



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION

**UNIDO SAP ID 150105**  
**Regional Demonstration Project for Coordinated Management of ODS and POPs Disposal**  
**in Ukraine, Belarus, Kazakhstan and Armenia**

**TERMS OF REFERENCE**  
**FOR THE PURCHASE OF EQUIPMENT AND SUPPLIES (TURNKEY) FOR A**  
**NATIONAL ODS/POPS DISPOSAL FACILITY, UKRAINE**

**1. BACKGROUND INFORMATION**

The United Nations Industrial Development Organization (UNIDO) is the specialized agency of the United Nations that promotes industrial development for poverty reduction, inclusive globalization and environmental sustainability. The mandate of UNIDO is to promote and accelerate inclusive and sustainable industrial development in developing countries and economies in transition.

The “Regional Demonstration Project for Coordinated Management of ODS and POPs Disposal in Ukraine, Belarus, Kazakhstan and Armenia” will demonstrate environmentally sound collection and destruction of Ozone Depleting Substances (ODS) and Persistent Organic Pollutants (POPs) stocks. This demonstration project will assist the countries involved in meeting their obligations under the Montreal Protocol and the Stockholm Convention and establish local capacities for destruction of ODS and some POPs substances. Through the demonstration activities, the project aims to destroy a minimum of 11,700 tons of PCB-containing waste, 418 tons of extracted ODS and 4.14 MM of CO<sub>2</sub>eq. It will introduce regulatory reforms in Armenia, Belarus, Ukraine and Kazakhstan and strengthen national capacity in identifying, assessing, managing, and treating such wastes in an environmentally sustainable manner.

**2. PROJECT OBJECTIVES**

The project supports the GEF-5 strategy for chemicals, the aim of which is to consolidate the persistent organic pollutants and ozone layer depletion focal areas, as well as to broaden the scope of GEF’s engagement with the sound management of chemicals. Specifically, it addresses GEF Chemicals Strategy Objectives 1 and 2, to "Phase out POPs and Reduce POPs Releases" and "Phase out ODS and Reduce ODS Releases".

Focal area	Outcome
Chem-1: Phase out POPs and reduce POPs releases	Quantifiable and verifiable tons of POPs eliminated or reduced. The Project aims to destroy a minimum of 11,700 tons of PCB-containing waste.
Chem-2: Phase out ODS and reduce ODS releases	Outcome 5.1: Countries have phased out Ozone Depleting Substances and replaced them with zero ODP, low GWP alternatives. The Project aims to destroy 418 tons of extracted ODS and 4.14 MM of CO <sub>2</sub> eq.

The prevention of ODS emissions from the ODS banks is also in line with priorities to reduce GHG emissions from ODS release into the atmosphere.

The project is being implemented at the country level, in cooperation with the Government focal points in each country, namely the Ministry of Environmental Protection and Natural Resources of Ukraine, the Ministry of Natural Resources and Environment Protection of the Republic of Belarus, the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan and the Ministry of Natural Protection of the Republic of Armenia.

Under this project, three independent but linked ODS/POPs co-destruction centres will be established - one in each of the three countries - as listed below:

<b>Country</b>	<b>Facility to be created</b>	<b>Location</b>
Belarus	1 x ODS/POPs co-destruction center	Gomel Oblast, Chechersk Rayon
Kazakhstan	1 x ODS/POPs co-destruction center  1 x Recycling center for recovery of ODS refrigerants and foam blowing agents	Akmola region, Stepnogorsk town
Ukraine	1 x ODS/POPs co-destruction center 1 x Recycling center for recovery of ODS refrigerants and foam blowing agents	Cherkasy region, Cherkasy city

In Ukraine, the project will include a Center for the Joint Destruction of ODS (CFC and HCFC) and accumulated materials containing POPs / PCBs (including, but not limited to DDT, aldrin, heptachlor, hexachlorobenzene, hexachlorocyclomentan) with a capacity of at least 800 tons of waste per year.

The recipient of the project in Ukraine, responsible for the placement of equipment for recycling and the creation of a joint destruction center ODS / POPs, as a single material and technical complex is located in Cherkasy region, Cherkasy city – the exact address of the Project Recipient will be provided at later stage to the awarded contractor.

