



## **TERMS OF REFERENCE (TOR)**

### **Iran HCFC Phase-out Management Plan (HPMP) Stage II 150200**

---

#### **1. Background**

UNIDO is jointly implementing a project in the Islamic Republic of Iran on hydrochlorofluorocarbon (HCFCs) phase-out management plan Stage II funded by the Multilateral Fund for the Implementation of the Montreal Protocol, together with UNDP, GIZ and UNEP. The overall objective of the project is to assist the country to comply with the adjusted control schedule for Annex – C Group-I substances (HCFCs) under the Montreal Protocol. UNIDO has been assigned to be responsible mainly for the foam sector for the domestic refrigerator manufacturing and procurement of equipment for the refrigeration servicing training centers.

#### **2. Project description: HPMP Stage-II (2016 to 2023)**

In the HPMP Stage-II period from 2016 to 2023, the focal areas for action are identified:

- HCFC phase-out in the foam sector is resulting in complete phase-out of HCFCs in foam application. This project will include phase-out of HCFCs from formal sector as well as informal sector.
- Addressing HCFC consumption in the refrigeration and air-conditioning sector (manufacturing) on priority basis given the high consumption levels as well as consumption growth coupled with the availability of low GWP energy efficient technologies. It must be noted that technical assistance support would be made available to a large number of SMEs to facilitate the process of their adoption of low GWP and commercially viable alternatives.
- Technical assistance to small SMEs combined with technology and equipment.
- Addressing service sector to build capacity of service agencies for reducing HCFC use in servicing.
- Adopting a sectoral/sub-sectoral approach in the phase-out strategy to offer a level playing field to all market players.
- Providing project-monitoring support to ensure that HCFC phase-out activities are implemented in a systematic and phased-manner.

The Government of Iran proposes to use low GWP HC based technologies in foam sector wherever feasible. The Government of Iran, after careful and thorough consultations with the industry, recognizes the importance of safety while adopting flammable alternatives in different applications and in their strategy, supports measures to ensure that the alternatives are adopted in a safe manner. Under the proposed plan, the Government of Iran would phase-out HCFCs in different applications in the further explicated manner.

#### **3. Scope**

The project document and the inventory conducted in 2015 identified 9 companies which will be converted through the MLF financial support.

This TOR related to the conversion of five of those Beneficiary companies from HCFC-141b to cyclo-pentane, namely the following Beneficiary companies:

- A. Parto Shiva Sanat, Company Berta in Jajrood, Iran
- B. Javaheran Tehran company in Tabriz, Iran
- C. Evans insulating systems in Tehran, Iran.

D. Arvin dey (Charmahali) in Hamedan, Iran.

E. Takran Mobared (East Cool) in Qom, Iran

The Terms of Reference (TOR) describe the services and equipment that shall be provided by the selected contractor and also describe the responsibilities of each party. The signed contract, as well as the working arrangement, will be shared with the National Ozone Office of the Iranian Government.

The contract will supersede the terms and conditions in this working arrangement when signed.

**The offer should contain:**

- a. a detailed description of every major equipment item,
- b. detailed and itemized cost breakdown,
- c. the technical data and performance levels including the density and thermal conductivity of foams to be produced by the offered equipment,
- d. sustainability of foams produced by the offered equipment and proposed input materials
- e. safety measures intended to apply,
- f. tentative layout(s), and
- g. indication of options which are included in this TOR and separately those which are not included in the TOR, and items which are not included in the scope of supply and/or in the price of the offer but required/recommended by the supplier, should be explicitly listed, indicated and budgeted whenever appropriate.

All deviations from the Terms of Reference should be clearly indicated and explained in the offer. Partial and/or not binding offers or offers without indication of the name of original equipment manufacturer (if not identical to the bidder itself) of major equipment items will be rejected.

**4. Responsibilities of the respective Beneficiary Company**

Beneficiaries confirm and accept the following terms and conditions:

- 4.1. Beneficiary shall submit the request letter for the MLF financial support and indicating top management commitment for HPMP.
- 4.2. Confirm availability of competent personnel for safe handling of hydrocarbons.
- 4.3. Confirm to provide reports of production and also HCFC consumption with evidence and photos for three years before the contract issuance (2017, 2018, 2019), during contract implementation and until 2 years after installation, commissioning and start-up of the equipment.
- 4.4. Ensure that employees and relevant stakeholders are aware of the safety requirements of using flammable alternatives. (UNIDO can suggest someone to do the training or do 1-2 training sessions and bear the training cost.)
- 4.5. Confirm to provide evidence-based documents required for identification of required equipment specifications and will cooperate in developing the business plan.
- 4.6. Confirm that the equipment specifications to be suggested by UNIDO meet their needs for conversion of their production to non-HCFC and non-HFC based production, and the signed document will be added as Appendices.
- 4.7. Agree to provide all the preparatory works and the services as specified in Appendices): “Scope of Supply and Services”; including but not limited to all required civil engineering and construction work, mechanical, piping, utilities, testing, human resources, security measures of the premise and any other additional work that is agreed.
  - 4.7.1. Ensure that the personnel/sub-contractors assigned by the Beneficiary to the projects shall work under the direct supervision of the project coordinator and the representative of the supplier of the technology.

- 4.7.2. Be committed to processing all the payments associated with its agreed services as specified under this clause in time as agreed upon in the tender documents in order to prevent the occurrence of any delay in the implementation of the project.
- 4.8. Absorb the financial losses occurring in case of suspension of the production of the Beneficiary or due to either reckless handling or manipulation of the equipment and actions by the Beneficiary staff or the use of incompatible/inefficient equipment and machinery at the premise, which might be needed for rebuilding, replacement, installation and production trials of the equipment, supporting and safety systems.
- 4.9. Prepare and, where needed, provide UNIDO with all necessary legal documents, permits, certificates etc. required for the starting and implementation of the conversion and permitting full operation of the new process. The compliance of the documents and all the legal issues for permitting the Beneficiary to participate in the phase-out will be verified by Department of Environment protection in Iran (DoE)/NOU.
- 4.10. Appropriately render all actions needed to dismantle and/or destroy any equipment designed for the use of HCFCs upon installation and commissioning of the new equipment. The replaced equipment must be destroyed and thus confirmed in a written form by the Beneficiary. The destruction process will be monitored and shall be confirmed by DoE/NOU.
- 4.11. Agree to convert its HCFC-141b foam production processes to a hydrocarbons system as specified in the project document and be committed to finally and permanently phasing-out all CFC, HCFC and HFC use in all its production line, and refrain under any circumstances from using CFC, HCFC and HFC again in the future.
- 4.12. Provide a progress report every 6 months during the contract period in the format specified by UNIDO.
- 4.13. Ensure that during the tendering process, its associates and other persons having a direct relation with the Beneficiary shall not in any form communicate with suppliers about any issue related to the tender. Any breach will lead to the immediate disqualification of the supplier. All requests from suppliers regarding the tender shall be addressed only to the authorized staff of UNIDO.
- 4.14. Confirm that the legal ownership of the equipment, granted to the Beneficiary enterprise under HPMP-Stage II approved at the 77<sup>th</sup> ExCOM, belongs to DoE for 10 years after the equipment is transferred from UNIDO, based on the article 120 of Islamic Republic of Iran's Custom Affairs law, commencing from the date of custom clearance of the equipment.

## **5. Description of required services and equipment to be delivered**

Deliverables under the contract to be provided as a result of this bidding procedure shall be undertaken under the working arrangement articulated for each Beneficiary company.

### **5.1. Site visit and technical assessment**

The Contractor shall visit the Beneficiary Companies to conduct technical assessment and submit the technical assessment report including the following:

- i. technical specifications of the polyurethane form specifications before and after the conversion
- ii. a work plan agreed to by the Beneficiary Companies
- iii. plant schematic diagrams
- iv. technical specifications of civil work needed by the Beneficiary Companies
- v. utility requirements to be provided by the Beneficiary Companies

A site visit is possible for bidders in the tendering stage and mandatory for the Contractor in the first two months of Contract implementation. In case a site visit is foreseen by bidders during the tendering stage, they

should communicate their request to UNIDO within a reasonable timeframe before the end of the submission deadline. A site visit can be held individually or in a group and has to be accompanied by a UNIDO representative.

The National Ozone Office will be informed of the assessment results at a face to face meeting during the site visit. An initial assessment report containing the above as well as list of people visited and their contact information will be submitted to UNIDO.

#### 5.2. Equipment

Based on the site visit, the Contractor will confirm that the list of equipment and their technical specifications described in Appendix A, B, C, D and E for each company meet the needs of the Beneficiary Companies. The list of the finalized equipment and their technical specifications will be submitted to UNIDO for review. The construction of the equipment can be initiated only after UNIDO's acceptance of the final list of equipment. The new setting of piping and cables are to be equivalent to the old unit.

The expected guarantee period of the equipment: 12 months after issuance of the Certificate of Acceptance.

#### 5.3. Transport

An offer should indicate the offered transport option as per INCOTERMS 2010, such as DAP, EXW or others. In case of EXW, please attach a price quote from a partner transport company, if any.

UNIDO Iran Office is capable of handling the customs clearance.

#### 5.4. Installation, Commissioning, and Acceptance

Qualified staff members of the Contractor will visit the Beneficiary Companies for installation, commissioning, and acceptance following UNIDO's Contract terms and requirements. The Certificate of Acceptance will be signed by all involved parties and submitted to UNIDO.

#### 5.5. Training of Local Operators

During the installation, commissioning, and acceptance period, the Contractor will provide training on safe handling of input materials, manufacturing process, safety systems, problem solving, maintenance, etc. following the terms of training found in the Appendices (A.7, B.7, C.7, D.7, E.7).

#### 5.6. Technical Support and Local Representatives

Please indicate the terms and conditions of offered technical support, referring to the example found in the Appendices (A.6, B.6, C.6, D.6, E.6).

#### 5.7. Maintenance and Spare Parts

Please indicate offered spare parts, numbers, and breakdown of costs. Please see Appendices.

5.8. Installation, commissioning, training and after-sale and equipment maintenance services shall be provided through a registered and accredited Iranian service provider.

### 6. General Time Schedule

The equipment needs to be commissioned within 11 months upon the signature of the contract.

Installation, commissioning and trial test of the new production line shall start not later than four months after the date of delivery of the equipment at the Beneficiary.

### 7. Personnel

To perform the activities specified herein, the Contractor will engage staff members and consultants as needed. The Contractor should clearly indicate academic and professional background of each member involved in the proposed activities and how long they will be involved in what activities including cost breakdown.

