording interface for data acquisition.	4	100	400
4	Circulation pump	Supply hot water circulation pump up to 100^{o}C water temperature, European made, up to 3 m^{3}/hr flow rate @ 10 m head. The pump should be inverter type (variable speed) with control over head and flow, price includes suitable strainer at the pump inlet, flow meter, pressure gauge, and one-way valve at discharge side.	1	1500	1500

5	Solar irradiance simulator	Supply locally assembled solar irradiance simulator, xenon or halogen light pulps grid, with steel profile frame, shading board, and solar collector mounting frame at suitable distance from lights grid plan, all according to engineering drawing and dimensions, the solar simulator should be capable of providing 1050 W/m2 for a 250 cm * 150 cm area, the price includes all cabling, electrical board, switches, safety devices, and any necessary labor and works required to finish the job as per engineering supervision.	1	12000	12000
6	Pyranometer	Supply thermopile Pyranometer Class I or better according to ISO 9060 with responsivity + 1 W/m2, stability: + 1%, temperature response: + 1%, spectral sensitivity (0.3 -3.0 µm): + 2%, linearity: + 1%, and range: 0-1200 W/m2. Price includes removable shadow ring and proper mounting means			
		With analogue output	1	900	900
		With digital output	1	1000	1000
7	Pyrgeometer	Supply class brand pyrgeometer with wide range spectrum with digital output.	1	1200	1200
8	Anemometer	Supply class brand digital anemometer with vane probe,range of 0 to 10 m/s and required accuracy of + 0,5 m/s, the price includes a suitable holder or fixer for positioning the probe perpendicular to a flat surface or on metal beam, the price also includes one spare vane probe.	1	1200	1200
9	Pressure gauge	Supply class brand analogue pressure gauge 0 – 10 bars scale for hot water applications.	2	125	250

10	Electric in-line water heater	Supply 3-phase in-line electric water heater with appropriate size as per engineering requirement. Price includes outlet temperature control and monitoring.	1	1500	1500
11	Water Chiller	Supply class brand, European made, inverter type, water chiller for cooling only purposes, with maximum capacity of 16 KW and ESEER not less than 6.5, the unit should be of the compact model (Plug & Play) with internal built in hydraulic module (water pump, buffer tank, and all valves fittings and safety measures).	1	12000	12000
12	Air Blower (Wind Generator)	Supply class brand air blower/fan inverter drive with speed control, price includes suitable mounting base with orientation adjustments as per engineering instructions.	2	1000	2000
13	Flow meter	Supply class brand digital flow meter with mass or volumetric flow meter in the range of 0 - 1000 lit/hr and required accuracy of +1% for hot water applications, as per engineering instructions and specifications.	1	2000	2000
14	Ball Valves	European made, various sizes, as per engineering requirements.	8	50	400
15	Air Vents	European made various sizes, as per engineering requirements.	2	30	60
16	Sight glass	In-line hot water pipe sight glass segments with fittings.	2	125	250
17	Plate Heat Exchanger	Cross flow water-water plate heat exchanger up to 16 KW capacity as per engineering specifications.	1	1200	1200
18	Expansion Tank	European made, various sizes, as per engineering requirements.	1	600	600
19	Differential Pressure Gauge	European made Differential pressure gauges for measuring pressure drop of liquid water through the heating collector. range of 0 – 1 bar and required accuracy of 1% full scale.	1	100	100
					43000

2.PV lab

No.	Item	Function Description	Quantity	Unit Price $	Total $
1	Installation inspection equipment according to IEC 62446.	1. Ability to test single and three phase pv installation. 2. Efficiency measurement of AC and DC sides of the system. 3. I-V curve up to 1500V 4. Voc and Isc 1500V and 15A respectively 5. Ability to Store database of thousands of PV modules 6. Ability to auto start measure multiple strings in sequence 7. Irradiance (W/M^2)and temperature (◦C) measurement. And ability to display real time irradiance and temperature. 8. Cell reference to measure the actual module surface irradiance ($W/M^{2)}$. 9. Temperature sensors to measure the module surface temperature and the environment temperatures (◦C). 10. Irradiance and temperature remote to read the measured values and send it the main unit tester by USB and RF. 11. The needed clamp meters to get the ability to measure fully both AC and DC sides V, I, P, and efficiency. 12. Active P, Reactive Q, Apparent S Power/Energy 13. Ability to provide immediate test results. 14. Module or string output DC voltage, current, and power 15. Modules resistance measurement 16. Device to measure PV panels inclination. 17. Ability to perform measuring values comparison with standard conditions. 18. Internal memory for saving measured data 19. Ability to recall results on screen 20. USB to connect PC include onboard software. 21. Recording parameters on time duration	1	23,000	23,000