### **3. SCOPE OF SUPPLY**

The scope of this proposal relates to the supply of an integrated hazardous waste disposal system and related equipment and consumables for the establishment in Ukraine of a national Center for Joint Disposal of ODS (CFCs and HCFCs) and accumulated materials containing POPs / PCBs (including but not limited to DDT, aldrin, heptachlor, hexachlorobenzene, hexachlorocyclomentan).

The process equipment must meet the requirements for the maximum permissible concentration (MPC) of hazardous and harmful substances in high-temperature combustion sites.

Bidders must offer a set of equipment that meets the requirements described in Section 4. Specifications. All deviations from these Technical Specifications should be clearly indicated and explained in the offer.

Only complete offers shall be considered. All partial and/or non-binding offers shall be rejected.

<b>DESCRIPTION OF REQUIRED EQUIPMENT and SERVICES</b>		
<b>Items</b>	<b>Quantity</b>	<b>Specifications Required</b>
<b>Required Equipment</b>		
Disposal system and hazardous waste disposal equipment	1	<p>Integrated disposal system including process equipment for the disposal of hazardous waste ODS (CFC and HCFC) and accumulated materials containing POPs / PCBs (including, but not limited to DDT, aldrin, heptachlor, hexachlorobenzene, hexachlorocyclohexane) in the engineering device.</p> <p>Potential fracture technologies include, but are not limited to: incinerator rotary kilns, cement kilns, and plasma technologies (eg, argon plasma arc or nitrogen plasma arc)</p> <p>Bidders may submit bids with more than one technology that meets the requirements of this Terms of Reference, with the following characteristics:</p> <ul style="list-style-type: none"> <li>- Primary combustion chamber with an operating temperature of at least 850 ° C and up to 1300 ° C</li> <li>- Secondary combustion chamber with an operating temperature of at least 1200°C and a residence time of minimum 2 seconds for complete combustion</li> <li>- Automatic ash discharge by means of a screw conveyor, magnetic separation unit and ash chamber</li> <li>- Automatic Burner Control Unit</li> <li>- Air regulation system</li> <li>- A carbon monoxide and/or oxygen meter/recorder</li> <li>- A gas flow meter/recorder</li> <li>- Other instruments or measurement devices considered necessary</li> </ul>

	Waste feeding system	3 units	Controlled feeding methods for solid, liquid, paste-like and gaseous hazardous waste, which do not negatively influence the air supply and/or temperature in the combustion chambers: <ul style="list-style-type: none"> <li>• ODS waste feed mechanism</li> <li>• Liquid injection unit</li> <li>• Automatic solid waste loading unit</li> </ul>
	Quench chamber	1	Quench chamber to cool gases before introduction to the downstream cleaning processes.
	Flue gas cleaning system	1	The integrated destruction system can be equipped with different configurations of the flue gas cleaning system depending on the type and composition of waste and provide the maximum permissible norms of emissions of hazardous and harmful substances into the atmosphere
	Programmable logic controller	1	Programmable logic controller to control the installation (also by internet) and ensure safety in maintenance and optimisation of operational costs
	Emissions monitoring and control system	1	Continuous monitoring should include data on emissions and operating conditions (ie destruction chamber temperature, approximate residence time, etc.) The equipment must be entered in the state register of Ukraine.
<b>Optional Equipment</b>			
	Heat generation system (heat exchanger)	1	The integrated destruction system can be equipped with a system for generating hot water or hot air at a temperature of 90-100 ° C by removing hot gases from the flue gas purification system to the heat exchanger
	Electricity generation system (turbine)	1	The integrated destruction system can be equipped with an electric power generation system by using hot water or hot air to start the turbine

<b>Auxiliary Services and Equipment</b>		
	Manuals and operating documentation (in English and Ukrainian)	<ul style="list-style-type: none"> <li>- Manufacturer’s manual and maintenance manual, including detailed operating instructions for the unit and units, basic maintenance and troubleshooting, and replacement of components</li> <li>- Technical passport</li> <li>- Technological description of each of the elements and installation as an integral production complex</li> </ul>
	Spare parts	A set of spare parts to cover the first two (2) years of operation and maintenance
	Warranty	Valid for at least twelve (12) months from the date of issuance of the certificate of acceptance.
	Installation, commissioning and acceptance	<p>The Contractor is responsible for the installation, testing, commissioning and commissioning of the installation on the site of the Project Recipient, and includes all related costs in its proposal.</p> <p>The Contractor shall be responsible for providing all materials necessary for the assembly and installation of the installation on site and shall provide all services necessary for the technical acceptance of the equipment during the installation of the equipment.</p>
	Training	<p>After successful commissioning, the contractor provides training for the staff of the Project Recipient on the operation and maintenance of the installation.</p> <p>The proposal includes at least 10 days of practical training of project staff at the place of installation of technological equipment.</p>
	Transportation	All equipment and spare parts to be delivered DAP Cherkasy region, Cherkasy city, Ukraine.

