Israeli Firefighting & Rescue National Authority

Fire Training Center simulation system

Statement Of Work

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Chapter 1 - General

1. This document designed to define the technical and functional requirements from the fire training center simulation system (referred to hereinafter as the "**simulation system**" or "**the system**") and the integrated logistic support thereto for the Israeli Fire & Rescue National Authority (referred to hereinafter as the "**Authority**").

2. The simulation system will include the following main ingredients:.

   2.1. The fire training units (referred to hereinafter as the "**FTU**" or the "**fire simulator**") with or without flash over unit (refer to hereinafter as the "**FOU**").

   2.2. The smoke simulation system including the smoke generators, smoke oil tank and smoke delivery systems.

   2.3. The safety, emergency and alarm system.

   2.4. The thermal protection systems.

   2.5. The control and supervising system (central control room, wireless handheld control and control units for the various simulators).

   2.6. The software for managing and operation of the entire system.

3. The supplier of the simulation system and its ancillary equipment (referred to hereinafter as "**The Supplier**") will be responsible for:

   3.1. Detailed design of the infrastructure required for installation and operating of the simulation systems supplied by him.

   3.2. Supplying the simulation system and its components at the facility site in Israel.

   3.3. Commissioning of the system in Israel.

   3.4. Operators and basic maintenance work technicians Training.

   3.5. Supplying of technical literature.

   3.6. Providing adequate Maintenance at the site to ensure "smooth" and continuous operation of the system.

4. Corporation with the Architects office

   4.1. The supplier will be responsible for detailed designing of the infrastructure required for installation and operating of the simulation systems supplied by him with full cooperation with the Architects office , including with its

various professional advisers, selected by the Authority to design the entire facility.

4.2. The detailed design will refer to the following subjects (for both the indoor and outdoor systems as defined hereinafter):

4.2.1. The Ethernet infrastructure and connection points.

4.2.2. The electrical supply system and connection points.

4.2.3. The gas supply system and connection points.

4.2.4. The water supply system and connection points.

4.2.5. The ventilation ducts and connection points.

4.2.6. The smoke delivery system to the smoke training rooms.

4.2.7. Cabling and wiring for the communication systems required for operating the indoor and outdoor simulators.

4.2.8. The safety systems.

4.2.9. The control and supervising systems.

4.2.10. The entire infrastructure, equipment or other devices required for the operation of the entire system.

4.3. The building general drawings will be provided to the supplier by the aforementioned Architects office of the Authority.

4.4. The detailed design that will be received from the supplier will be integrated in the general design for the entire project.

4.5. The drawings and programs of the detailed design shall be provided in DWG format by Auto-Cad software. The drawings shall be in a scale of 1:50 at least.

5. Compliance with standards:

The system ant the way of its installation shall comply with the relevant standards for this kind of system including:

5.1. NEN 3324- Regulation for the installations of liquid gas installations.

5.2. NEN – EN60204-Electrical equipment for machines

5.3. Equivalent Israeli standards.

5.4. Equivalent American standards.

5.5. In case of contradiction between the Israeli standards and the other standards, the Israeli standards shall prevail.

Chapter 2 – technical requirements

Section 1 - The Fire Training simulators ("FTU" & "FOU"))

1. The FTU will consist of the following main elements:

   1.1. The prop itself (like car, kitchen, sofa, bed and etc.)

   1.2. The control unit.

   1.3. The fire tray.

2. **Props** - The following fire simulation props will be provided as part of the fire simulation system:

   2.1. Car fire simulator.

   2.2. Kitchen fire simulator.

   2.3. Sofa fire simulator.

   2.4. Double bed fire simulator.

   2.5. Window fire simulator.

   2.6. Stair fire simulator.

   2.7. Hot door.

   2.8. Industrial fire simulator

   2.9. Vessel spill fire simulator (outdoor)

   2.10. Split flange fire simulator (outdoor).

   2.11. FLASHOVER installations.

3. The above mentioned simulators shall include al the installations, devices, , infrastructure , ancillary accessories and any other equipment required for their operation which means "assembly system".

4. The customer preserves his right to change, without additional charge, the locations of the FTU and FOU in the building including the smoke training area as detailed hereinafter and this with coordination with the supplier.

5. The control unit

5.1. The task of the control unit is to provide the link between the operator's (instructor's) control device and the fire unit.

5.2. In case the control unit is installed inside the simulator prop it shall be protected against the high temperature and mechanical hits.

5.3. The control unit will include the pilot burner, the necessary valves, pressure fans, Safety components and related component to enable the fire ignition and fire management.

5.4. The pilot burner

5.4.1. The role of the pilot burner is to ignite the gas in the fire tray specified hereinafter.

5.4.2. The pilot burner is made of stainless steel pipe and include the following main elements:

- The ventilator
- Air pressure switch
- Ignition pin
- Ionization pin
- Burner
- Pressure reducing valve

5.4.3. The role of the ventilator is to cool down the pilot burner and also supplies air for the pilot flame within the combustion process.

5.4.4. The roll of the air pressure switch is to check the proper operation of the ventilator by measuring the pressure inside the piping that is created by the ventilator.

5.4.5. The role of the ignition pin is to ignite the flame in the pilot burner.

5.4.6. The role of the ionization pin is to monitor the presence and stability of the pilot flame.

5.4.7. The role of the burner is to ensure that each fire is consistently ignited as demanded by the operator via the control system.

5.4.8. The way of installation of the pilot burner shall ensure that the burner will not be visible for the trainees.

5.5. The system shall enable that each fire unit can be either operated independently or with combination with the other units.

6. The fire tray

6.1. The fire tray will be hidden inside the props in a way that the trainees will not be able to see it.

6.2. The fire tray will be of "Water- bath" type.

6.3. The fire tray shall be made of 3 mm stainless steel at least.

6.4. The fire will be created by ignition of LPG gas emerging outside above the water level from a gas piping located at the bottom of the tray under the water.

6.5. The fire tray will be ignited by the pilot burner of the control unit.

6.6. The gas can be ejected from the piping in a predetermined points.

6.7. The system will include automatic water refilling system for the "water-bath" tray to ensure an adequate supply of water for cooling and prevents the buildup of residues and extinguishing materials

6.8. The design and the construction of the fire tray shall enable continuous operation for 8 hours at least without the need to stop the operation for cooling down the system.

6.9. The fire tray shall last 10 years at least.

6.10. The fire tray assembly can be easily detached from the FTU for replacing if it will became necessary.

6.11. The fire tray will be fitted with a stainless steel grill that will prevent spraying of water outside by the fire extinguishing hoses.