The qualifications required for those who will be leading this work include experience in conducting detailed technical assessment as well as installation and commissioning of the equipment in emerging markets. Knowledge on the Montreal Protocol and the Kigali Amendment to phase down HFCs is highly desirable.

## 8. Reporting

Reports shall be submitted by the Contractor as per paragraph 10 below. All reports for submission to UNIDO should be made available in electronic formats (PDF and MS-word compatible formats).

The Contractor will regularly inform UNIDO in writing on the progress of the assignment by copying all important communication at least once every two months or when major milestones are reached or major change needs to be made.

## 9. Language Requirements

All reports to be submitted need to be in English or accompanied by an English translation. All written material submitted to UNIDO should be of such quality that no additional technical editing is required.

## 10. Deliverables and suggested payments schedule

Payments will be made within 30 days after approval submitted by the contractor to the UNIDO, confirming that the required activities are delivered, and upon receipt of respective invoice. The following deliverables will be requested:

Proposed Time	Deliverables	Payment in % of the contract cost
Upon signature of the contract	Submission of <b>countersigned contract</b> incl. a <b>tentative work plan</b> . Invoice	<i>Not specified</i>
2nd Month	<b>Site visit and technical assessment report</b> , including i. technical specifications of the polyurethane foam specifications before and after the conversion ii. a work plan agreed by the Beneficiary Companies iii. plant schematic diagrams iv. technical specifications of civil work needed by the Beneficiary Companies v. utility requirement to be provided by the Beneficiary Companies  <b>Finalized list of equipment and their technical specifications</b> Invoice	<i>Not specified</i>
7th Month	<b>Shipping documents</b>  Proof of equipment delivered at the Beneficiary Companies  Invoice	<i>Not specified</i>
11th Month	<b>Final Report</b> on the completion of installation, commissioning, training and acceptance.  At least 10 <b>photos</b> of the equipment and training sessions including those of the staff and trainees of the Beneficiary Companies	<i>Not specified</i>

Proposed Time	Deliverables	Payment in % of the contract cost
	Certificate of Acceptance signed by all stakeholders	
	Invoice	

## 11. Dispute Resolution

As per UNIDO's general contractual terms and conditions, in case of disputes between the parties involved, the following applies:

### 11.1. Amicable Settlement:

The Parties shall use their best efforts to settle amicably any dispute, controversy or claim arising out of, or relating to this Contract or the breach, termination or invalidity thereof. Where the parties wish to seek such an amicable settlement through conciliation, the conciliation shall take place in accordance with the UNCITRAL Conciliation Rules then obtaining, or according to such other procedure as may be agreed between the parties.

### 11.2. Arbitration:

Unless, any such dispute, controversy or claim between the Parties arising out of or relating to this Contract or the breach, termination or invalidity thereof is settled amicably under the preceding paragraph of this Article within sixty (60) days after receipt by one Party of the other Party's request for such amicable settlement, such dispute, controversy or claim shall be referred by either Party to arbitration in accordance with the UNCITRAL Arbitration Rules then obtaining, including its provisions on applicable law. The arbitral tribunal shall have no authority to award punitive damages. The parties shall be bound by any arbitration award rendered as a result of such arbitration as the final adjudication of any such dispute. It is understood, however, that the provisions of this paragraph shall not constitute nor imply the waiver by UNIDO of its privileges and immunities.

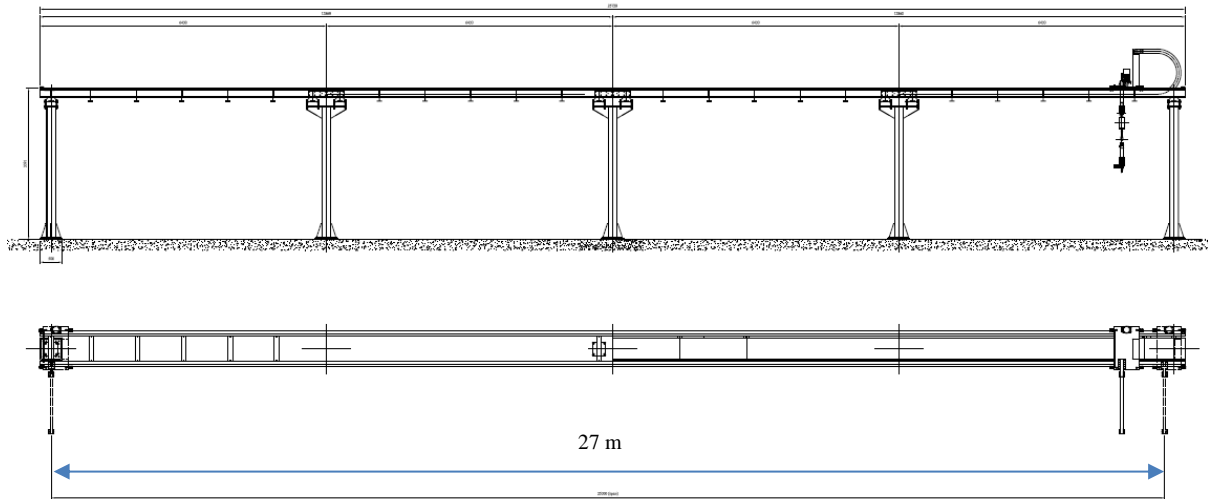
**Appendix (A)**  
**Required services and equipment to be delivered at**  
**Parto Shiva Sanat**

### A.1 Equipment specifications for the tendering and purchase of equipment in Parto Shiva Sanat

#### A.1-1 High-pressure, PU foam dispensing unit with variable output up to about 80 l/min at ratio 1:1 for the insulation of cabinets for domestic refrigerators using cyclopentane based systems

Description of basic unit	High pressure mixing head PU dispensing unit with variable output between 20-80 l/min		Compliance Yes/No
	Output range at ratio 1:1	~ 20-80 l/min.	
Configuration of basic unit	As a minimum, the unit must be equipped with	Self-cleaning filters before the component pump	
		Inlet pressure control to the pumps	
		Min/max. mixing pressure control	
		Gauge for pump inlet and mixing pressure	
		Safety valves or rupture disks for high pressure, to be connected to the tank-return piping.  All electrical components to be pre-grounded	
Pumps (2)	Equipped with pumps with single speed motors with electromagnetic couplings and be EX-proof		
	Equipped with liquid control on the suction side, assuring continuous positive pressure on the suction side		
	Installed in an enclosure equipped with drip pans and two independent air extraction units locked in with the gas detection and control system		
Mixing head with nitrogen flushing and railing system	One (1) hydraulically operated, self-cleaning mixing head. The head must be horizontally mounted on a balancing (lifting) device to facilitate comfortable handling of the mixing head by the operator. The head will be positioned on the railing system for manual positioning in the vertical direction to allow injection into the bores.  Railing system: The mixing head is to be mounted on the motorized carrier, which facilitate the mixing head movement in the horizontal direction.  The rail is to be suspended on the pillars shown in the drawing below, and the carrier needs to be provided with cable-chain. The cable-chain needs to contain the energy cables, raw material hoses, hydraulic oil and compressed air line.		
	Injection pressure	Between about 120- 200 bar	





<p>High pressure piping</p>	<p>The dosing group (pump) should be connected to the mixing head with rigid and flexible high pressure hoses. To reach the injection points the mixing head will be mounted on carrier (the carrier for the mixing head is described in the previous paragraph).</p> <p>The piping will consist of the following lines:</p> <ul style="list-style-type: none"> <li>▪ Delivery and return line for polyol</li> <li>▪ Delivery and return line for isocyanate</li> <li>▪ Delivery and return line for hydraulic oil</li> <li>▪ Compressed air line</li> <li>▪ Electrical line</li> </ul> <p>Construction starting from the dosing unit, there will be the following sections:</p> <ul style="list-style-type: none"> <li>▪ High pressure rigid piping complete with insulation and supports from the dosing unit to the beginning of the chain on the carriage rail</li> <li>▪ Piping on the mixing head carriage: <ul style="list-style-type: none"> <li>○ One set of high-pressure flexible hoses installed in the energy chain going to mix head carriage (13.5 mt)</li> <li>○ One set of high-pressure flexible hoses from the mixing head carriage to the mixing head (3 mt)</li> </ul> </li> </ul> <p>There needs to be one frame mounted on the carrier including:</p> <ul style="list-style-type: none"> <li>▪ Manual ball valves for maintenance</li> <li>▪ Stream distributors for chemicals recirculation</li> <li>▪ Hydraulic valves to operate the mixing head</li> </ul>	
-----------------------------	---	--

Hydraulic unit for the mixing head (1)	Controls	Oil temperature	
		Oil level	
		Hydraulic pressure	
	Filters	As required	
	Accumulator	Ensuring closure of mixing head in case of emergency	
Working tanks	Two (2) working tanks suitable for serving the high pressure dispenser. The tanks must meet internationally and locally required standards		
	Volume	Minimum 200 l each	
		Level control system for automatic filling	
		Temperature control system maintaining a tank temperature of 20 <sup>0</sup> C, including a cold water compressor chiller combined with a double wall tank or similar	
		Insulation in case of double wall tanks	
		Safety valves for max. tank pressure	
		Valves for letting air out during filling, connected to the ventilation system	
		Pneumatic ball valve for automatic tank filling	
	Polyol tank	Installed inside an enclosure containing a drip pan, of a capacity to hold the full content of the tank. Two independent air extraction systems, locked in with the gas detection and safety system should be included	
		Equipped with a sealed stirrer if no booster circuit is installed	
		All electrical components and connections fitted inside polyol-blend tank and tank enclosure must be EX –proof	
		The outlet to the pump must be fitted with a SHUT DOWN valve	
		Equipped with nitrogen pressure control suited to maintain a low pressure blanket over the tank content	
Control and operator panel(s)	Shot timers	The unit must be equipped with a minimum of sixteen (16) shot timers for the mixing head.	
		Individual setting of each shot timer	
		Reading error display	

	PLC unit	The unit should be equipped with a PLC unit	
	Mixing head	Panels for Start/Stop Shot and for Emergency Stop must be mounted on each mixing head	

**A.1-2 One Unit - Pentane/polyol premixing station with accessories to serve item 1.**

	Connected on one side with the pentane and the polyol tanks and to the other side to the buffer tank. The connection line between premixing station and the buffer tank must be suitable for an operation pressure of 60 bar. To start automatically when the unit calls for polyol-blend	Compliance Yes/No
Capacity	Polyol output not less than 15 l/min; Pentane output 0.5 to 3.0 l/min	
Automatic transfer	System for automatic transfer from the polyol and pentane service tanks to the buffer tank .	
Installation	System for automatic transfer from the buffer tank to the working tanks and for the automatic refilling of the working tanks.	
	Must be installed in an enclosure with two independent air extraction systems, locked into the gas detection and control system	
	All electrical components/connections to be Ex-proof	
Connections	The connection to the foam dispenser must be through permanently fitted pipe connections, with an estimated length of 18 meters. Please find the layout in the Zip-File named 'Layout'; Layout_Parto Shiva Sanat.	