#### **4. TECHNICAL SPECIFICATIONS**

The below table outlines the technical requirements for the scope of the supply:

##### **4.1. TECHNICAL SPECIFICATIONS FOR THE SET OF EQUIPMENT**

##### **4.1.1. The set of equipment for disposal of hazardous waste shall consist of the following units:**

###### **1. Integrated system for hazardous waste disposal**

- **Input materials:** Integrated system for the disposal of ODS waste (CFC and HCFC) and accumulated materials containing POPs / PCBs (including, but not limited to DDT, aldrin, heptachlor, hexachlorobenzene, hexachlorocyclopentan), containing or contaminating OPP and POPs, including but not limited to: (a) ODS (liquid and gaseous); (b) liquid or semi-liquid POPs containing wastes or residues (c) obsolete pesticides; (d) liquid printed circuit board oil; (e) parts of transformers and capacitors impregnated with printed circuit boards (paper, aluminum foil, polyethylene, wooden parts, etc.); (e) concrete and soil contaminated with PCBs;;
- **Capacity:** Capacity to dispose of solid, liquid, paste-like and gaseous hazardous waste, at a rate of at least 100 kg per hour (800 tons per year)
- **Operating parameters:** The minimum combustion temperature of the primary combustion chamber shall be no less than 850°C and up to 1300 °C. The combustion temperature of the secondary combustion chamber shall be no less than 1200 °C and the residence time in the secondary chamber shall not be less than two seconds. The gas temperature as measured against the inside wall in the secondary chamber, not in the flame zone, shall be no less than 1100°C.

Both the primary and the secondary temperatures shall be maintained until all the waste has been completely combusted. An audible and visible alarm shall be installed to warn the operator when the secondary temperature drops below the required temperature.

- **Approved destruction technologies:** Suitable incineration technologies must be certified for the purpose of ODS and POPs disposal and included in the list of approved destruction technologies for all controlled substances by the TEAP Destruction Taskforce for the Montreal Protocol and in line with the guidance on best available techniques and best environmental practices for the disposal of POPs under the Stockholm Convention.
- **Destruction and Removal Efficiency (DRE):** The minimum acceptable DRE is: 95% for foams and 99.99% for concentrated sources.
- **Materials and housing:** The nodes of the block in contact with the input materials must be highly resistant to any corrosive effects. A refractory lining shall be put in place to insulate the steel shell from the high temperatures inside the kiln, and to protect it from the corrosive properties of the process material.

Project Recipient must provide a properly ventilated industrial building for the incinerator, in accordance with the requirements of the manufacturer.

The proposed location and construction site should take into account possible impacts on ambient air quality, soil, vegetation and other factors that may be relevant.

The planned activities for the joint destruction of ODS / POPs / PCB must undergo the procedure of Environmental Impact Assessment, in accordance with the Law of Ukraine "On Environmental Impact Assessment" ([https://zakon.rada.gov.ua/laws/show/2059-19# Text](https://zakon.rada.gov.ua/laws/show/2059-19#Text)), in order to prevent environmental damage, ensure environmental safety, environmental protection, rational use and reproduction of natural resources.

## 2. Waste feeding system

### 2.1 Injection of ODS

- **Input material:** ODS (liquid or gaseous) in containers from 5 to 200 L
- **Capacity:** 10 kg per hour
- **Motorization:** Electric
- **Control System:** The unit should envisage unloading in a manual mode and with the use of a loader. Direct contact of personnel and destruction material after unloading is prohibited.
- **Safety:** The unit must be equipped with an aspirated cover; so that sucked air passes through a dust filter, catching micro particles, before exhaust to the atmosphere. Must be equipped with automatic cut-off control systems on the ODS feed system, or be able to go into standby mode whenever the temperature in the reaction chamber falls below the minimum temperature required to achieve destruction.
- **Service life:** The resource (service life) of the equipment must be at least 15 years. The nodes of the block in contact with the input materials must be highly resistant to any corrosive effects.