6.12. The fire tray will be equipped with the following components:

- **Extinguishing agent detection** (water detection) to detect if the fire has been extinguished by the water.

- **Temperature detection system** which is done via thermocouples and is aimed to detect excessive high temperature for protecting the steelwork of the tray assembly against those temperatures and thus extending the life span of the FTU. The system shall enable to determine preset temperatures.

- **Fresh air supply** for the combustion process creating the fire, done via external fan located underneath the burner to ensure optimal combustion by maintaining proper air / gas ratio. The cooler air provided will extend the lifespan of the FTU.

6.13. Extinguishing detection system

- The purpose of this system is to simulate the fire extinguishing process for the trainees.

- The system will includes a series of temperature sensors the fire tray is fitted with, depending on the size of the tray/prop, fitted with steel

housing for protecting the sensors against mechanical hits and also provides consistent temperature reading.

- Operation principle – when the sensors registered certain decrease of the temperature during the firefighting process implemented by the trainee , the fire is then automatically adjusted to lower intensity and after additional decrease the fire will be automatically and completely extinguished. The temperatures controlling the fire intensity and the complete extinguishing point can be preset as required.

7. Car Simulator

The car simulator will be will be constructed as follows:

7.1. Location – basemen, designated as "M1" in the drawing attached.

7.2. Control unit

- Mounted in the car prop
- Made of 3 mm stainless steel
- Fitted with the pilot burner, gas valves, electrical components and communication systems.

7.3. Fire tray

- Mounted within the car prop
- Dimensions : (LxWxH): 1,900x1,200X150 mm approx..
- Material: 3 mm grade 304 stainless steel.
- Equipped with 4 burners:
    - One in the engine compartment with one flame height and flame capacity of 750 KW approx.,
    - One in the dashboard compartment with one flame height and flame capacity of 250 KW approx.
    - One in the interior passenger's compartment with one flame height and flame capacity of 750 KW approx.
    - One in the front wheel with one flame height and flame capacity of 250 KW approx.
- Fitted with 4 thermocouples for the extinguishing detecting system.
- Adjusting of the fire intensity will be made via the control unit.

7.4. Car prop

- Similar to typical family saloon vehicle (sedan ,4 doors and separated trunk), hinged doors, bonnet and rear trunk along with internal features such as dashboard, front & rear seats and steering wheel. The bonnet and the trunk can be safely remained open to enable the trainee to handle the fire inside . Special attention shall be given to avoid sharp edges in the prop structure.

- Dimension: (LxWxH): 3700x1700X1300 mm approx.

- Material: 5 mm CORTEN or stainless steel.

8. Kitchen simulator

The kitchen simulator will be constructed as follows:

8.1. Location – Ground floor, designated as "M3" in the drawing.

8.2. Control unit

- Will be made of 3 mm electro- galvanized metal sheet.

- Fitted with the pilot burner. Gas valves, electrical components and communication systems.

8.3. Fire tray

- Mounted within the kitchen prop.

- Dimension:

    - Stove: (LxWxH): 800x500X175 mm approx.

    - Overhead cooker hood: (LxWxH): 800x40X40 mm approx.

- Material: 3 mm stainless steel (304)
- equipped with two burners:
    - One in the stove with three flame heights (low, medium and high) and a capacity of 250 / 400 / 650 kw approx.
    - One in the overhead exhaust hood with one flame height and a capacity of 275 kw approx.
- Fitted with 4 thermocouples for the extinguishing detecting system.

- Adjusting of the fire flame intensity will be made via the control unit.

8.4. Kitchen prop

- The structure of the prop will simulate a cooker with 4 ring gas stove and overhead exhaust hood
- Dimensions:
    - Stove: (LxWxH): 850x600X900 mm approx.
    - Overhead cooker hood : (LxWxH): 800x500X500mm approx.
    - Total height of the stove including overhead cooker hood 2,300 mm approx.
- Material: will be made of 3 mm CORTEN or stainless steel.

9. Sofa simulator

The sofa simulator will be constructed as follows:

9.1. Location C floor , designated as "M8" in the drawing.

9.2. Control unit

- Will be made of 3 mm electro- galvanized metal sheet.
- Fitted with the pilot burner. Gas valves, electrical components and communication systems.

9.3. Fire tray

- Mounted within the sofa prop.
- Dimension: (LxWxH): 1,800x500X150 mm approx.
- Material: 3 mm stainless steel (304)
- Equipped with one burner with three flame heights: low, medium and high and a flame capacity of 250 / 600 /850 mm respectively approx.
- Fitted with three thermocouple for the extinguishing detecting system.
- Adjusting of the fire flame intensity will be made via the control unit.

9.4. Sofa prop

- The structure of the sofa prop will simulate a 3 seats settee.
- Dimensions: (LxWxH) 2000x800X950 mm approx.
- Material: will be made of 3 – 5 mm CORTEN or stainless steel.

10. Double Bed Simulator

The double bed simulator will be constructed as follows:

10.1. Location A floor , designated as " M4 " in the drawing

10.2. Control unit

- Will be made of 3 mm electro- galvanized metal sheet.
- Fitted with the pilot burner. Gas valves, electrical components and communication systems.

10.3. Fire tray

- Mounted within the double bed prop.
- Dimension: (LxWxH): 1,650 x1,550X155 mm approx.
- Material: 3 mm stainless steel (304)
- Equipped with two burners:
    - One in the pillow area with one flame height and a capacity of 250 KW approx.
    - One in the mattress area with three flame height (low / medium/ high) and a capacity of 350 / 650/ 1,000 kw approx.
- Fitted with three thermocouple for the extinguishing detecting system.
- Adjusting the levels of the flames via the control unit.

10.4. Double Bed prop

- The structure of the prop will simulate a standard double bed
- Dimensions: (LxWxH): 2,000x1, 800X900 mm approx.
- Material: will be made of 3-5 mm CORTEN or stainless steel.

11. Window simulator

The window fire simulator shall simulate a fire that has broken through a window from an internal fire.

The Window simulator will be constructed as follows:

11.1. Location C floor , designated as "M7" in the drawing

11.2. Control unit

- Placed against the window prop.
- Made of 3 mm stainless steel

- Fitted with the pilot burner. Gas valves, electrical components and communication systems.

11.3. Fire tray

- Mounted within the Window prop
- Dimensions: (WxHxD): 1,000x1,000X200 mm approx.
- Material: 4 mm grade 304 stainless steel.
- Equipped with 3 burners:
    - One in the window frame area itself with one flame height and flame capacity of 250 KW approx.,
    - Two above the window, each with one flame height and a capacity of 250 kw approx...
- Fitted with three thermocouple for the extinguishing detecting system.
- Adjusting the levels of the flames via the control unit.
- The design of the simulator shall insure that the fire will emanate from the window frame to the outside of the building

11.4. Window Prop

- Simulate window shutter placed in the window frame..
- Dimension: (WxHxD): 1,000X1,000X200 mm approx.
- Material: 3-5 mm CORTEN or stainless steel.