**A.1-3 One Unit - Chemical transfer/Pentane storage system**

Pentane tank	Remote (preferably outside) located, with spill containment. The tank must meet locally required standards	Compliance Yes/No
Capacity	Approximately 500 l or two 250 l	
General safety features	Fitted with all necessary safety valves	
	All electrical components to be EX-Proof	
Tank pressure	Nitrogen based pressure system to maintain the tank pressure at ~ 0.1 bar	
Fill line	Must extent to the bottom of the tank	
Level Control	Automatic level switches and controls to ensure a minimum fill level and avoid overfilling, with automatic shut-off at minimum level	
Pentane transfer from barrels	Pneumatic transfer pump with shut down valve	
	Connected to the level switches for semi-automatic filling	
Pentane transfer to pre-mixing station	Designed for handling flammable liquids, with a "back to tank" over-pressure valve	
Pentane tank (cont.)	Electrically tied into the operation of the pre-mixer <b>or</b> executed with a circulation circuit to assure continuous pressure in the supply piping to the blender	
	Outlet to be fitted with an automatic air operated SHUT DOWN valve	
	Piping to the blender suitable for the transport of flammable liquids	
Polyol tank	For raw polyol, equipped with all necessary control equipment, to be connected to the premixing station	
Capacity	Sufficient for the application (~500 l)	

	Features	Temperature conditioning with chiller of adequate capacity	
		Automatic level control interlocked with the barrel pump	
	Features	Pumping system to feed the premix station	
	Fittings and connections	Equipped with such fittings and connections as are necessary for connecting the unit to the barrel pump	

**A.1-4 One Lot - Gas detection and alarm system for pentane vapors**

Detection/alarm system for cyclopentane emissions covering the entire system from storage through pouring, suitable to trigger alarm and automatic process shut-down at predetermined gas concentration levels		Compliance Yes/No
Functions	10% LEL: audible/visible alarm and triggering of auxiliary ventilation	
	20% LEL: audible/visible alarm and automatic shut-down of production	
	Adjustment of warning and shut-down level should be possible up to a level not to exceed 40% LEL	
Control panel	A central control panel is required, located at a safe place, clear from potential emission sources	
Sensors	15 Sensors must be supplied with the complete system. Additional space in for 5 sensors	
Sensor locations	1 each at the pentane tank, premixer, day tank; 2 in proximity of the mixing head; 4 at locations to be determined	
Hand hydrocarbons monitor	1 handheld monitor with calibration capability and alarm function, battery operated, batteries to be included	
Hand-held anemometer	1 to check air flow of the extract ventilation system, battery operated, battery to be included	
Hydrocarbon gas detectors	4 pcs under cabinet jigs, 1 with foaming machine, 1 with premixing machine, 1 with C5 storage, 4 pcs under door molds	
Ventilation design	Ventilation design for the whole foaming operation	
Fire detector	at the C5 storage	
Electrical components to be changed to Ex-proof at fixtures and molds or hot water circulation	Photos of Existing Systems are provided in a Zip file named 'Photos_Parto Shiva Sanat'.	

**A.2 Scope of supply and services to be provided by the Beneficiary Company**

#	Item	Note
1	Power Supply	380V, 50Hz, 3 phase, 100kW
2	Supply of nitrogen	Cylinders or nitrogen generator
3	Start up	Raw material and consumables for machine testing and start up as attached (Appendix A.4)
4	Preparatory works	All civil works, authorizations from local authorities and utilities as attached (Appendix A.4)
5	Extra flexible hose	Additional hoses in case that the distance between the foam machine and the mixing head is longer than 7 m
6	Ventilation system	Ventilation system including piping and blowers connected to the outside
7	Lighting conductor	To be installed on the roof of building housing the equipment

**A.3 Spare Parts List Needed for 1 Year Full Operation (to be provided by supplier)**

**Please indicate breakdown cost for each spare part**

Description	Quantity (to be provided by the supplier)
Mixing head nozzle	
Proximity sensor (for the mixing head)	
One set bush for high pressure pump	
Set of shaft seal for high pressure pump	
Hydraulic filter	
Pressure relieve valve of buffer tank	
Magnetic inlet for water – daily tank	
Electric valve 5/2 – 24V	
Switch, selector, lamp, alarm signal	
Filter for polyol line in premixing unit	
O-ring, seal, etc.	
PT 100 sensor EX-type	
Other spare parts to be listed as needed below	

#### **A.4 List of preparatory works and items needed for start-up**

##### **1- Fence and shelter for c-pentane feeding system:**

A separate room with the specified extract ventilation to be provided by the Beneficiary.

##### **2- Electrical power supply**

Power supply to the electrical cabinet of the equipment according to the scope of the supply.

The power supply is three-phase, PE, ground, five-wire input, 380V / 50Hz, 100kW.

The power supply cables to the cabinets will be provided by the Beneficiary.

##### **3- Grounding**

The Contractor will provide all the necessary information for grounding. The grounding of the fixtures, presses and other plant equipment is done by Contractor. Grounding points will be provided by the Beneficiary near the equipment, grounding hole should be less than 3 ohm, measuring report by certified organization should be provided by the Beneficiary.

##### **4- Civil works**

Civil works for preparation of the site, underground cable channels, supply of resources water/oil/compressed air etc. are to be provided by the Beneficiary. The ventilation design is to be provided the Contractor. The ventilators including the ventilation ducts from the exhaust fans to the exterior (e.g. roof surface) and further ducts after the roof surface are to be provided locally.

- Grounding and floor levelling, construction works.
- Support for placing ventilation fans
- Support for duct, pipe line and cabling

##### **5- Utility requirement**

- Electricity Power: 380 V, 3 phases, 50 HZ, approximately 130 kW (for the Beneficiary with PU machine, they have to provide 100 kW of electricity power)
- Compressed air: 7 bar oil free
- N<sub>2</sub> supply from N<sub>2</sub> drum or N<sub>2</sub> generator, at minimum 7 bar.
- Earth connection less than 3 ohm close to the equipment will be provided by the Beneficiary

##### **6- Material for start-up (responsibility of Beneficiary)**

- Material such as polyol, ISO and Cyclo-pentane, at least 2 drums of each for start-up (Polyol should be compatible with Cyclo-pentane)
- 200 liters dioctylphtalate (DOP) for test of PU machine in the Beneficiary plant
- 100 liters water for chiller unit
- 100 liters hydraulic oil for start-up of PU machine

**A.5 General notes:**

- When the order is placed, the Contractor will provide technical layout and utility requirements; however, it is the Beneficiary's responsibility to provide electricity power, water connection, compressed air, N<sub>2</sub>, and earth connection as defined in the Contractor's technical layout and utility requirements.
- It is the Beneficiary's responsibility to supply raw material for testing in the Beneficiary's plant.
- It is the Beneficiary's responsibility to provide appropriated crane or lift to unload the equipment from the truck and placing the machinery in the required position based on the layout.
- Smooth and on-schedule progress of the assembly work is only possible with unrestricted access to the site.
- The floor of the workshop where the equipment is installed must be level and dirt-free.
- Concrete for the floor should be at least of a quality conforming to B25<sup>1</sup>.
- On the floor, minimum drilling depth is 200 mm, for accommodating M20<sup>2</sup> grouting-/ rag-bolts.
- It is the Beneficiary's responsibility to provide firefighting equipment for hazardous material, Ex-light for the production area if needed.
- The Contractor reserves the right to improve the technical specification of the services, goods and equipment to be provided by the Beneficiary as required ensuring the optimal installation and operation of the foam system.

---

<sup>1</sup> One of the Concrete classes according to compressive strength

<sup>2</sup> Anchor size



**A.6 Terms & conditions of technical assistance during guarantee period  
(will be provided by Contractor)**

**An example**

Once equipment is set up & in production, in case the Beneficiary needs technical assistance the procedure will be as following:

**Basic Helpline services (tel.:-----):** Contractor's technicians will try in first step to solve the issue via phone by guiding the personnel who have received training during start up.

**Replacing of faulty spare parts:** In case a 'warranty replacement part' is agreed; the Contractor/Contractor's local service provider will arrange for replacing the defective parts by sending new ones in the first available time and free of charge, within the guarantee period.

**Repair service (s):** If a problem was not solved on phone or the part replacement should only be done by the Contractor/Contractor's local service provider, a technician will be sent to customer site not later than 24 hours after receiving the first phone call, followed by a written fax/email describing the issue. During guarantee period, this visit (labor, transportation and accommodation) will be free of charge in case the fault would be from the Contractor side but if the damage is due to improper handling or not trained operators using the equipment, the Contractor will charge the Beneficiary by the daily rate of ----- IRR plus transportation & accommodation (if needed). Parts under guarantee are freely replaced while those of wear & tear should be paid by Beneficiary.

**Service agreement/health check services:** In case of a need to a routine periodical visit, the Beneficiary can enter a service agreement with the Contractor/Contractor's local service provider for a specified time and within a certain amount of cost. Regular monitoring & maintenance by a Contractor/Contractor's local service provider technician will reduce the risk of an unforeseen breakdown in production.

### **A.7 Terms of training**

Training is an essential part securing the optimum use of the equipment which will be performed in below steps:

**Initial training during start up but before delivery:** This is the best time for the Beneficiary company's maintenance personnel to be involved with real problems happening during commissioning & start up, so it is advised to the Beneficiary company to have one mechanical & one electrical expert (preferably with Programmable Logic Controller software knowledge) to be available in the last days before final start up. Knowledge gained in this period will help them to better understand the later advanced trainings.

**Training after start up:** There will be two separate trainings, one for operators & one for maintenance department (mechanical & electrical) in Farsi language. At the end of each training sessions, there will be a form to be signed by all trainees, where the syllabus of training is clearly described. In this way we will make sure that all topics are addressed. It is important not to relocate the trainees to other departments before being sure that there are still trained operators/maintenance to take care of the plant. Any improper handling of equipment by untrained staff will void the guarantee.