### 2.2 Injection of Liquid Waste

- **Input material:** Liquid hazardous waste (obsolete pesticides, including chlorinated, PCB, ODS) in UN standard HDPE drums or IBC-cubes for liquids
- **Capacity:** 10 kg per hour
- **Motorization:** Electric
- **Control System:** The unit should envisage unloading in a manual mode and with the use of a loader. Direct contact of personnel and destruction material after unloading is prohibited.
- **Safety:** The unit must ensure leak-tightness of waste feeding, and must be equipped with all necessary safety systems (emergency prevention)
- **Service life:** The resource (service life) of the equipment must be at least 15 years. The nodes of the block in contact with the input materials must be highly resistant to any corrosive effects.

### 2.3 Injection of Solid Waste

- **Input material:** Solid hazardous waste (obsolete pesticides, including chlorinated; soils contaminated by PCB or obsolete pesticides) in UN standard HDPE drums.
- **Capacity:** Corresponds to the declared capacity of the main combustion chamber (at least 100 kg of waste)
- **Motorization:** Electric
- **Control System:** The unit should envisage unloading in a manual mode and with the use of a loader. Direct contact of personnel and destruction material after unloading is prohibited.
- **Safety:** Automatic system of waste loading in the combustion / reaction chamber, allows for leak-tightness of the system (bunker).
- **Service life:** The resource (service life) of the equipment must be at least 15 years. The nodes of the block in contact with the input materials are highly resistant to any corrosive effects.

**3. Quench chamber**

- **Design:** The design of the chamber shall be made to deliver a continuous and homogenous velocity profile over the height of the air exit.

**4. Flue gas and waste water cleaning system**

Proposals will be adopted for various systems that reduce emissions of substances hazardous to the environment and health.

Maximum permissible concentration of hazardous and harmful substances in production facilities, including high-temperature combustion plants.

The offer shall include a flue gas cleaning system, to reduce atmospheric emissions of substances that are hazardous to the environment. Bidders shall indicate the type of technology that shall be provided for this purpose. Proposals may include, but are not limited to:

- Dry and semi-dry flue gas cleaning (cyclones, bag and carbon filters)
- Wet flue gas cleaning (alkaline solution scrubbers)
- Energy recovery with flue gas condensation (heat exchangers)
- System for cleaning waste water and regeneration of alkaline solutions for their reuse

All additional components, instruments or measurement devices considered necessary for the operation of the flue gas treatment system shall be included in the proposal.

Some components of the flue gas cleaning system should be modifiable according to the composition of waste communicated by the Project Recipient, (Cherkasy region, Cherkasy city).

**5. Programmable logic controller**

The control system must be built on the basis of a programmable logic controller (PLC) and include a set of control signals, input/output modules and an electronic display and control panel.

With the automatic control unit the following actions shall be monitored and controlled:

- Injection of ODS;
- Injection of Liquid Waste;
- Loading of Solid Waste;
- Kiln - Incinerator;
- Ash Removal Cycle;
- Safety interlock of the system display and control;
- Temperature measurement and recording;
- Cooling system conditions;
- Flue-gas cleaning systems conditions;
- All other relevant processes and emergency situations



## 6. Emissions monitoring and control system

System of continuous monitoring of emissions of toxic and dangerous chemicals in accordance with the requirements:

Directive 2010/75 / EC of the European Parliament and of the Council on industrial emissions (integrated approach to pollution prevention and control) (<https://eur-lex.europa.eu/eli/dir/2010/75/oj>) ([https://www.kmu.gov.ua/storage/app/sites/1/55-GOEEI/%202010\\_75\\_EC.pdf](https://www.kmu.gov.ua/storage/app/sites/1/55-GOEEI/%202010_75_EC.pdf));

Law of Ukraine "On Atmospheric Air Protection" of 1992 (<https://zakon.rada.gov.ua/laws/show/2707-12#Text>);