12. Stair Simulator

The Stair Fire Simulator will include 3 stair steps and will be constructed as follows:

12.1. Location –ground floor , designated as "M2" in the drawing

12.2. Control unit

- Placed under the stair prop..
- Dimensions: (BxHxD): 600x600X600 mm approx.
- Made of 3 mm CORTEN or stainless steel
- Fitted with the pilot burner. Gas valves, electrical components and communication systems.

12.3. Fire tray

- Material: 3 mm grade 304 stainless steel.
- Will include 3 burner pipes installed in the stair as follows:
    - One burner pipe under stair step one and dimensions as follows: (lxwxh) 800/ 40 /40 mm approx.
    - One burner pipe under stair step two and dimensions as follows: (lxwxh) 800/ 40 /40 mm approx.
    - One burner pipe under stair step three and dimensions as follows: (lxwxh) 800/ 40 /40 mm approx.
- The fire tray will be equipped with one flame height and a capacity of 600 kw.
- Fitted with 3 thermocouples for the extinguishing detecting system.
- Adjustable level through the control unit.

12.4. Stair Prop

- The prop will be consisted with 3 steps..
- Dimension: (LxWxH): 1,000x250X800 mm approx.
- Material: 4 mm mild steel.
- Treated with a special heat resistant paint.

13. Hot door simulator

The Hot Door Simulator will be constructed as follows:

13.1. Location – A floor , designated as "M5" in the drawing

13.2. The hot door will be made of steel covered with aluminum plating on one side.

13.3. Three heating elements will be fitted into the aluminum side

13.4. One heating element will be fitted in the door handle which will warm up the handle up to a temperature of 50ºC approx.

13.5. This simulator will be built to operate in conjunction with smoke simulation where the smoke is forced out through openings in the casing around the door.

14. Industrial installation fire simulator(indoor)

14.1. Location – B floor designated as " M6" in the drawing

14.2. Will simulate fire breaking through from a flange, valve and piping.

14.3. Control unit

- Placed near the industrial prop.
- Dimensions: (LxWxH): 600x600X600 mm approx.
- Made of 3 mm stainless steel
- Fitted with the pilot burner, gas valves, electrical components and communication systems.

14.4. Fire tray

- Mounted on the floor at a height of approx. 400 mm above the ground.
- Dimensions: (LxWxH): 2,000x800X150 mm approx.
- Material: 3 mm grade 304 stainless steel.
- Equipped with one burner with three flame heights (Low. Medium and high) and a flame capacity of 250 / 550 / 800 KW approx.
- Fitted with 2 thermocouples for the extinguishing detecting system.
- Adjustable level through the control unit.

14.5. Industrial prop

- The prop will consist of 6" at least industrial piping 3 mm thick installed on the fire tray and equipped with:
    - Working valve that the trainees can turn off to eliminate the source of fire from the flange
    - Working valve that the trainees can turn off to eliminate the source of fire from the piping itself.
    - Material: stainless steel.

15. Vessel spill simulator (outdoor)

The vessel spill fire Simulator will be constructed as follows:

15.1. Location- designated as " " in the drawing of the outdoor facility.

15.2. The unit will simulate spill of fuel on an area of 6X2 meter as a result of fuel spilling or overflowing from a fuel vessel. The vessel will be installed next to the fire unit and will be supplied and installed by the supplier.

15.3. The simulator will include the following components:

15.3.1. The control unit.

15.3.2. The fire tray.

15.4. The control unit:

15.4.1. Will be placed on the ground opposite to the fire tray.

15.4.2. Material: 3 mm 304 grade stainless steel.

15.4.3. Fitted with the gas valves, electrical components and communication systems.

15.4.4. Treated with heat resistant paint.

15.5. The fire tray

15.5.1. Will be placed on the ground next to the fuel vessel which is laying down on the ground.

15.5.2. Dimensions: (LXWXH): 6,000X2,000X150 mm approx.

15.5.3. Material: 4 mm 304 grade stainless steel.

15.5.4. Equipped with one burner with single flame height and capacity of 5,000 KW at least.

15.5.5. Fitted with 4 thermocouples for the extinguishing detecting system.

15.5.6. The fire shall brake through the tray covering the entire area as determined above.

15.5.7. Treated with heat resistant paint.

16. Split flange fire simulator (outdoor)

16.1. Location, designated as " " in the drawing of the outdoor facility

16.2. The split flange fire simulator designed to simulate fire caused by a gasket failure in a flange or material failure int a pipe joint

16.3. The mock – up will be made of 6" piping at least 3 mm thick fitted with a flange joint in the vertical leg of the piping,

16.4. The fire will emanate from the joint in the flange engulfing the area around the joint.

16.5. The simulator will feature single fire intensity.

16.6. A dummy valve will be installed at a distance of 1.5 meter approx. from the joint to enable training of the trainees how to isolate a flammable fluid running inside a pipe causing a fire.

16.7. The operator will be able to stop the fire manually upon successful actions by the trainees.

16.8. The construction shall be made from suitable materials that will withstand the rigor of the live fire training environment.

16.9. During the fire scenario and as a result of the fire training, no harmful material substances should be emitted from the equipment.

16.10. The mock-up will be coated in heat resistant paint to protect from corrosion.

17. Flash Over Unit

17.1. Two FOU will be installed, one in the double bed simulator room and the second one in the sofa simulator room in addition to the FTU's in these rooms.

17.2. The flash over unit system shall enable to create high intensity and rapidly repeatable flash over scenario features "rolling fire" effects in which the fire spreads across the ceiling in the fire room.

17.3. The FOU shall be ignited in at least three stages. in each consecutive stage a predetermined amount of gas will be allowed to escape and ignite.

17.4. The first stage will be ignited by the pilot burner of the control unit and the other stages will be ignited by the previous stage.

17.5. To supply the large amount of gas flow, the burner pipes will be fed directly from buffer tanks located nearby.

17.6. The design of the unit will enable to abruptly stop the FOU.

17.7. The FOU can be reignited after a short period of time.

17.8. The flash over fire simulator will be constructed as follows:

- Control unit
    - Material: 3 mm electro-galvanized metal sheet.
    - Fitted with the pilot burner. gas valves, electrical components and communication systems
- The flash over structure
    - Will consist of burner pipes installed underneath the ceiling of the fire room.
    - The burner/burners pipes will be fed directly from the buffer tank / tanks.
    - The flashover shall have a capacity of 1,500 kw at least and a flame radius of 6 m at least.
    - It will be possible to continuously operate the flash over for at least 30 seconds.
    - The unit shall enable repeatable and continuous training where the reload time for the next operation of the flash over effect shall not exceed 10 seconds.