**Post contract training:** To be provided by the Contractor.



## **Appendix B**

### **Required services and equipment to be delivered at Javaheran Tehran**



## B.1 Equipment specifications for the tendering and purchase of equipment for Javaheran Tehran

### B.1-1 High-pressure, PU foam dispensing unit with variable output up to about 80 l/min at ratio 1:1 for the insulation of cabinets for domestic refrigerators using cyclopentane based systems

Description of basic unit	High pressure mixing head PU dispensing unit with variable output between 20-80 l/min		Compliance Yes/No
	Output range at ratio 1:1	~ 20-80 l/min.	
Configuration of basic unit	As a minimum, the unit must be equipped with	Self-cleaning filters before the component pump	
		Inlet pressure control to the pumps	
		Min/max. mixing pressure control	
		Gauge for pump inlet and mixing pressure	
		Safety valves or rupture disks for high pressure, to be connected to the tank-return piping.  All electrical components to be pre-grounded	
Pumps (2)	Equipped with pumps with single speed motors with electromagnetic couplings and be EX-proof		
	Equipped with liquid control on the suction side, assuring continuous positive pressure on the suction side		
	Installed in an enclosure equipped with drip pans and two independent air extraction units locked in with the gas detection and control system		
Mixing head	One (1) hydraulically operated, self-cleaning mixing head. The head must be horizontally mounted on an existing railing system for manual positioning to allow injection into the bores. Nitrogen flushing. The length of flexible hose is estimated to be 30 m.		
	Injection pressure	Between about 120- 200 kg/cm <sup>2</sup>	
Hydraulic unit for the mixing head (1)	Controls	Oil temperature	
		Oil level	
		Hydraulic pressure	
	Filters	As required	
	Accumulator	Ensuring closure of mixing head in case of emergency	
Working tanks	Two (2) working tanks suitable for serving the high pressure dispenser. The tanks must meet internationally and locally required standards		



	Volume	Minimum 200 l each		
		Level control system for automatic filling		
		Temperature control system maintaining a tank temperature of 20 <sup>0</sup> C, including a cold water compressor chiller combined with a double wall tank or similar		
		Insulation in case of double wall tanks		
		Safety valves for max. tank pressure		
		Valves for letting air out during filling, connected to the ventilation system		
		Pneumatic ball valve for automatic tank filling		
	Polyol tank	Installed inside an enclosure containing a drip pan, of a capacity to hold the full content of the tank. Two independent air extraction systems, locked in with the gas detection and safety system should be included		
		Equipped with a sealed stirrer if no booster circuit is installed.		
		All electrical components and connections fitted inside polyol-blend tank and tank enclosure must be EX –proof		
		The outlet to the pump must be fitted with a SHUT DOWN valve		
		Equipped with nitrogen pressure control suited to maintain a low pressure blanket over the tank content		
	Control and operator panel(s)	Shot timers	The unit must be equipped with a minimum of sixteen (16) shot timers for the mixing head.	
			Individual setting of each shot timer	
Reading error display				
PLC unit		The unit should be equipped with a PLC unit		
Mixing head		Panels for Start/Stop Shot and for Emergency Stop must be mounted on each mixing head		



### B.1-2 One Unit - Pentane/polyol premixing station with accessories to serve item 1.

Connected on one side with the pentane and the polyol tanks and to the other side to the buffer tank. The connection line between premixing station and the buffer tank must be suitable for an operation pressure of 60 bar. To start automatically when the unit calls for polyol-blend		Compliance Yes/No
Capacity	Polyol output not less than 15 l/min; Pentane output 0.5 to 3.0 l/min	
Automatic transfer	System for automatic transfer from the polyol and pentane service tanks to the buffer tank .	
Installation	System for automatic transfer from the buffer tank to the working tanks and for the automatic refilling of the working tanks.	
	Must be installed in an enclosure with two independent air extraction systems, locked into the gas detection and control system	
	All electrical components/connections to be Ex-proof	
Connections	The connection to the foam dispenser must be through permanently fitted pipe connections, with an estimated length of 18 meters. Please find the layout in the Zip-File named 'Layout'; Layout_Javaهران Tehran.	

### B.1-3 One Unit - Chemical transfer/Pentane storage system

Pentane tank	Remote (preferably outside) located, with spill containment. The tank must meet locally required standards		Compliance Yes/No
	Capacity	Approximately 500 l or two 250 l	
	General safety features	Fitted with all necessary safety valves	
		All electrical components to be EX-Proof	
	Tank pressure	Nitrogen based pressure system to maintain the tank pressure at ~ 0.1 bar	
	Fill line	Must extent to the bottom of the tank	
	Level Control	Automatic level switches and controls to ensure a minimum fill level and avoid overfilling, with automatic shut-off at minimum level	
	Pentane transfer from barrels	Pneumatic transfer pump with shut down valve	
		Connected to the level switches for semi-automatic filling	
Pentane tank (cont.)	Pentane transfer to pre-mixing station	Designed for handling flammable liquids, with a "back to tank" over-pressure valve	
		Electrically tied into the operation of the pre-mixer <b>or</b> executed with a circulation circuit to assure continuous pressure in the supply piping to the blender	
		Outlet to be fitted with an automatic air operated SHUT DOWN valve	
		Piping to the blender suitable for the transport of flammable liquids	
Polyol tank	For raw polyol, equipped with all necessary control equipment, to be connected to the premixing station		
	Capacity	Sufficient for the application (~500 l)	
	Features	Temperature conditioning with chiller of adequate capacity	
		Automatic level control interlocked with the barrel pump	
	Features	Pumping system to feed the premix station	
	Fittings and connections	Equipped with such fittings and connections as are necessary for connecting the unit to the barrel pump	



#### B.1-4 One Lot - Gas detection and alarm system for pentane vapors

Detection/alarm system for cyclopentane emissions covering the entire system from storage through pouring, suitable to trigger alarm and automatic process shut-down at predetermined gas concentration levels		Compliance Yes/No
Functions	10% LEL: audible/visible alarm and triggering of auxiliary ventilation	
	20% LEL: audible/visible alarm and automatic shut-down of production	
	Adjustment of warning and shut-down level should be possible up to a level not to exceed 40% LEL	
Control panel	A central control panel is required, located at a safe place, clear from potential emission sources	
Sensors	15 Sensors must be supplied with the complete system. Additional space in int the safety management system for 5 sensors	
Sensor locations	1 each at the pentane tank, premixer, day tank; 2 in proximity of the mixing head; 4 at locations to be determined	
Hand hydrocarbons monitor	1 handheld monitor with calibration capability and alarm function, battery operated, batteries to be included	
Hand-held anemometer	1 to check air flow of the extract ventilation system, battery operated, battery to be included	
Hydrocarbon gas detectors	4 pcs under cabinet jigs, 1 with foaming machine, 1 with premixing machine, 1 with C5 storage, 4 pcs under door molds	
Ventilation design	Ventilation design for the whole foaming operation	
Fire detector	at the C5 storage	
Electrical components to be changed to Ex-proof at fixtures and molds or hot water circulation	Photos of Existing Systems are provided in a Zip file named 'Photos_Javaheran Tehran'.	



## **B.2 Scope of supply and services to be provided by the Beneficiary Company**

#	Item	Note
1	Power Supply	380V, 50Hz, 3 phase, 100kW
2	Supply of nitrogen	Cylinders or nitrogen generator
3	Start up	Raw material and consumable for machine testing and start up as attached (Appendix B.4)
4	Preparatory works	All civil works, authorizations from local authorities and utilities as attached (Appendix B.4)
5	Extra flexible hose	Additional hoses in case that the distance between the foam machine and the mixing head is longer than 7 m
6	Ventilation system	Ventilation system including piping and blowers connected to the outside
7	Lighting conductor	To be installed on the roof of building housing the equipment





### B.3 Spare Parts List Needed for 1 Year Full Operation (to be provided by supplier)

**Please indicate breakdown cost for each spare part**

Description	Quantity (to be provided by the supplier)
Mixing head nozzle	
Proximity sensor (for the mixing head)	
One set bush for high pressure pump	
Set of shaft seal for high pressure pump	
Hydraulic filter	
Pressure relieve valve of buffer tank	
Magnetic inlet for water – daily tank	
Electric valve 5/2 – 24V	
Switch, selector, lamp, alarm signal	
Filter for polyol line in premixing unit	
O-ring, seal, etc	
PT 100 sensor EX-type	
Other spare parts to be listed as needed below	



## **B.4 List of preparatory works and items needed for start-up**

### **1-Fence and shelter for c-pentane feeding system:**

A separate room with the specified extract ventilation to be provided by the Beneficiary

### **2- Electrical power supply**

Power supply to the electrical cabinet of the equipment according to the scope of the supply.

The power supply is three-phase, PE, ground, five-wire input, 380V / 50Hz, 100kW.

The power supply cables to the cabinets will be provided by the Beneficiary.

### **3- Grounding**

The Contractor will provide all the necessary information for grounding. The grounding of the fixtures, presses and other plant equipment is done by Contractor. Grounding points will be provided by Beneficiary near the equipment, grounding hole should be less than 3 Ohm, measuring report by certified organization should be provided by the Beneficiary.

### **4- Civil works**

Civil works for preparation of the site, underground cable channels, supply of resources water/oil/compressed air etc. are to be provided by the Beneficiary. The ventilation design is to be provided the Contractor. The ventilators including the ventilation ducts from the exhaust fans to the exterior (e.g. roof surface) and further ducts after the roof surface are to be provided locally.

- Grounding and floor levelling, construction works.
- Support for placing ventilation fans
- Support for duct, pipe line and cabling

### **5- Utility requirement**

- Electricity Power: 380 V, 3 phases, 50 HZ, approximately 130 kW (for the Beneficiary with PU machine, they have to provide 100 kW of electricity power)
- Compressed air: 7 bar oil free
- N<sub>2</sub> supply from N<sub>2</sub> drum or N<sub>2</sub> generator, at minimum 7 bar.
- Earth connection less than 3 ohm close to the equipment will be provided by the Beneficiary

### **6- Material for start-up (responsibility of Beneficiary)**

- Material such as polyol, ISO and Cyclo-pentane, at least 2 drums of each for start-up (Polyol should be compatible with Cyclo-pentane)
- 200 liters dioctylphtalate (DOP) for test of PU machine in the Beneficiary plant
- 100 liters water for chiller unit
- 100 liters hydraulic oil for start-up of PU machine



#### **B.5 General notes:**

- When order is placed, the Contractor will provide technical layout and utility requirements; however, it is the Beneficiary's responsibility to provide electricity power, water connection, compressed air, N<sub>2</sub>, and earth connection as defined in the Contractor's technical layout and utility requirements. It is the Beneficiary's responsibility to supply raw material for testing in the Beneficiary's plant.
- It is the Beneficiary's responsibility to provide appropriated crane or lift to download the equipment from the truck and placing the machinery in the required position based on the lay out.
- Smooth and on-schedule progress of the assembly work is only possible with unrestricted access to the site.
- The floor of the workshop where the equipment is installed must be level and dirt-free.
- Concrete for the floor should be at least of a quality conforming to B25.<sup>3</sup>
- On the floor, minimum drilling depth is 200 mm, for accommodating M20<sup>4</sup> grouting-/ rag-bolts.
- It is the Beneficiary's responsibility to provide firefighting equipment for hazardous material, Ex-light for the production area if needed.
- The Contractor reserves the right to improve the technical specification of the services, goods and equipment to be provided by the Beneficiary as required ensuring the optimal installation and operation of the foam system.