		22. DC power measurement, AC active power measurement 23. DC Efficiency correction in relation of measured Temperature and irradiance 24. Numerical and graphical display of I-V characteristics. 25. Provided PC interface with software for Windows 26. Evaluation test result. 27. Include all terminals and cables, wires, accessories that able the unit full functions.			
2	Testing efficiency of single and three phase PV system of single or multi strings and analysis of power quality according to EN 50160	1. Single-phase/three-phase photvoltaic systems' testing. 2. Ability to measure DC/AC TRMS of current. 3. Ability to measure the DC/AC power. 4. Ability to measure the AC energy. 5. Ability to measure the power factor of single and three phase. 6. Ability to measure solar irradiation w/m^2. 7. Ability to measure the temperature ◦C. 8. Ability to measure the voltage and current harmonics up to the 49^{th} order. 9. Ability to measure the voltage anomalies. 10. Flicker analysis in compliance with standard EN50160 11. Ability to measure inrush currents with resolution of 10ms. 12. Ability to measure voltage transient spikes with resolution of 5microseconds. 13. Ability to perform a full analysis of mains quality according to the standard EN50160 14. Ability to display numerical and graphical display of each measured quantity. 15. Ability to recall all measured quantities and results on its display. 16. Touch and colored display. 17. Ability to use it away from AC source depends on battery with ability for recharge and include charger.	1	23,000	23,000

		18. Compact flash memory and memory extension, USB memory, USB port connection. 19. Help online at the display. 20. DC side efficiency of the photovoltaic field. 21. Cell reference to measure the actual module surface irradiance ($W/M^{2)}$. 22. Temperature sensors to measure the module surface temperature and the environment temperatures (◦C). 23. Irradiance and temperature remote to read the measured values and send it the main unit by USB and RF. 24. Voltage unbalance (NEG%, ZERO%) 25. Active P, Reactive Q, Apparent S Power/Energy 26. Voltage and current harmonics up to the 49th with THD 27. Voltage anomalies (dips, peaks) with a resolution of 10ms (@ 50Hz) 28. Voltage anomalies (dips, peaks) with a resolution of 10ms (@ 50Hz) 29. Voltage Spikes with 5µs resolution 30. Electric motor starting current (INRUSH) 31. Test Voltage flickers (Pst, Plt) 32. Test Phase sequence 33. Test Neutral-Ground Voltage 34. Test Neutral current 35. Internal memory extension with Compact Flash card 36. Power supply with rechargeable battery and battery charger 37. Provided PC interface with software for Windows 38. USB port for data download onto Pen Drive 39. Voltage/current vector diagram 40. Tables or histograms of Harmonics and THD% 41. Voltage/current waveforms 42. Summary table of main electric parameters. 43. The needed clamp meters to get the ability to measure fully both AC and DC sides V, I, P, and efficiency. 44. Testing PV module inclination.			

		45. Include all terminals and cables, wires, accessories that able the unit full functions.			
5	Digital infrared camera	1. Light capacitive touch screen 2. Laser pointer 3. Visual image camera 4. Built in flash LED 5. 50HZ high resolution even with moving parts 6. Up to 3 independent cursors 7. high resolution 384*288 8. ability of PIP fusion function for combination of thermal and visual images 9. micro SD card memory 10. USB connection 11. Temperature range -20̊ C - 400̊C 12. Thermal sensitivity less than 0.06̊C @30˚C 13. Spectrum range 8-14micro meter Zoom 1x – 20x. 14. Thermal sensitivity <0.06̊C @ 30̊C	1	11,000	11,000
6	Flash test equipment (sun irradiance, temperature) simulator	1. Testing PV module out puts on the STC conditions. 2. Testing output of PV (I-V curve), maximum power output, Voc, Isc. 3. Fully computerized and ability to perform test manually or automatic. 4. Ability to perform test on different types PV modules and dimensions. 5. Ability to connect the simulator to external PC and printer to save and print the test report. 6. Ability to save thousands of PV manufacturers IV curves. 7. Ability to evaluate the tested modules IV curves with manufacturers IV curves. 8. Gives the defect and IV curves evaluation.	1	11,000	11,000
				Total	68,000

Annex 13

New test needed for several sectors

A-Plastic industry

No	Testing Machine/tool	Specifications	units	Price /unit $	Total cost $
1	Carbon black content apparatus	Protect product from UV	1	1000	1000
2	Carbon Black Dispersion	For Pipes	1	1000	1000
3	Opacity tester	For plastic welding of pipes	1	1000	1000
4	Digital Density Apparatus	For final product	1	1000	1000
5	Bulk Density	For plastic powder	1	1000	1000
6	measurement of opacity	Oxidization time		5000	5000
7	Test Chamber	UV effect	1	7000	7000
	Total				17000