Section 2 - The Smoke Simulation System

1. The smoke simulation system will be operated in conjunction with the FTU's or separately as smoke space /room only.

2. The system will consist of 3 main components as follows:

   2.1. The smoke generator

   2.2. The smoke fluid reservoir

   2.3. The smoke delivery system.

3. The system will be supplied in two configuration as follows:

   - Standalone mobile smoke system consisting of smoke generator and built in smoke liquid tank.
   - A fix system consisting of central oil tank and smoke generator/ generators.

4. The smoke generator

4.1. The smoke generator will be equipped with electrical heating chambers for producing the smoke by warming up the smoke fluid.

4.2. The heating chambers will be computer controlled to provide precise temperature management ensuring constant operation of the generator without the need for warm / cool cycles.

4.3. The design of the system shall ensure creating of pure smoke without any unwanted residues.

4.4. The smoke generator will be fed with smoke liquid from the smoke liquid reservoirs via an external pump controlled by the computerized system.

4.5. The system will be fitted with smoke fluid level measuring device. The smoke fluid level will also be displayed in the central control room as detailed hereinafter.

4.6. The smoke generator will be mounted on a galvanized steel frame mounted against the wall at 1,000 mm approx. above the floor level.

4.7. It will be possible to control the amount / flow of smoke produced by the system.

4.8. The control system of the generator shall enable setting of the smoke density, smoke duration and heating core temperature.

5. The smoke fluid reservoir

5.1. In a standalone mobile configuration the capacity of the smoke fluid tank shall be 5 liter at least and will enable at least two hours of training in a smoke density of 50% of the maximal possible density.

5.2. When a fix system is used the capacity of the central reservoir shall be 180 liter at least.

5.3. The average consuming rate of smoke oil for creating 50% density, shall not exceed 35 milliliter per minute.

5.4. The fluid shall be supplied with Material Safety Data Sheet (MSDS).

5.5. The system will be delivered to the authority with full oil tanks for the entire system after completing all the inspections , the commissioning and training as defined hereinafter.

6. The smoke distribution system

6.1. For each smoke generator a spiral pipe with a diameter of 125 mm will be used to deliver the smoke to each smoke room as defined in paragraph 7. hereinafter.

6.2. In cases it is necessary to deliver the smoke to several rooms separately or at the same time ,a delivery pipe will be installed for each room. Each pipe will be fitted with fan and controlled valve enabling to control the smoke flow rate to each room. The task of the fan is to prevent condensation of smoke while flowing in the pipe or causing it to be too thick.

7. Locations- several location will be used as smoke training area as follows:

7.1. Standalone mobile systems will be installed in the following locations designated in the attached drawings:

7.1.1. Ground floor at kitchen simulator room at the area designated as G 07.

7.1.2. Ground floor at stairs simulator area designated as G 06.

7.1.3. A floor at the double bed simulator room.

7.1.4. B floor at the industrial simulator place in the area designated as B 04.

7.1.5. B floor at the area designated as B 03.

7.2. Fix systems with central oil supply tank will be installed in the following locations designated in the attached drawings:

7.2.1. Basement floor in the areas designated as basement 04 and basement 05.

7.2.2. Ground floor in the areas designated as G 01 and G 02. It will be possible to control the smoke flow to each room separately or at the same time.

7.2.3. B floor at the offices area designated as B 01.

7.2.4. C floor – contains 4 independent apartments in the area designated as C 01, C 02, C 03 and C 04. It will be possible to control the smoke flow to each apartment separately or delivery the smoke to all of them at the same time.

Section 3 - The gas system

1. The system shall include manual shut-off valve for every area of training unit.

2. In addition to the manual valve an electrical shut off valve will be installed.

3. The system will be designed so that in case of emergency situation as defined hereinafter the main valves of the gas supply tank will be closed.

4. The main electrical valve will regulate the flow of gas ,through the main gas lines, to the electrical shut off valve of the fire tray where the pressure is further reduced to the working pressure of the system.

5. The design of the system shall ensure constant working pressure

6. The valves in the building will be easily accessible.

7. The system will include gas console to connect the building and the outer fire simulators as mentioned above to the central gas tank via the main gas valves which will be controlled by the central control room.

8. The gas console shall enable to add at least 3 fire training units in the future whether indoor or outdoor FTU's.

9. The gas console will be equipped with the following main components:

    - Shut off valve
    - Manometer
    - Reducing valve
    - Exhaust valve' mounted to the outside of the gas cabinet.
    - Filter

10. The system shall be provided with semi-automatic gas tightness test that will be activated once in a day or after power failure.

11. A central underground gas tank with a capacity of 8 cubic meter will be supplied and installed by the supplier including the entire piping according to the Israeli standards. The agreement for supplying gas on a routine basis with local gas supplier will be done by the customer and on his own expense.

12. The gas required for the inspection of the system by the supplier, the acceptance tests, the training and commissioning and any other activity required for the delivery of the system to the customer will be on the supplier own expense.

Section 4 - The water system

1. The water system is designed for automatic water filling in the fire trays.

2. The water system will include a water console that connects the existing water pipes to the installation of the simulation system via a water valves controlled by the central control unit and which reduce the water pressure to an appropriate level.

3. The water console will be equipped with the following items:

   3.1. Shut off valve

   3.2. Pressure reducing valve

   3.3. Filter.

4. The water system for supplying water to the fire trays will be separated from the water system used for supplying water to the fire extinguishing hoses.

5. Automatic water filling system

   5.1. The water filling system will be activated automatically depending on the temperature developed in the fire trays.

   5.2. When the temperature in the fire tray rises, the system automatically filled the fire tray with more water.

6. By stopping the water supply system completely, the drainage valve of all the fire trays will be automatically opened removing the water used during the training session.

Section 5 - Safety and Emergency systems

1. The system will be provided with the following safety and emergency systems:

   1.1. Gas detection system

   1.2. Temperature monitoring system

   1.3. Emergency stop system

   1.4. Ventilation system

   1.5. Audio and visual alarm systems.

2. Gas Detection System`

2.1. Gas detection sensors will be installed as follows:

- Two gas detection sensors in every fire room.

2.2. The system will be designed so that each sensor will function independently of the other to provide a back-up, should one of the sensor fail.

2.3. The sensors will be installed above the floor (exact distance will be determined by the supplier) inside a steel housing for protection.