Law of Ukraine "On regulation of economic activity with ozone-depleting substances and fluorinated greenhouse gases" of 2020 (<https://zakon.rada.gov.ua/laws/show/376-20#Text>);

Law of Ukraine "On Principles of Monitoring, Reporting and Verification of Greenhouse Gas Emissions" of 2020 (<https://zakon.rada.gov.ua/laws/show/377-20#Text>);

Clarification on the implementation of the system of monitoring, reporting and verification of greenhouse gas emissions for operators of the Ministry of Environmental Protection and Natural Resources of Ukraine (<https://mepr.gov.ua/news/36624.html>);

Resolution of the Cabinet of Ministers of Ukraine dated 23.09.2020 № 880 "On approval of the list of activities, greenhouse gas emissions as a result of which are subject to monitoring, reporting and verification" (<https://zakon.rada.gov.ua/laws/show/880-2020-n#Text>);

Resolutions of the Cabinet of Ministers of Ukraine dated 23.09.2020 № 960 "On approval of the Procedure for monitoring and reporting on greenhouse gas emissions" (<https://zakon.rada.gov.ua/laws/show/960-2020-p#Text>);

Resolutions of the Cabinet of Ministers of Ukraine dated 23.09.2020 № 959 "On approval of the Procedure for verification of the operator's report on greenhouse gas emissions" (<https://zakon.rada.gov.ua/laws/show/959-2020-p#Text>).

Hygienic regulations of the maximum permissible concentration of chemicals and biological substances in the air of the working area, approved by the Order of the Ministry of Health of Ukraine July 14, 2020 № 1596 (<https://zakon.rada.gov.ua/laws/show/z0741-20#Text>).

Hygienic regulations of the maximum permissible concentration of chemical and biological substances in the air of populated areas, approved by the Order of the Ministry of Health of Ukraine on January 14, 2020 № 52 (<https://zakon.rada.gov.ua/laws/show/z0156-20#Text>).

**Continuous measurements of the following substances:** total dust, CO, NO<sub>x</sub>, HCl, total organic carbon

**Continuous measurements of the following process operation parameters:** temperature near the inner wall or at another representative point of the combustion chamber as authorized by the competent authority, concentration of oxygen, pressure, temperature and water vapour content of the waste gas;

During test runs, the equipment must meet the minimum destruction and removal efficiencies (DRE) and maximum emission of pollutants to the atmosphere.

After commissioning, the online monitoring devices should be entered into the Unified Register of MRVs (Monitoring, Reporting, Verification) established in the List of activities, greenhouse gas emissions as a result of which are subject to monitoring, reporting and verification, approved by the Cabinet of Ministers. Of Ukraine from 23.09.2020 № 880

## 4.2. OPERATING CONDITIONS

**4.2.1.** The equipment shall be designed for 24/7 operation mode, with breaks for maintenance according to service regulations. Annual operating time of at least 8000 hours.

**4.2.2.** The bidder shall acquaint himself with the precise climate conditions of the place of delivery:

- Maximum outside temperature in summer: 40°C
- Minimum outside temperature in winter: -45°C
- Expected snow up to 50 cm in winter.

**4.2.3.** The bidder must include all cables necessary for the installation and use of equipment that must comply with the standard of the:

- International Electrotechnical Commission IEC 61508 - "Functional safety of industrial systems»,
- State standards of Ukraine:
- DSTU-N B B.2.5-80: 2015 "Guidelines for the design of power supply systems of industrial enterprises" ([http://online.budstandart.com/ua/catalog/doc-page?id\\_doc=63305](http://online.budstandart.com/ua/catalog/doc-page?id_doc=63305)),
- DSTU B B.2.5-82: 2016 "Electrical safety in buildings and structures. Requirements for protective measures against electric shock" ([http://online.budstandart.com/ua/catalog/doc-page.html?id\\_doc=65395](http://online.budstandart.com/ua/catalog/doc-page.html?id_doc=65395)),
- State building codes: DBN B.2.5-23: 2010 "Design of electrical equipment for civil purposes" ([http://kbu.org.ua/assets/app/documents/dbn2/92.1.%20DBN%20B.2.5-23 ~ 2010.%20Engineering%20equipment%20houses%20i.pdf](http://kbu.org.ua/assets/app/documents/dbn2/92.1.%20DBN%20B.2.5-23~2010.%20Engineering%20equipment%20houses%20i.pdf)),
- DBN B.2.5-24: 2012 "Electric cable heating system" ([https://legotherm.com.ua/poleznyessylki/gosudarstvennye-stroitelnye-normy-ukrainy/DBN%20V.2.5-24\\_2012%20Electric%20cable%20system %20opelenie.pdf](https://legotherm.com.ua/poleznyessylki/gosudarstvennye-stroitelnye-normy-ukrainy/DBN%20V.2.5-24_2012%20Electric%20cable%20system%20opelenie.pdf)),
- DBN B.2.5-27-2006 "Protective measures of electrical safety in electrical installations of buildings and structures" ([http://online.budstandart.com/ua/catalog/doc-page.html?id\\_doc=6719](http://online.budstandart.com/ua/catalog/doc-page.html?id_doc=6719)).