---

<sup>3</sup> One of the Concrete classes according to compressive strength

<sup>4</sup> Anchor size



## **B.6 Terms & conditions of technical assistance during guarantee period (will be provided by Contractor)**

### **An example**

Once equipment is set up & in production, in case the Beneficiary needs technical assistance the procedure will be as following:

**Basic Helpline services (tel.:-----):** Contractor's technicians will try in first step to solve the issue via phone by guiding the personnel who have received training during start up.

**Replacing of faulty spare parts:** In case a 'warranty replacement part' is agreed; the Contractor/Contractor's local service provider will arrange for replacing the defective parts by sending new ones in the first available time and free of charge, within the guarantee period.

**Repair service (s):** If a problem was not solved on phone or the part replacement should only be done by the Contractor/Contractor's local service provider, a technician will be sent to customer site not later than 24 hours after receiving the first phone call, followed by a written fax/email describing the issue. During guarantee period, this visit (labor, transportation and accommodation) will be free of charge in case the fault would be from the Contractor side but if the damage is due to improper handling or not trained operators using the equipment, the Contractor will charge the Beneficiary by the daily rate of ----- IRR plus transportation & accommodation (if needed). Parts under guarantee are freely replaced while those of wear & tear should be paid by Beneficiary.

**Service agreement/health check services:** In case of a need to a routine periodical visit, the Beneficiary can enter a service agreement with the Contractor/Contractor's local service provider for a specified time and within a certain amount of cost. Regular monitoring & maintenance by a Contractor/Contractor's local service provider technician will reduce the risk of an unforeseen breakdown in production.



### **B.7 Terms of training**

Training is an essential part securing the optimum use of the equipment which will be performed in below steps:

**Initial training during start up but before delivery:** This is the best time for the Beneficiary company's maintenance personnel to be involved with real problems happening during commissioning & start up so it is advised to the Beneficiary company to have one mechanical & one electrical expert (preferably with Programmable Logic Controller software knowledge) to be available in the last days before final start up. Knowledge gained in this period will help them to better understand the later advanced trainings.

**Training after start up:** There will be two separate trainings, one for operators & one for maintenance department (mechanical & electrical) in Farsi language. At the end of each training sessions, there will be a form to be signed by all trainees, where the syllabus of training is clearly described. In this way we will make sure that all topics are addressed. It is important not to relocate the trainees to other departments before being sure that there are still trained operators/maintenance to take care of the plant. Any improper handling of equipment by untrained staff will void the guarantee.

**Post contract training:** To be provided by the Contractor.



## **Appendix C**

### **Required services and equipment to be delivered at Evans Insulating System**



## C.1 Equipment specifications for the tendering and purchase of equipment for Evans Insulating System

### C.1-1 High-pressure, PU foam dispensing unit with variable output up to about 80 l/min (100 kg) at ratio 1:1 for the insulation of doors using cyclo-pentane based systems

Description of basic unit	High pressure mixing head PU dispensing unit with variable output between 20-80 l/min		Compliance Yes/No
	Output range at ratio 1:1	~ 20-80 l/min.	
Configuration of basic unit	As a minimum, the unit must be equipped with	Self-cleaning filters before the component pump	
		Inlet pressure control to the pumps	
		Min/max. mixing pressure control	
		Gauge for pump inlet and mixing pressure	
		Safety valves or rupture disks for high pressure, to be connected to the tank-return piping.  All electrical components to be pre-grounded	
Pumps (2)	Equipped with pumps with single speed motors with electromagnetic couplings and be EX-proof for polyol and ATEX for MDI		
	Equipped with liquid control on the suction side, assuring continuous positive pressure on the suction side		
	Installed in an enclosure equipped with drip pans and two independent air extraction units locked in with the gas detection and control system		
Mixing head	One (1) hydraulically operated, self-cleaning mixing L-type head. The head must be horizontally mounted on the existing balancing device, utilize existing 3 m boom for manual positioning to allow injection into the bores of press. Nitrogen flushing.		
	Injection pressure	Between about 120 - 200 kg/cm <sup>2</sup>	
Hydraulic unit for the mixing head (1)	Controls	Oil temperature	
		Oil level	
		Hydraulic pressure	
	Filters	As required	
	Accumulator	Ensuring closure of mixing head in case	



		of emergency	
Working tanks	Two (2) working tanks suitable for serving the high-pressure dispenser. The tanks must meet internationally and locally required standards		
	Volume	Minimum 200 l each	
		Level control system for automatic filling	
		Temperature control system maintaining a tank temperature at 20°C, utilizing the existing 2 tons cold water compressor chiller and combined with a double wall tank or similar	
		Insulation in case of double wall tanks	
		Safety valves for max. tank pressure	
		Valves for letting air out during filling, connected to the ventilation system	
		Pneumatic ball valve for automatic tank filling	
	Polyol tank	Installed inside an enclosure containing a drip pan, of a capacity to hold the full content of the tank. Two independent air extraction systems, locked in with the gas detection and safety system should be included	
		Equipped with a sealed stirrer if no booster circuit is installed.	
		All electrical components and connections fitted inside polyol-blend tank and tank enclosure must be EX –proof	
		The outlet to the pump must be fitted with a SHUT DOWN valve	
		Equipped with nitrogen pressure control suited to maintain a low pressure blanket over the tank content	
Control and operator panel(s)	Shot timers	The unit must be equipped with a minimum of twenty (20) shot timers for the mixing head.	
		Individual setting of each shot timer	
		Reading error display	
	PLC unit	The unit should be equipped with a PLC unit	
	Mixing head	Panels for Start/Stop Shot and for Emergency Stop must be mounted on mixing head	





### C.1-2 One Unit - Pentane/polyol premixing station with accessories to serve item 1.

Connected on one side with the pentane and the raw polyol tanks and to the other side to the foaming machine work tank. The connection line between premixing station and work tank must be suitable for an operation pressure of 60 bar. To start automatically when the foaming unit calls for polyol-blend		Compliance Yes/No
Capacity	Polyol output not less than 15 l/min; Pentane output 0.5 to 3.0 l/min	
Automatic transfer	System for automatic transfer from the polyol and pentane service tanks to the polyol work tank.	
Installation	System for automatic transfer from pre-mixer to the working tanks and for the automatic refilling of the working tanks.	
	Must be installed in an enclosure with two independent air extraction systems, locked into the gas detection and control system	
	All electrical components/connections to be Ex-proof	
Connections	The connection to the foam dispenser must be through permanently fitted pipe connections, with an estimated length of 18 meters.	
	A Layout can currently not be made available.	

### C.1-3 One Unit - Chemical transfer/Pentane storage system

Pentane tank	Remote located, with spill containment. The tank must meet locally required standards		Compliance Yes/No
	Capacity	Not less than 100 liters	
	General safety features	Fitted with all necessary safety valves	
		All electrical components to be EX-Proof	
	Tank pressure	Nitrogen based pressure system to maintain the tank pressure at ~ 0.1 bar	
	Fill line	Must extent to the bottom of the tank	
	Level Control	Automatic level switches and controls to ensure a minimum fill level and avoid overfilling, with automatic shut-off at minimum level	
	Pentane transfer from barrels	Pneumatic transfer pump with shut down valve	
		Connected to the level switches for semi-automatic filling	
Pentane tank (cont.)	Pentane transfer to pre-mixing station	Designed for handling flammable liquids, with a "back to tank" over-pressure valve	
		Electrically tied into the operation of the pre-mixer <b>or</b> executed with a circulation circuit to assure continuous pressure in the supply piping to the blender	
		Outlet to be fitted with an automatic air operated SHUT DOWN valve	
Polyol tank		Piping to the blender suitable for the transport of flammable liquids	
	For raw polyol, equipped with all necessary control equipment, to be connected to the premixing station		
	Capacity	Sufficient for the application (~500 l)	
	Features	Temperature conditioning with chiller of adequate capacity	
		Automatic level control interlocked with the barrel pump	



	Features	Pumping system to feed the premix station	
	Fittings and connections	Equipped with such fittings and connections as are necessary for connecting the unit to the barrel pump	

#### C.1-4 One Lot - Gas detection and alarm system for pentane vapors

Detection/alarm system for cyclopentane emissions covering the entire system from storage through pouring, suitable to trigger alarm and automatic process shut-down at predetermined gas concentration levels		Compliance Yes/No
Functions	10% LEL: audible/visible alarm and triggering of auxiliary ventilation	
	20% LEL: audible/visible alarm and automatic shut-down of production	
	Adjustment of warning and shut-down level should be possible up to a level not to exceed 40% LEL	
Control panel	A central control panel is required, located at a safe place, clear from potential emission sources	
Sensors	6 Sensors must be supplied with the complete system. Additional space in for 5 sensors	
Sensor locations	1 each at the pentane tank, premixer, day tank; 3 in proximity of the mixing head and the press	
Portable hydrocarbon monitor	1 handheld monitor with calibration capability and alarm function, battery operated, batteries to be included	
Hand-held anemometer	1 to check air flow of the extract ventilation system, battery operated, battery to be included	
Ventilation design	Ventilation design for the whole foaming operation	
Fire detector	at the C5 storage	
Electrical components to be changed to Ex-proof at fixtures and molds or hot water circulation	Photos of Existing Systems are provided in a Zip file named 'Photos_Evans Insulating Systems'.	