2.4. The gas detection sensor will be IP 65 rated at least to withstand the water jets from the firefighting hoses as well as the high temperature developed in the fire rooms.

2.5. The system shall continually measure the gas / air ratio. The values shall be expressed by LEL (Lower Explosion Limit) percentage and will be displayed in the central control room in real time.

2.6. Gas detection setting

The setting of the detection system will be as follows:

- Warning - above 10% LEL
- Lower alarm level- above 25% LEL
- Upper alarm level- above 35% LEL

If the warning level (10% LEL) is exceeded the following activities in the relevant FTU will be initiated:

- The main burner gas valve will be shut off', pilot flame will continue to burn.
- The audio and visual alarm will be activated.

If the lower alarm level (25% LEL) is exceeded the following activities in the relevant FTU will be initiated:

:

- The main gas valves will be closed
- The burners will be switched off.
- Lights will be switched on and lights can no longer be switched manually.
- Smoke production will be stopped.
- The central exhaust system will be switched to maximum output.
- The audio and visual alarm will be activated.
- It will be possible to restart the system once less than 10% LEL has been measured and the gas detection system will automatically be reset.

If the upper alarm level (35% LEL) is exceeded the following activities in the relevant FTU will be initiated:

- The main gas valves will be closed
- The burners will be switched off.
- Lights will be switched on and lights can no longer be switched manually.
- Smoke production will be stopped.
- Electricity supply will be shut down.
- The cool air ventilators will be switched off
- The central exhaust system will be switched to maximum output.
- The audio and visual alarm will be activated.
- It will no longer be possible to restart the system before the entire system has been reset by qualified service technician.

3. Temperature Monitoring

3.1. The temperature monitoring system shall comply with DIN14097-2 or equivalent.

3.2. Each fire room will be fitted with a minimum of two sets of temperature sensors.

3.3. Each set will be consist of three thermocouples with the following configuration:

- One sensor mounted at a high level
- One sensor mounted at a medium level
- One sensor mounted at a low level

3.4. The temperature sensors will be fitted with a steel housing for protection.

3.5. Temperature monitoring setting:

The system setting will be adjusted as follows:

- 1st measurement location at 300 mm approx. above floor level and set to 50°c approx.
- 2st measurement location at 1,000 mm approx. above floor level and set to 250°c approx.
- 3st measurement location close to the ceiling and set to 475°c approx.

3.6. If one of the measurement of the temperature sensor in one of the FTU exceeds 90% of the pre-programmed temperature level the following functions will take place in the relevant FTU:

- The flame capacity of the fire tray will be reduced to a lower level
- Training can continue once the temperature has been fallen below the threshold temperature.

3.7. If one of the measurement of the temperature sensor in one of the FTU exceeds 100% of the pre-programmed temperature level the following functions will take place in the relevant FTU:

- All the fire trays will be switched off.
- All gas valves will be closed.
- The production of smoke will be stopped.
- All light will be switched on
- The exhaust system will be switched to full power
- The signal light will deliver an acoustic / optical warning signal

3.8. In case that the temperature in the room exceeds the maximum safety threshold for personnel, all the heat sources will be shut down immediately and the ventilation system will be switched to maximum output.

4. Emergency Stop System

4.1. The system will include emergency stop buttons that will be installed at least at the following locations:

- One button at the entry to all fire rooms
- One button on the wireless pendant (remote control).
- One button on the control panel in the central control room.

4.2. The emergency stop buttons will be installed at 1,200 mm approx. above the floor level and will be fitted with steel housing to prevent accidental activation of the buttons by the breathing apparatus of the trainees and to provide mechanical protection as well.

4.3. The color of the emergency buttons will be red, activated by pressing inside and released by pulling them outside.

4.4. The buttons will be IP 65 rated to withstand jets of water from the fire hoses and the high temperature as well.

4.5. Emergency stop system setting

If one of the emergency stop buttons is activated the following components shall be switched on or off:

- All fire trays will be switched off.
- All gas valves will be closed.
- The power supply to the simulators will be cut off.
- The production of smoke will be stopped.
- All light will be switched on.
- The exhaust system will be switched to full power.
- The signal light will deliver an acoustic / optical warning signal

To reset the system from the emergency situation it will be necessary to pull the emergency button outside and to push the reset button on the main control cabinet.

4.6. Activating the emergency button related to one of the FTU shall not affect the others FTU's.

5. Ventilation system

5.1. The task of the ventilation system is to provide the safety environment for the trainees on one hand and to supply fresh air required for the optimum combustion process of the fire sources.

5.2. The ventilation system will be installed at the fire rooms and the smoke rooms..

5.3. The ventilation system shall include the following elements:

- Air supply to :
    - Fire rooms.
- Air removal from:
    - Fire rooms
    - Smoke rooms.

5.4. Air supply for the fire rooms

Two systems shall be installed as follows:

- Supply of air by auxiliary ventilators to cool down the control unit (in case it is installed within the prop, car as example) and supply of air to the bottom part of the fire tray to ensure effective combustion
- Supply of fresh air to the space of the fire rooms as follows:
    - The supply of fresh air will be made through ventilation grids mounted in the outside wall of the fire rooms
    - Servo controlled damper will control the position of the grid (open or closed).
    - During the training session the grid shall be kept closed to prevent escaping of heat and smoke out through the ventilation grid and to ensure darkness conditions, in the fire rooms as well, that required for the training session.
    - The grids will be opened automatically when activating the ventilation system (air removal).
    - The grids and the dumpers shall be made of galvanized steel.
    - The ventilation grids shall have a size of at least 1 square meter

5.5. Air removal

The purpose of the air removal system is to handle safety aspects involving the training activities and to control the temperature at the bottom and at the top of the fire rooms for extending the lifespan of the component installed in the room and to help cooling the fire trays and allow the fire trays to burn continuously and in a stable manner for hours. The system will consist of the following elements and functions:

- Ventilators that enables to refresh the air in the fire rooms and smoke rooms in a rate of 8 times per hour.
- The ventilators shall withstand a temperature of 400°C, and will be water and corrosion resistant.
- The ventilators will be automatically activated by the following systems:

- The temperature monitoring system.
- The gas detection system
- The emergency stop system.

5.7 The ventilation grids- in addition to Servo controlled damper grids mentioned above a manually activated grids will be installed as a back-up in emergency situation and in case of failure in the main system.

6. Audio and visual alarms

The system will include visual alarm for each fire room and on the control panel in the central control room. The visual alarm on the control panel will be switched on every time a visual alarm has been activated in the building designating the specific fire room related to this visual alarm. Each visual alarm will include the following items:

- One green light activated when using the simulation system.
- One orange flashing light activated :
  - In case of gas alarm.
  - In case of a temperature exceeding the threshold temperatures as specified above.
  - When activating the emergency stop button.