B-Equipment for testing of safety doors

No	Testing Machine/tool	Specifications	units	Price /unit $	Total cost $
1	Impact test	ENV1629		15000	15000
2	Periodic Operating	Cable of continuous run more than 25000 time		15000	15000
3	Resistance Pressure test	ENV1628		20000	20000
4	Fire door	EN 1364, 1363 and ISO 834-1, 3008-1		250000	250000
	Total				300000

Priority to fire door cost about 250000

C-Testing of Electrical Cables – Gaza lab

No	Testing Machine/tool	Specifications	units	Price /unit $	Total cost $
1	Singe Digital Dc High Voltage Breakdown Tester, 230 V	DC High voltage Usage/Application Tester for cable Brand Quality Instruments Power Supply 230 V ,Display Type , Digital, Phase , Singe, Color , BLUE	1	17000	17000
2	Partial discharge tester PD 4000B	5500 AC voltage measurement 6000 DC voltage measurement Frequency range active microwave antenna 1.57GHZ Frequency range active inductive decoupling 400MHZ Limit value PD Limit value PD with phase PDIV inception voltage PDEV extinction voltage		14000	14000
3	Low temperature tester for cable (Low temperature impact test apparatus)	Mass of hammer for power cables in fixed installations Rang 100g – 1500g Rang 100g – 600g for flat cables		1000	1000
	Total				32000

Annex 14

Paint lab

No	Testing Machine/tool	Specifications EN ---	Units	Price /unit	Total cost $
1	Ford flow viscometer		1	300	300
2	Digital kreps viscometer	37-141 Kreps	1	6000	6000
3	Gloss instrument	3 angels – 20-60-85	1	5000	5000
4	Opacity instruments		1	4000	4000
5	Wet abrasion scrub tester		1	11000	11000
6	Automatic film applicators		1	10000	10000
7	applicators	50-100-150-300 micron	3 from each size-12 piece	200	2400
8	Cylinder mandrel bend tester	5,10,15 mm	1	3000	3000
9	Drying time recorder		1	3500	3500
10	Furnace	0-200 c	1	5000	5000
11	Grinding indicator	0-100 micron		1000	1000
12	Digital moisture tester		1	1000	1000
13	Stainless steel specific gravity cup	100 ml	1	700	700
14	Digital thickness gauge		1	1500	1500
15	Balance	0-2kg, resolution 0.01g	1	1000	1000
16	PH metre		1	1000	1000
17	Veri vide		1	3000	3000
18	Corrosion tester		1	12000	12000
19	Digital temerture indicator		1	100	100
20	Moisture analyzer		1	4000	4000
21	Plastic and glass films , steel plates, Special coated carton films			4000	4000
					80000

Annex 15

Equipment for Gaza Food lab

No	Testing Machine/tool	Units	Price /unit	Total cost $
1	Drying oven	2	2500	5000
2	Incubater	2	2500	5000
3	Muffel Furnace	1	14000	14000
4	Mixer	4	500	2000
5	Vortex mixer	4	1000	4000
6	Hotplate with magnatic mixer	4	600	2400
7	Refregirator	2	3000	6000
8	Deep freezer -70 c	1	15000	15000
9	Autoclave vertical	1	8000	8000
10	Analytical balance	2	1800	3600
11	Elizer reader	1	10000	10000
12	High speed centrigue	1	18000	18000
13	Centriguge	1	6000	6000
14	Water bath	2	1200	2400
15	Microwave digester	1	15000	15000
16	Micrfilter Millipore	2	4000	8000
17	LAF Biohazard	2	17000	34000
18	UV/Vis Spectrophotometer (Diode Array Detector)	1	30000	30000
19	UV/Vis Spectrophotometer (PMT Detector)	1	45000	45000
20	FTIR Spectrometer	1	75000	75000
21	UPLC (Gradient)	1	70000	70000
22	GC-MS complete with Pesticides & Drugs Libraries	1	180000	180000
23	Heating Mantle	3	5000	15000
24	Shaker	1	3500	3500
25	Digital Microscope w/ Camera	1	3500	3500
26	CO2 Tester for boverage	1	5000	5000
27	Gluten Sensor (Portable)	1	1000	1000
28	Hectoliter Tester (Portable) Complete kit	1	2500	2500
29	Flame Photometer	1	20000	20000
30	Polarimeter (Automatic-Digital)	1	17000	17000
31	Viscometer	1	10000	10000
32	Calorimeter System	1	17000	17000
33	Atomic Absorption Spectrometer	1	100000	100000

34	Inframatic and grain analyser	1	35000	35000
35	Glutomatic gulten index system	1	30000	30000
36	Solvent recovery extractor for fats and oils DET-GRANS	1	2000	2000
37	Labortaory Mil	1	60000	6000
				812000