**C.2 Scope of supply and services to be provided by the Beneficiary Company for Evans Insulating Industry**

#	Item	Note
1	Power Supply	380V, 50Hz, 3 phase, 100kW (100 A)
2	Supply of nitrogen	Cylinders or nitrogen generator
3	Start up	Raw material and consumable for machine testing and start up as attached (Appendix C.4)
4	Preparatory works	All civil works, authorizations from local authorities and utilities as attached (Appendix C.4)
5	Extra flexible hose	Additional hoses in case that the distance between the foam machine and the mixing head is longer than 7 m
6	Ventilation system	Ventilation system including piping and blowers connected to the outside
7	Lighting conductor	To be installed on the roof of building housing the equipment



**C.3 Spare Parts List Needed for 1 Year Full Operation (to be provided by supplier) for Evans Insulating Industry**

**Please indicate breakdown cost for each spare part**

<b>Description</b>	<b>Quantity (to be provided by the supplier)</b>
Mixing head nozzle	
Proximity sensor (for the mixing head)	
One set bush for high pressure pump	
Set of shaft seal for high pressure pump	
Hydraulic filter	
Pressure relieve valve of buffer tank	
Magnetic inlet for water – daily tank	
Electric valve 5/2 – 24V	
Switch, selector, lamp, alarm signal	
Filter for polyol line in premixing unit	
O-ring, seal, etc.	
PT 100 sensor EX-type	
Other spare parts to be listed as needed below	



#### **C.4 General notes:**

- When the order is placed, the Contractor will provide technical layout and utility requirements; however, it is the Beneficiary's responsibility to provide electricity power, water connection, compressed air, N<sub>2</sub>, and earth connection as defined in the Contractor's technical layout and utility requirements.
- It is the Beneficiary's responsibility to supply raw material for testing in the Beneficiary's plant.
- It is the Beneficiary's responsibility to provide appropriated crane or lift to download the equipment from the truck and placing the machinery in the required position based on the layout.
- Smooth and on-schedule progress of the assembly work is only possible with unrestricted access to the site.
- The floor of the workshop where the equipment is installed must be level and dirt-free.
- Concrete for the floor should be at least of a quality conforming to B25<sup>5</sup>.
- On the floor, minimum drilling depth is 200 mm, for accommodating M20<sup>6</sup> grouting-/ rag-bolts.
- It is the Beneficiary's responsibility to provide firefighting equipment for hazardous material, Ex-light for the production area if needed.
- The Contractor reserves the right to improve the technical specification of the services, goods and equipment to be provided by the Beneficiary as required ensuring the optimal installation and operation of the foam system.

---

<sup>5</sup> One of the Concrete classes according to compressive strength

<sup>6</sup> Anchor size



### **C.5 Terms & conditions of technical assistance during guarantee period (will be provided by Contractor)**

#### **An example**

Once equipment is set up & in production, in case customer needs technical assistance the procedure will be as following:

**Basic Helpline services (tel.:-----):** Contractor's technicians will try in first step to solve the issue via phone by guiding the personnel who have received training during start up.

**Replacing of faulty spare parts:** In case a 'warranty replacement part' is agreed; the Contractor/Contractor's local service provider will arrange for replacing the defective parts by sending new ones in the first available time and free of charge, within the guarantee period.

**Repair service (s):** If a problem was not solved on phone or the part replacement should only be done by the Contractor/Contractor's local service provider, a technician will be sent to customer site not later than 24 hours after receiving the first phone call, followed by a written fax/email describing the issue. During guarantee period, this visit (labor, transportation and accommodation) will be free of charge in case the fault would be from the Contractor side but if the damage is due to improper handling or not trained operators using the equipment, the Contractor will charge the Beneficiary by the daily rate of ----- IRR plus transportation & accommodation (if needed). Parts under guarantee are freely replaced while those of wear & tear should be paid by Beneficiary.

**Service agreement/health check services:** In case of a need to a routine periodical visit, the Beneficiary can enter a service agreement with the Contractor/Contractor's local service provider for a specified time and within a certain amount of cost. Regular monitoring & maintenance by a Contractor/Contractor's local service provider technician will reduce the risk of an unforeseen breakdown in production.



## C.6 Terms of training

Training is an essential part securing the optimum use of the equipment which will be performed in below steps:

**Initial training during start up but before delivery:** This is the best time for the Beneficiary company's maintenance personnel to be involved with real problems happening during commissioning & start up so it is advised to the Beneficiary company to have one mechanical & one electrical expert (preferably with Programmable Logic Controller software knowledge) to be available in the last days before final start up. Knowledge gained in this period will help them to better understand the later advanced trainings.

**Training after start up:** There will be two separate trainings, one for operators & one for maintenance department (mechanical & electrical) in Farsi language. At the end of each training sessions, there will be a form to be signed by all trainees, where the syllabus of training is clearly described. In this way we will make sure that all topics are addressed. It is important not to relocate the trainees to other departments before being sure that there are still trained operators/maintenance to take care of the plant. Any improper handling of equipment by untrained staff will void the guarantee.



## **Appendix D**

### **Required services and equipment to be delivered at Arvin Dey (Charmahali)**





## D.1 Equipment specifications for the tendering and purchase of equipment for Arvin Dey (Charmahali)

### D.1-1 High-pressure, PU foam dispensing unit with variable output up to about 80 l/min at ratio 1:1 for the insulation of cabinets for domestic refrigerators using cyclo-pentane based systems

Description of basic unit	High pressure mixing head PU dispensing unit with variable output between 20-80 l/min		Compliance Yes/No
	Output range at ratio 1:1	~ 20-80 l/min.	
Configuration of basic unit	As a minimum, the unit must be equipped with	Self-cleaning filters before the component pump	
		Inlet pressure control to the pumps	
		Min/max. mixing pressure control	
		Gauge for pump inlet and mixing pressure	
		Safety valves or rupture disks for high pressure, to be connected to the tank-return piping.  All electrical components to be pre-grounded	
Pumps (2)	Equipped with pumps with single speed motors with electromagnetic couplings and be EX-proof for polyol and ATEX for MDI		
	Equipped with liquid control on the suction side, assuring continuous positive pressure on the suction side		
	Installed in an enclosure equipped with drip pans and two independent air extraction units locked in with the gas detection and control system		
Mixing head	One (1) hydraulically operated, self-cleaning mixing L-type head. The head must be horizontally mounted on balancing device, and on 3 m boom for manual positioning to allow injection into the bores of jigs. Nitrogen flushing. The boom and balancing device are to be supplied by the supplier		
	Injection pressure	Between about 120 - 200 kg/cm <sup>2</sup>	
Hydraulic unit for the mixing head (1)	Controls	Oil temperature	
		Oil level	
		Hydraulic pressure	
	Filters	As required	



	Accumulator	Ensuring closure of mixing head in case of emergency	
Working tanks	Two (2) working tanks suitable for serving the high-pressure dispenser. The tanks must meet internationally and locally required standards		
	Volume	Minimum 100 l each	
		Level control system for automatic filling	
		Temperature control system maintaining a tank temperature at 20°C including cold water compressor chiller and combined with a double wall tank or similar.	
		Insulation in case of double wall tanks	
		Safety valves for max. tank pressure	
		Valves for letting air out during filling, connected to the ventilation system	
		Pneumatic ball valve for automatic tank filling	
	Polyol tank	Installed inside an enclosure containing a drip pan, of a capacity to hold the full content of the tank. Two independent air extraction systems, locked in with the gas detection and safety system should be included	
		Equipped with a sealed stirrer if no booster circuit is installed.	
		All electrical components and connections fitted inside polyol-blend tank and tank enclosure must be EX –proof	
		The outlet to the pump must be fitted with a SHUT DOWN valve	
		Equipped with nitrogen pressure control suited to maintain a low pressure blanket over the tank content	
Control and operator panel(s)	Shot timers	The unit must be equipped with a minimum of twenty (20) shot timers for the mixing head.	
		Individual setting of each shot timer	
		Reading error display	
	PLC unit	The unit should be equipped with a PLC unit	
	Mixing head	Panels for Start/Stop Shot and for Emergency Stop must be mounted on mixing head	



### D.1-2 One Unit - Pentane/polyol premixing station with accessories to serve item 1.

Connected on one side with the pentane and the raw polyol polyol tanks and to the other side to polyol work tank. The connection line between premixing station and work tank must be suitable for an operation pressure at 60 bar. To start automatically when the foaming unit calls for polyol-blend		Compliance Yes/No
Capacity	Polyol output not less than 15 l/min; Pentane output 0.5 to 3.0 l/min	
Automatic transfer	System for automatic transfer from the polyol and pentane service tanks to the polyol work tank.	
Installation	System for automatic transfer from premixer to the working tanks and for the automatic refilling of the working tanks.	
	Must be installed in an enclosure with two independent air extraction systems, locked into the gas detection and control system	
	All electrical components/connections to be Ex-proof	
Connections	The connection to the foam dispenser must be through permanently fitted pipe connections, with an estimated length of 18 meters.	
	A Layout can currently not be made available.	

### D.1-3 One Unit - Chemical transfer/Pentane storage system

Pentane tank	Isolated with spill containment. The tank must meet locally required standards		Compliance Yes/No
	Capacity	Not less than 100 liters	
	General safety features	Fitted with all necessary safety valves	
		All electrical components to be EX-Proof	
	Tank pressure	Nitrogen based pressure system to maintain the tank pressure at ~ 0.1 bar	
	Fill line	Must extent to the bottom of the tank	
	Level Control	Automatic level switches and controls to ensure a minimum fill level and avoid overfilling, with automatic shut-off at minimum level	
	Pentane transfer from barrels	Pneumatic transfer pump with shut down valve	
		Connected to the level switches for semi-automatic filling	
Pentane tank (cont.)	Pentane transfer to pre-mixing station	Designed for handling flammable liquids, with a "back to tank" over-pressure valve	
		Electrically tied into the operation of the pre-mixer <b>or</b> executed with a circulation circuit to assure continuous pressure in the supply piping to the blender	
		Outlet to be fitted with an automatic air operated SHUT DOWN valve	
Polyol tank		Piping to the blender suitable for the transport of flammable liquids	
	For raw polyol, equipped with all necessary control equipment, to be connected to the premixing station		
	Capacity	Sufficient for the application (~500 l)	
	Features	Temperature conditioning with chiller of adequate capacity. Chiller unit to be provided by the supplier.	
		Automatic level control interlocked with the	



		barrel pump	
	Features	Pumping system to feed the premix station	
	Fittings and connections	Equipped with such fittings and connections as are necessary for connecting the unit to the barrel pump	

#### **D.1-4 One Lot - Gas detection and alarm system for pentane vapors**

Detection/alarm system for cyclopentane emissions covering the entire system from storage through pouring, suitable to trigger alarm and automatic process shut-down at predetermined gas concentration levels		Compliance Yes/No
Functions	10% LEL: audible/visible alarm and triggering of auxiliary ventilation	
	20% LEL: audible/visible alarm and automatic shut-down of production	
	Adjustment of warning and shut-down level should be possible up to a level not to exceed 40% LEL	
Control panel	A central control panel is required, located at a safe place, clear from potential emission sources	
Sensors	5 Sensors must be supplied with the complete system.	
Sensor locations	1 each at the pentane tank, premixer, day tank; 2 in proximity of the mixing head and the jigs and door presses	
Portable hydrocarbon monitor	1 handheld monitor with calibration capability and alarm function, battery operated, batteries to be included	
Hand-held anemometer	1 to check air flow of the extract ventilation system, battery operated, battery to be included	
Ventilation design	Ventilation design for the whole foaming operation	
Fire detector	at the C5 storage	
Electrical components to be changed to Ex-proof at fixtures and molds or hot water circulation	Photos of Existing Systems are provided in a Zip file named 'Photos_Arvin dey Charmahali'.	