The system will include audio alarm for each fire room, on the control panel in the central control room and at the button of the shaft. The audio alarm on the control panel and at the shaft will be switched on every time an audio alarm has been activated in the building. The specific fire room related to this audio alarm will be designated on the control panel. The audio alarm will be automatically activated in the following conditions:

- In case of gas alarm.
- In case of temperature exceeding the threshold temperatures as specified above
- When activating the emergency stop button.

Each audio alert notification will produce a unique signal to enable the instructor to know which emergency / safety system has been activated.

Stopping the alarm and returning to normal operation condition will be possible only from the control panel in the central control room related to the fire room the alarm was activated

Section 6 - The thermal protection system

1. The role of the thermal protection system is to prevent direct contact between the flames and the walls and the ceiling in the fire rooms.

2. The thermal protection will be based on CORTEN plates 6 mm thick at least.

3. Walls protection - The wall protection will be placed against the walls according to the following principals:

   3.1. Complete height wall protection at 1,500 mm around the fire tray.

   3.2. Other walls approx. 1,250 mm from the ceiling, with a maximum of 3,000 mm around the fire tray.

4. Ceiling protection - The ceiling protection will be placed against the ceiling according to the following principals:

   4.1. Complete ceiling coverage with a maximum of 6,000 mm around the outside dimensions of the fire tray.

5. The supplier will enclose to his proposal detailed specification of the thermal protection elements and the way of installation on the walls / ceiling as specified in chapter 3.

Section 7 -The control and supervising system

The control system shall enable the instructors /operators to manage the various scenarios the fire & smoke simulation system can create. The controlling shall be done by 2 different ways:

The central control room

The wireless handheld control (hereinafter referred to as the "**wireless pendant**")

1. The central control room

1.1. Location- in the A floor designated as " A02 " in the attached drawings.

1.2. The central control room shall include a modular control table made of metal and opposite to it LCD screens to display the relevant data.

1.3. Control panels sunken inside the table will be installed for each fire and smoke room. Each control panel will include the indication , control and the safety and alarm devices as specified above and hereinafter and all the other devices required for proper operation of the entire simulation system.

1.4. The number of screens and their size will be determined according to the system needs so it will be possible to conveniently read the data from each control panel.

1.5. The control table, mounting of the control panels and the screens will be of high quality, design and finishing level

1.6. The control panel will enable the operators / instructors in the central control room to set parameters, initiate training scenarios, monitor technical information and evaluate the performance of the students via a digital display.

1.7. The system will be password protected

1.8. Each control panel will include the following items:

- Keyboard and wireless mouse interface.
- Required software licenses.

1.9. Each control panel shall be fitted with at least the following functions:

- Operator key.

- Controls for the FTU:
    - Ignition start / stop.
    - Fire ON / OF
    - Fire variable height control
- Smoke start / stop
- Ventilation start / stop
- Light ON / OF
- Various status indicators
- Emergency shut down button.

1.10 The control panel will include reserve space for installing controls of public address system and communication device that will be supplied and installed by the authority.

1.10. The control panel shall enable the instructors to manage the scenario the trainees has to cope with.

1.11. This management capability shall be subject to a pre- determined built-in safety factors which prevent the instructors from establishing non safety scenarios.

1.12. Within the management of the scenarios , the following parameters can be adjusted / modified:

- Level of difficulty in reducing the temperature during the extinguishing process.
- Growth time and dynamic spreading of the fire.
- Extinguishing time for the amount of time the trainee has to maintain the required temperature drop to extinguish the fire.
- Re-flash setting.
- The amount of extinguishing agent needed to avoid rekindling.
- Intensity of the fire.
- Density of the smoke.
- Duration / intervals of smoke emission system.

1.13. <u>Monitoring and acquisition of data</u>:

The central control room shall provide the instructors with various data and information, the data will be presented in a graphical way on the drawings of the installation. The information provided shall include the following data at least:

- The level of LPG
- The temperature in the training room containing a fire tray.
- The status of the pilot burners (On / Off or faulty)
- The status of the fire trays (flame level: high / medium / low)
- The status of the flash over fires.
- The status of the smoke generators and the level of the smoke liquid.
- The status of the ventilation system.
- Extinguishing detection
- Displaying of error messages.
- The information obtained by the cameras

1.14. The control panel shall enable the control room instructor to mimic or to override the wireless pendant.

1.15. Safety element should feature built-in redundancy.

2. <u>Technical support(hot line) and software modification</u>

2.1. The control system will be linked to the internet which will enable the service engineers / technicians of the supplier to perform the following activities:

- To remotely analyze what took place during the training exercise and when any system faults occurred,
- Fixing some faults from the facility of the supplier.
- Updating of software that will be provided free of charge along the entire period of the contractual engagement.

3. <u>The wireless pendant</u>

3.1. The wireless pendant shall enable the instructor to activate all the fire & smoke system, to adjust the intensity levels, activate ventilation and evacuation lighting systems and initiate emergency situation.

3.2. Each wireless pendant will compromise the following elements:

- A remote control
- A receiver installed in the control room
- A charger / bracket for charging and hanging up the remote control.

3.3. Each wireless pendant will enable the following basic functions

- A "dead man" switch.
- Buttons to select the various flame heights.
- Several buttons to control the smoke production.
- A control button for starting and stopping the smoke.
- An emergency shutdown button.

3.4. The customer will preserve the right to define, without additional charge, the final configuration and functions that can be controlled by the wireless pendant.

3.5. The wireless remote will be linked to the controls via a two-way radio transmitter.

3.6. Once the transmitter has been registered with the receiver, the signals transmitted and received will be continuously monitored. If the signals are interrupted the safety relay of the emergency shutdown shall be activated automatically and the system then shall follow the emergency shutdown procedure.

3.7. The safety relay shall be controlled as a backup by two microprocessor so when one of them has stopped functioned the other one will detect it and will initiate automatically the emergency shutdown procedure.

3.8. The remote control unit shall be provided with a chargeable battery and charging adapter suitable for charging through 230 VAC.

3.9. Fully charged battery shall enable the wireless pendant to function continuously for a period of 8 hours at least.

3.10. The remote control unit will feature green and red LED lights indicators showing the charging position of the battery, the red shall turn on when 10% of the full capacity remain, equivalent to one hour of use approx.

Chapter 3 -Technical information to be provided with The Supplier proposal

1. The supplier shall attach to its proposal the following information:

   1.1. Company profile: location, experience in design, manufacture and installation of fire training simulations system, size of plant, number of employees, turnover etc.

   1.2. General drawing of the various infrastructures required for the installation of the simulation systems in regard to the following infrastructures:

      1.2.1. Gas system

      1.2.2. Smoke system.

      1.2.3. Water

      1.2.4. Electricity.

      1.2.5. Ventilation

      1.2.6. Smoke delivery system.

      1.2.7. Safety and control system

      1.2.8. Cabling and wiring for the communication systems.

   1.3. Technical brochures and pictures of the various items and components in the system such as; smoke generators, control table assembly ,control panel, wireless pendant, screens and screens array opposite the control table , warning and emergency devices etc.

   1.4. Smoke system

      1.4.1. Concept layout of the smoke system to comply with the smoke simulation requirement as specified in section 2 above.

      1.4.2. Technical specification of the mobile smoke generators as specified in paragraph 7.1 in section 2- location of the generator, capacity of the oil tank, smoke producing capacity of the generator, oil consuming rate and time required to start producing smoke after ignition,

1.4.3. Technical specification of each fix system as specified in paragraph 7.2 in section 2- location of the central oil tank and its capacity, number of generators and their location in the building, the total smoke producing capacity for each system, oil consuming rate in full operation capacity and time required to start producing smoke after ignition.

1.4.4. Layout of feeding the smoke generators by the oil tanks.

1.4.5. Technical specification of the oil.

1.4.6. Layout of the smoke delivery system to the various rooms / locations as specified above.

1.5. Location of control units for the FTU's (can be indicated in the building general drawing attached to the tender documents).

1.6. Location of all the fire props in the building (can be indicated in the building general drawing attached to the tender documents).

1.7. Location of the fire tray in the various fire props (can be indicated in the building general drawing attached to the tender documents).

1.8. Thermal protection for walls and ceilings:

1.8.1. Location and dimensions and thickness of the thermal protection plates on the walls and on the ceilings and way of installation. (can be indicated in the building general drawing attached to the tender documents)

1.9. Structure , general drawing, dimensions and accessories of the car prop.

1.10. Structure , general drawing, dimensions and accessories of the kitchen prop.

1.11. Structure , general drawing and dimensions of the sofa prop.

1.12. Structure , general drawing and dimensions of the double bed prop.

1.13. Structure , general drawing and dimensions of the window prop.

1.14. Structure , general drawing and dimensions of the stair prop.

1.15. Structure , general drawing and dimensions of the hot door prop.

1.16. Structure , general drawing and dimensions of the stair prop.

1.17. Structure , general drawing and dimensions of the industrial prop Including the piping diameter.

1.18. Structure , general drawing and dimensions of the vessel spill prop Including dimensions of the vessel.

1.19. Structure , general drawing and dimensions of the split flange prop Including the piping diameter.

1.20. Location and layout of the Flash-Over simulator structure (can be indicated in the building general drawing attached to the tender documents).

1.21. Location, number and capacity of the buffer gas tanks for the FOU's. (can be indicated in the building general drawing attached to the tender documents)

1.22. Location of gas detectors at each fire room (can be indicated in the building general drawing attached to the tender documents).

1.23. Location of temperature sensors at each fire room.

1.24. Location of the emergency stop buttons.

1.25. General drawing of the central control room and the devices installed in the room as follows:

1.25.1. Control table- dimension, structure, materials and way of mounting the control panels in the table, one panel for each fire room.

1.25.2. Location of the screens above the control table and way of installation.

1.25.3. Technical specification of the screens.

1.25.4. Layout of the controls, indicators and safety devices on the control panel.

1.25.5. Details regarding additional controls and indicators on the control table.

1.25.6. Layout of the controls, indicators and safety devices on the wireless pendant.

1.26. Technical instruction for conducting periodic (preventive) maintenance including schedule intervals , inspection calibrations, adjustments to be carried out and spare parts to be replaced within the maintenance treatment.

1.27. Training program (curriculum) as specified in Chapter 5.

1.28. Filling out the following technical data table

No.	**Required technical data / information**	**The bidder data**

1	Material, thickness of the metal sheet and dimensions of the car simulator fire trays	
2	Material, thickness of the metal sheet and dimensions of the kitchen simulator fire trays	
No.	**Required technical data / information**	**The bidder data**
3	Material, thickness of the metal sheet and dimensions of the sofa simulator fire trays	
4	Material, thickness of the metal sheet and dimensions of the double bed simulator fire trays	
5	Material, thickness of the metal sheet and dimensions of the window simulator fire trays	
6	Material, thickness of the metal sheet and dimensions of the stair simulator fire trays	
7	Material, thickness of the metal sheet and dimensions of the industrial simulator fire trays	
8	Material, diameter and thickness of the industrial simulator piping.	
9	Material, thickness of the metal sheet and dimensions of the vessel spill simulator fire tray and the vessel itself	
10	Material, thickness of the metal sheet and dimensions of the split flange simulator fire tray	
11	Material, diameter and thickness of the split flange industrial simulator piping.	
12	Lifespan of the fire trays by years	

13	Number of flames heights in car simulator and flame capacity of each of them in KW	
14	Number of flames heights in kitchen simulator and flame capacity of each of them in KW	
No.	**Required technical data / information**	**The bidder data**
15	Number of flames heights in sofa simulator and flame capacity of each of them in KW	
16	Number of flames heights in double bed simulator and flame capacity of each of them in KW	
17	Number of flames heights in window simulator and flame capacity of each of them in KW	
18	Number of flames heights in stairs simulator and flame capacity of each of them in KW	
19	Number of flames heights in industrial simulator and flame capacity of each of them in KW	
20	Number of flames heights in vessel spill simulator and flame capacity of each of them in KW	
21	Number of flames heights in split flange simulator and flame capacity of each of them in KW	
22	The heating elements capacity in the handle (1) and the body (3) of the hot door simulator in KW	
23	The temperature developed in the hot door handle in Celsius	

24	Number and capacity of the central oil tanks (for fix simulation systems) in liter	
25	Capacity of the oil tanks for mobile smoke simulators in liter	
26	Number of the buffer tanks for the FOU and the capacity of each of them in liter	
No.	**Required technical data / information**	**The bidder data**
27	The maximal capacity of the flames in the FOU in KW	
28	Flame radius of the FOU in meter	
29	FOU fire duration in seconds	
30	Reloading time of the FOU for next operation in seconds	
31	Gas consuming rates of the various fire simulators according to the flame capacity when various flame capacity provided in the fire simulator as indicted in the specification	
32	Number and size of the screens in the central control room in inches	
33	The warranty period for the various component in the system if exceeding 2 years regular warranty period	
34	Possibility to use alternate commercial smoke oil complying with specification provided by the supplier	Yes / NO (sign in circle)

Chapter 4- Technical literature

1. The supplier shall provide the Authority with the commissioning of the system the following technical literature:

Note: *All the technical literature items specified in the table below shall refer* ***to the entire systems installed by the supplier***.