## **D.2 Scope of supply and services to be provided by the Beneficiary Company**

#	Item	Note
1	Power Supply	380V, 50Hz, 3 phase, 100kW (100 A)
2	Supply of nitrogen	Cylinders or nitrogen generator
3	Start up	Raw material and consumable for machine testing and start up as attached (Appendix 4)
4	Preparatory works	All civil works, authorizations from local authorities and utilities as attached (Appendix 4)
5	Extra flexible hose	Additional hoses in case that the distance between the foam machine and the mixing head is longer than 7 m
6	Ventilation system	Ventilation system including piping and blowers connected to the outside
7	Lighting conductor	To be installed on the roof of building housing the equipment



### D.3 Spare Parts List Needed for 1 Year Full Operation (to be provided by supplier)

**Please indicate breakdown cost for each spare part**

Description	Quantity (to be provided by the supplier)
Mixing head nozzle	
Proximity sensor (for the mixing head)	
One set bush for high pressure pump	
Set of shaft seal for high pressure pump	
Hydraulic filter	
Pressure relieve valve of buffer tank	
Magnetic inlet for water – daily tank	
Electric valve 5/2 – 24V	
Switch, selector, lamp, alarm signal	
Filter for polyol line in premixing unit	
O-ring, seal, etc.	
PT 100 sensor EX-type	
Other spare parts to be listed as needed below	



#### **D.4 General notes:**

- When the order is placed, the Contractor will provide technical layout and utility requirements; however, it is the Beneficiary's responsibility to provide electricity power, water connection, compressed air, N<sub>2</sub>, and earth connection as defined in the Contractor's technical layout and utility requirements.
- It is the Beneficiary's responsibility to supply raw material for testing in the Beneficiary's plant.
- It is the Beneficiary's responsibility to provide appropriated crane or lift to download the equipment from the truck and placing the machinery in the required position based on the layout.
- Smooth and on-schedule progress of the assembly work is only possible with unrestricted access to the site.
- The floor of the workshop where the equipment is installed must be level and dirt-free.
- Concrete for the floor should be at least of a quality conforming to B25<sup>7</sup>.
- On the floor, minimum drilling depth is 200 mm, for accommodating M20<sup>8</sup> grouting-/ rag-bolts.
- It is the Beneficiary's responsibility to provide firefighting equipment for hazardous material, Ex-light for the production area if needed.
- The Contractor reserves the right to improve the technical specification of the services, goods and equipment to be provided by the Beneficiary as required ensuring the optimal installation and operation of the foam system.

---

<sup>7</sup> One of the Concrete classes according to compressive strength

<sup>8</sup> Anchor size



#### **D.5 Terms & conditions of technical assistance during guarantee period (will be provided by Contractor)**

##### **An example**

Once equipment is set up & in production, in case the Beneficiary needs technical assistance the procedure will be as following:

**Basic Helpline services (tel.:-----):** Contractor's technicians will try in first step to solve the issue via phone by guiding the personnel who have received training during start up.

**Replacing of faulty spare parts:** In case a 'warranty replacement part' is agreed; the Contractor/Contractor's local service provider will arrange for replacing the defective parts by sending new ones in the first available time and free of charge, within the guarantee period.

**Repair service (s):** If a problem was not solved on phone or the part replacement should only be done by the Contractor/Contractor's local service provider, a technician will be sent to customer site not later than 24 hours after receiving the first phone call, followed by a written fax/email describing the issue. During guarantee period, this visit (labor, transportation and accommodation) will be free of charge in case the fault would be from the Contractor side but if the damage is due to improper handling or not trained operators using the equipment, the contractor will charge the Beneficiary by the daily rate of ----- IRR plus transportation & accommodation (if needed). Parts under guarantee are freely replaced while those of wear & tear should be paid by Beneficiary.

**Service agreement/health check services:** In case of a need to a routine periodical visit, the Beneficiary can enter a service agreement with the Contractor/Contractor's local service provider for a specified time and within a certain amount of cost. Regular monitoring & maintenance by a Contractor/Contractor's local service provider technician will reduce the risk of an unforeseen breakdown in production.





## D.6 Terms of training

Training is an essential part securing the optimum use of the equipment which will be performed in below steps:

**Initial training during start up but before delivery:** This is the best time for the Beneficiary company's maintenance personnel to be involved with real problems happening during commissioning & start up so it is advised to the Beneficiary company to have one mechanical & one electrical expert (preferably with Programmable Logic Controller software knowledge) to be available in the last days before final start up. Knowledge gained in this period will help them to better understand the later advanced trainings.

**Training after start up:** There will be two separate trainings, one for operators & one for maintenance department (mechanical & electrical) in Farsi language. At the end of each training sessions, there will be a form to be signed by all trainees, where the syllabus of training is clearly described. In this way we will make sure that all topics are addressed. It is important not to relocate the trainees to other departments before being sure that there are still trained operators/maintenance to take care of the plant. Any improper handling of equipment by untrained staff will void the guarantee.



## **Appendix E**

### **Required services and equipment to be delivered at Takran Mobared (East Cool)**



## E.1 Equipment specifications for the tendering and purchase of equipment for Takran Mobared (East Cool)

### E.1-1 Premixing unit

One new premixing unit to process raw polyol and pentane is already existing. However, never started-up.

It is assumed that the unit is equipped with components (electrical plant) in accordance to the EU standard safety rules.

It is assumed that the premix unit can deliver the premixed polyol/pentane to a buffer tank or directly to the dosing units (buffer tank and piping is considered already existing).

The raw polyol conditioning tank and pumping system (to the premix) is considered existing and adapt to the scope.

A fire-safe cut off valve **has to be supplied**

### E.1-2 Alarm and safety system (premix room)

One Alarm and Safety control board to control and manage ALL alarms that can happen during the premixing operation

1 (one) Double ventilator	Adapt to keep constantly the pentane concentration under 10% of LEL; ventilator and ducts at the Beneficiary charge
1 (one) Gas sensor	To be installed inside the dosing module box, to detect/manage 1 <sup>st</sup> step of alarm at 10% of LEL and to cut-off the m/c and operate the 2 <sup>nd</sup> ventilator at 20% of LEL
Control Panel	To interface ALL alarms, (Gas Sensors, Level switch, air duct pressure switch) and operate the ventilator, the cut off of the premix through a fire safe valve and switch on the siren and visual alarm; it has to be located in a area safe from emission of gas

### E.1-3 Pentane storage tank

One pentane storage and delivery system consisting:

- one 500 lt tank, to be placed outside under a shed, surrounded by steel-net fence (grounded), to be open on 3 sides (naturally ventilated); the tank is pressurized with nitrogen, with a min. pressure of 0,1 bar; the tank **MUST** be in line with the local standard safety rules
- a pneumatically operated SHUT-OFF safety valve must be installed on the delivery line to the premix unit
- electrical components **MUST** be ex-proof
- the delivery line to fill-in the tank (discharge from drum) **MUST** be obtained through a pipe to be extended to the bottom of the tank (saturation of the gas inside the tank); it is equipped with a pneumatically operated pump suitable to be placed onto a standard 200 lt drum (preferably double effect piston pump); a shut-off valve has to be foreseen.



- min/max filling level equip the tank in order to avoid overfilling and ensure a minimum quantity of liquid (operative min. level); the levels operate automatically also the delivery pump to premix station
- one pentane delivery pump, to process pure pentane, to deliver pentane to the premix station, provided with a return valve to the tank, in case of over pressure.
- piping to the blender to be included

#### **E.1-4 Retrofitting of the existing dosing units (cores) (\*)**

One high pressure dosing module (polyol side), to process polyurethane foam system with pentane (max output of the module not less than 40 kg/min), to be used with polyol / pentane blend-based systems, mounted on a steel frame, painted with anti-corrosion treatment.

The module includes both the dosing and the tank groups; it consists in a steel-frame with an enclosure with drip-pan, to be connected to the safety ventilation system from the bottom.

Capacity	Polyol/pentane blend total output	10 to 40 kg/min
----------	-----------------------------------	-----------------

One pressurized carbon-steel tank; tanks MUST be certified according to Standard European regulation; min. capacity: not less than 200 lt.

- control of the temperature through jacket or heat exchangers; insulation has to be provided.
- One filter, self-cleaning type to be installed in series to the pumps feeding

The tank is equipped with:

- overpressure safety valve, to be connected on the return to the tank
- pneumatically operated fire-safe cut-off valve to be controlled by the safety system
- draining valve
- visual level
- min/max level for automatic filling (to start the premix system)
- super-max safety level
- temp. detection probe (usually PT100) to control automatically the temperature of the component, with water / heating elements (chiller or water conditioner at the Beneficiary charge)
- nitrogen pressurization circuit
- Agitator (stirrer) with leakage monitoring
- ON/OFF valve pneumatically operated, controlled by the filling levels
- A drain valve is connected to the exhaust (ventilation) system, to evacuate the saturated air during the filling

Electrical control panel to control the module, through a PLC.

- all components are ex-proof or equivalent (according to international safety rules)
- the electrical board to interface the existing isocyanate side (controls)
- a flow transducer is provided on iso side and controlled by the control panel

The system controls (in open or closed loop) the speed and consequently the output of both components

A visual display allows the calibration and the continuous monitoring of the Ratio and output of the components.