No.	Book/manual name	Book/manual technical content	Quantity	Remarks
1.	Operator book	General description of the various systems, operation instructions with emphasis on the controlling of the various features from the central control room and wireless pendant, creating various training scenarios, routine preventive maintenance to be done by operator echelon, general technical data, safety and emergency instruction and aspects, warning and alert devices, trouble shooting by the operator	5 hard copies + 2 copies on magnetic media (CD / USB stick)	Shall be in Hebrew language
2.	Maintenance Manual	Specification of periodic maintenance and lubrication to be done by authorized technician (time intervals and activities, inspection, replacing of parts / liquids, lubrication etc.) in each treatment), filling of smoke oil , meaning of safety alerts , reset procedures when required, schemes of gas, water, smoke and ventilation systems , basic trouble shooting tables for the various systems.	5 hard copies + 2 copies on magnetic media (CD / USB stick)	Shall be in Hebrew language
3.	Spare parts catalogue	Will incorporate all the technical data necessary for ordering spare parts.	3 hard copies +2 copies on magnetic media (CD / USB stick)	

5.	Electrical Circuit schemes including breakers / relays table	Will specify all the circuit breakers and relays in the system.	3 hard copies +2 copies on magnetic media (CD / USB stick	

Chapter 5 - Training

The training will be conducted during the commissioning of the system by the supplier at the authority facility and will include:

1. Training of 3 operators (" train the trainer") that will be authorized by the supplier to train the others operators and users of the system in aspects of operation and basic maintenance (echelon A) of the system.
2. The training courses shall be conducted in Hebrew.
3. The supplier shall submit together with its proposal the training program which includes the following data:

   3.1 Number of days for each course.

   3.2 Curriculum for each training day.

4. The training curriculum shall include the following topics:

General description of the various systems, operation of the various systems with emphasis on the controlling of the various features from the central control room and the wireless pendant, way of creating various training scenarios, routine preventive maintenance to be done by the operator, safety and emergency instruction , indications ,warning and alert devices meaning, trouble shooting in operator echelon, routine preventive maintenance and basic trouble

shooting of minor faults

Note: *After completing successfully the courses, the students will be certified (by certifying certificate) to instruct other operators and users of the system as mentioned in paragraph 1. above.*

Chapter 6 - Acceptance test

1. The acceptance test will be performed within the commissioning of the system and will include the following main inspections:

   1.1. Full compatibility with the technical specification and the technical proposal of the supplier in regards of existing systems, components , accessories etc that have supplied and installed by the supplier.

   1.2. Operational and functional inspections.

   1.3. Dimension especially dimension of the various prop's

   1.4. Operation of the entire safety and emergency systems.

   1.5. Operation Duration of specific system as indicated in the specification (as flash over operation time).

   1.6. Function of the automatic response system in defined situations (by simulations of those situations).

   1.7. Controlling and operating the various systems from the central control room and by the wireless pendant,

   1.8. Capability to create various training scenarios.

Chapter 4 7– Spare parts, Maintenance and Warranty

1. Spare parts

1.1. The supplier shall provide spare parts for routine maintenance and repairs for a period of 10 years from the date of delivery and after completion the acceptance tests successfully.

1.2. A stock of spare parts will be kept by the representative in Israel who will also provide the maintenance services along all the period of agreement.

1.3. Delivery times in case the spare part is missing in the stock

1.3.1. In case the spare part is required to fix critical failure in part of the system or the entire system – within 4 working days.

1.3.2. In case the spare part is required to fix non critical failure – within 10 working days.

2. Maintenance

2.1. The supplier via his representative in Israel shall provide maintenance on site by service cars.

2.2. The representative's maintenance trephinations will be trained by the supplier and at the end of the training will be officially authorized by the supplier via an appropriate authorization certificate to maintain the system

2.3. The maintenance will includes:

2.3.1. Performing of periodic (preventive) maintenance according to the instructions of the manufacturer.

2.3.2. Repair of faults and deficiencies.

2.3.3. Modifications and software upgrade.

2.4. In case the representative cannot handle the problem to solve it, the supplier will sent his technician to Israel within 5 working days to fix the problem.

2.5. In addition "hot line" technical support will be provided by the supplier enabling to remotely handle and repair part of the problems and deficiencies by the supplier technicians sitting at the supplier facility abroad. This service will be provided along the entire regular working hours of the supplier.

2.6. The representative in Israel shall document all the maintenance activities both the periodic maintenance and repairs that will include the following details:

2.6.1. Date of calling to provide maintenance.

2.6.2. Date of performing the maintenance.

2.6.3. Nature of fault.

2.6.4. Description of the repair performed in the system.

2.6.5. Spare parts required for the repair.

2.7. The documentation will enable to conduct statistical analysis of the various deficiencies

2.8. This documentation will be provided for the authority when requested.

2.9. <u>The response times for the representative technician will be as follows</u>:

2.9.1. Critical failure – arrival of the technician within 24 hours from calling.

2.9.2. Regular failure – arrival of the technician within 48 hours from calling.

2.9.3. Normally repairs shall not last more than one working day. In case of special and deeper problems the repair time will be finalized between the two parties.

2.9.4. Periodic maintenance shall not last more than 0ne working day.

3. <u>Warranty</u>

3.1. Two years warranty from date of delivery

3.2. Five years warranty for color & protection against corrosion.

3.3. Seven years warranty for tanks such as smoke oil tanks and gas buffer tanks used for the FOU.

3.4. Repair warranty during the warranty period- 6 months after the end of the warranty period.

3.5. Repairs warranty behind the warranty period- 6 months.

3.6. <u>Handling of epidemic failure</u>

3.6.1. A failure which occurs three (3) times during the Warranty Period whether in the same component or different components will be defined as an epidemic **failure and the following preventive steps will be taken by the Supplier**:

3.6.1.1. Carrying out "failure research" in order to find out the reason and the source of this epidemic failure and the method to prevent it in the future. A detailed failure analysis report will be submitted to the Authority for review.

3.6.1.2. The steps to be taken according to the failure analysis report will be implemented in all the components / systems even the failure has not yet occurred in those components.

3.6.1.3. The Warranty Period of an epidemic item after repair or replacement of the deficient Equipment will be extended for one (1) additional year.

3.6.2. Significant safety default will be considered as an epidemic default.