Min. 20 shot times, individually set, to be selected on a box installed close to the injection head

**(\*): the complete replace of the existing dosing unit can be considered**



#### **E.1-5 Injection head and piping**

Rigid piping is existing and in good conditions, to be verified

New flexible piping MUST be replaced, 16 mt length

One new HP head is existing, to be overhauled (a replace of it can be considered with no extra price

A nitrogen inertization system must be provided

#### **E.1-6 Alarm and safety system (wet cores)**

One Alarm and Safety control board to control and manage ALL alarms that can happen during the premixing operation

1 (one) Double ventilator	Adapt to keep constantly the pentane concentration under 10% of LEL; ventilator and ducts at the Beneficiary charge
1 (one) Gas sensor	To be installed inside the dosing module box, to detect / manage 1 <sup>st</sup> step of alarm at 10% of LEL and to cut-off the m/c and operate the 2 <sup>nd</sup> ventilator at 20% of LEL
Control Panel	To interface ALL alarms, (Gas Sensors, Level switch, air duct pressure switch) and operate the ventilator, the cut off of the dosing module through a fire safe valve and switch on the siren and visual alarm; it has to be located in a area safe from emission of gas



<b>E.1-7 Additional Alarm and safety system (dry cores)</b>	
One Alarm and Safety control board to control and manage ALL alarms that can happen during the foaming operation	
1 (one) Double ventilator	Adapt to keep constantly the pentane concentration under 10% of LEL; (ventilator and ducts already existing, to be verified)
16 (sixteen) Gas sensor	To be installed along the existing jigs, to detect/manage 1 <sup>st</sup> step of alarm at 10% of LEL and to cut-off the m/c and operate the 2 <sup>nd</sup> ventilator at 20% of LEL
Control Panel	To interface ALL alarms, (Gas Sensors, Level switch, air duct pressure switch) and operate the ventilator, the cut off of the plant and switch on the siren and visual alarm; it has to be located in a area safe from emission of gas

<b>E.1-8 Retrofitting of the existing dosing units (doors) (*)</b>		
One high pressure dosing module (polyol side) to process rigid PU foam with pentane (max output of the module not less than 40 Kg/min), to be used with Polyol / pentane blend-based systems, mounted on a steel frame, painted with anti-corrosion treatment		
The module includes either the dosing and the tank groups; it consists in a steel-frame with an enclosure with drip-pan, to be connected to the safety ventilation system from the bottom		
Capacity	Polyol/pentane blend total output	10 to 40 kg/min
<p>One pressurized carbon-steel tank; tanks MUST be certified according to Standard European regulation; min. capacity: not less than 200 lt.</p> <ul style="list-style-type: none"> <li>- control of the temperature through jacket or heat exchangers; insulation has to be provided.</li> <li>- One filter, self-cleaning type to be installed in series to the pumps feeding</li> </ul> <p>The tank is also equipped with:</p> <ul style="list-style-type: none"> <li>- overpressure safety valve, to be connected on the return to the tank</li> <li>- pneumatically operated fire-safe cut-off valve to be controlled by the safety system</li> <li>- draining valve</li> <li>- visual level</li> <li>- min/max level for automatic filling (to start the premix system)</li> <li>- super-max safety level</li> <li>- temp. detection probe (usually PT100) to control automatically the temperature of the component, with water / heating elements (chiller or water conditioner at the Beneficiary charge)</li> <li>- nitrogen pressurization circuit</li> <li>- Agitator (stirrer) with leakage monitoring</li> <li>- pneumatically operated ON/OFF valve, controlled by the filling levels</li> <li>- A drain valve is connected to the exhaust (ventilation) system, to evacuate the saturated air during the filling</li> </ul>		
<p>Electrical control panel is provided, to control the module, through a PLC.</p> <ul style="list-style-type: none"> <li>- all components are ex-proof or equivalent (according to international safety rules)</li> </ul>		



- the electrical board also provide to interface the existing Isocyanate side (controls)
- a flow transducer is provided on ISO side and controlled by the control panel

The system controls (in open or closed loop) the speed and consequently the output of both components

A visual display allows the calibration and the continuous monitoring of the Ratio and output of the components.

Min. 20 shot times, individually set, to be selected on a box installed close to the injection head

**(\*): the complete replace of the existing dosing unit also can be considered**

#### **E.1-9 Injection head and piping**

Rigid piping is existing and in good conditions, to be verified

New flexible piping MUST be replaced, 10 mt length

One new HP head is existing, to be overhauled (replacement can be considered)

#### **E.1-10 Alarm and safety system (wet part of the door production)**

One Alarm and Safety control board to control and manage ALL alarms that can happen during the premixing operation

1 (one) Double ventilator	Adapt to keep constantly the pentane concentration under 10% of LEL; ventilator and ducts at the Beneficiary charge
1 (one) Gas sensor	To be installed inside the dosing module box, to detect/manage 1 <sup>st</sup> step of alarm at 10% of LEL and to cut-off the m/c and operate the 2 <sup>nd</sup> ventilator at 20% of LEL
Control Panel	To interface ALL alarms, (Gas Sensors, Level switch, air duct pressure switch) and operate the ventilator, the cut off of the dosing module through a fire safe valve and switch on the siren and visual alarm; it has to be located in a area safe from emission of gas

#### **E.1-11 Additional Alarm and safety system (dry part of the door production)**

One Alarm and Safety control board to control and manage ALL alarms that can happen during the foaming operation

1 (one) Double ventilator	Adapt to keep constantly the pentane concentration under 10% of LEL; (ventilator and ducts already existing, to be verified)
4 (four) Gas sensor	To be installed along the existing jigs, to detect/manage 1 <sup>st</sup> step of alarm at 10% of LEL and to cut-off the m/c and operate the 2 <sup>nd</sup> ventilator at 20% of LEL
Control Panel	To interface ALL alarms, (Gas Sensors, Level switch, air duct pressure switch) and operate the ventilator, the cut off of the plant and switch on the siren and visual alarm; it has to be located in a area safe from emission of gas



## E.2 Scope of supply and services to be provided by the Beneficiary Company

#	Item	Note
1	Power Supply	380V, 50Hz, 3 phase, 100kW
2	Supply of nitrogen	Cylinders or nitrogen generator
3	Start up	Raw material and consumable for machine testing and start up as attached (Appendix E.4)
4	Preparatory works	All civil works, authorizations from local authorities and utilities as attached (Appendix E.4)
5	Extra flexible hose	Additional hoses in case that the distance between the foam machine and the mixing head is longer than 7 m
6	Ventilation system	Ventilation system including piping and blowers connected to the outside
7	Lighting conductor	To be installed on the roof of building housing the equipment





### **E.3 Spare Parts List Needed for 1 Year Full Operation (to be provided by supplier)**

**Please indicate breakdown cost for each spare part**

<b>Description</b>	<b>Quantity (to be provided by the supplier)</b>
Mixing head nozzle	
Proximity sensor (for the mixing head)	
One set bush for high pressure pump	
Set of shaft seal for high pressure pump	
Hydraulic filter	
Pressure relieve valve of buffer tank	
Magnetic inlet for water – daily tank	
Electric valve 5/2 – 24V	
Switch, selector, lamp, alarm signal	
Filter for polyol line in premixing unit	
O-ring, seal, etc	
PT 100 sensor EX-type	
Other spare parts to be listed as needed below	



#### **E.4 General notes:**

- When the order is placed, the Contractor will provide technical layout and utility requirements; however, it is the Beneficiary's responsibility to provide electricity power, water connection, compressed air, N<sub>2</sub>, and earth connection as defined in the Contractor's technical layout and utility requirements.
- It is the Beneficiary's responsibility to supply raw material for testing in the Beneficiary's plant.
- It is the Beneficiary's responsibility to provide appropriated crane or lift to download the equipment from the truck and placing the machinery in the required position based on the layout.
- Smooth and on-schedule progress of the assembly work is only possible with unrestricted access to the site.
- The floor of the workshop where the equipment is installed must be level and dirt-free.
- Concrete for the floor should be at least of a quality conforming to B25<sup>9</sup>.
- On the floor, minimum drilling depth is 200 mm, for accommodating M20<sup>10</sup> grouting-/ rag-bolts.
- It is the Beneficiary's responsibility to provide firefighting equipment for hazardous material, Ex-light for the production area if needed.
- The Contractor reserves the right to improve the technical specification of the services, goods and equipment to be provided by the Beneficiary as required ensuring the optimal installation and operation of the foam system.

---

<sup>9</sup> One of the Concrete classes according to compressive strength

<sup>10</sup> Anchor size



### **E.5 Terms & conditions of technical assistance during guarantee period (will be provided by Contractor)**

#### **An example**

Once equipment is set up & in production, in case the Beneficiary needs technical assistance the procedure will be as following:

**Basic Helpline services (tel.:-----):** Contractor's technicians will try in first step to solve the issue via phone by guiding the personnel who have received training during start up.

**Replacing of faulty spare parts:** In case a 'warranty replacement part' is agreed; the Contractor/Contractor's local service provider will arrange for replacing the defective parts by sending new ones in the first available time and free of charge, within the guarantee period.

**Repair service (s):** If a problem was not solved on phone or the part replacement should only be done by ---, a the Contractor/Contractor's local service provider technician will be sent to customer site not later than 24 hours after receiving the first phone call, followed by a written fax/email describing the issue. During guarantee period, this visit (labor, transportation and accommodation) will be free of charge in case the fault would be from the Contractor side but if the damage is due to improper handling or not trained operators using the equipment, the Contractor will charge the Beneficiary by the daily rate of ----- IRR plus transportation & accommodation (if needed). Parts under guarantee are freely replaced while those of wear & tear should be paid by Beneficiary.

**Service agreement/health check services:** In case of a need to a routine periodical visit, the Beneficiary can enter a service agreement with the Contractor/Contractor's local service provider for a specified time and within a certain amount of cost. Regular monitoring & maintenance by a Contractor/Contractor's local service provider technician will reduce the risk of an unforeseen breakdown in production.



## **E.6 Terms of training**

Training is an essential part securing the optimum use of the equipment which will be performed in below steps:

**Initial training during start up but before delivery:** This is the best time for the Beneficiary company's maintenance personnel to be involved with real problems happening during commissioning & start up so it is advised to the Beneficiary company to have one mechanical & one electrical expert (preferably with Programmable Logic Controller software knowledge) to be available in the last days before final start up. Knowledge gained in this period will help them to better understand the later advanced trainings.

**Training after start up:** There will be two separate trainings, one for operators & one for maintenance department (mechanical & electrical) in Farsi language. At the end of each training sessions, there will be a form to be signed by all trainees, where the syllabus of training is clearly described. In this way we will make sure that all topics are addressed. It is important not to relocate the trainees to other departments before being sure that there are still trained operators/maintenance to take care of the plant. Any improper handling of equipment by untrained staff will void the guarantee.