The contractor must work with Project Recipient (Cherkasy region, Cherkasy city) to ensure that all equipment is fully compatible with the Ukrainian electrical system and infrastructure of the plant.

## 4.3. NORMS AND STANDARDS

**4.3.1.** Equipment shall comply with national (Ukraine) and international norms and standards. In the case of discrepancies between national and international standards, standards with stricter requirements will apply.

The equipment must comply in particular with:

- ISO 12100:2010 (Safety of machinery), or similar
- Standard EN 60204 (Safety of machinery – Electrical equipment of machines), or similar
- Directive 2014/34/EU relating to equipment and protective systems intended for use in potentially explosive atmospheres, or similar
- State standard of Ukraine DSTU EN 1127-1: 2014 Explosive environment. Explosion prevention and protection. Part 1. Basic concepts and methodology (EN 1127-1: 1997, IDT) ([http://online.budstandart.com/en/catalog/doc-page?id\\_doc=79735](http://online.budstandart.com/en/catalog/doc-page?id_doc=79735))
- Technical regulations for equipment and protective systems intended for use in potentially explosive atmospheres, approved by the Cabinet of Ministers of Ukraine dated December 28, 2016 № 1055 (<https://zakon.rada.gov.ua/laws/show/1055-2016-p> ), etc.

#### **4.4. SAFETY REQUIREMENTS**

**4.4.1.** Materials used in construction shall not be dangerous or harmful to humans or the environment. Safeguards for safety and protection, including posting danger signs and other warnings against hazards, shall be erected and maintained.

**4.4.2.** All reasonable precautions for the safety of employees at the work site and all other persons who may be affected shall be taken; and all reasonable protection to prevent damage or injury from the equipment (including drives, piping and cables) shall be provided. Compliance with

- Directive 2013/35/EU on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) shall be enforced.
- Law of Ukraine "On labor protection" of 1992 (<https://zakon.rada.gov.ua/laws/show/2694-12#Text>),
- DSTU 2293: 2014 "Labor protection. Terms and definitions of basic concepts" ([http://web.kpi.kharkov.ua/safetyofliving/wp-content/uploads/sites/171/2017/10/dstu\\_2293\\_2014.pdf](http://web.kpi.kharkov.ua/safetyofliving/wp-content/uploads/sites/171/2017/10/dstu_2293_2014.pdf)),
- DSTU 2156-93 "Safety of industrial enterprises. Terms and definitions" ([https://dnaop.com/html/41018/doc-DSTU\\_2156-93](https://dnaop.com/html/41018/doc-DSTU_2156-93)),
- DSTU 3038-95 "Hygiene. Terms and definitions of basic concepts" ([https://dnaop.com/html/41019/doc-DSTU\\_3038-95](https://dnaop.com/html/41019/doc-DSTU_3038-95)),
- DSTU 3138-95 Organization of industrial production. Labor and wages. Terms and definitions ([http://online.budstandart.com/ua/catalog/doc-page.html?id\\_doc=91071](http://online.budstandart.com/ua/catalog/doc-page.html?id_doc=91071)).

**4.4.3.** Current-carrying parts, cables and connecting harnesses shall be reliably insulated or fenced.

**4.4.4.** The design of the equipment shall include an alarm in case of violation of the normal operational mode, as well as a means of automatic shutdown and supply disconnection

**4.4.5.** Clear and visible signs or symbols shall be applied near the signal lamps and controls indicating their purpose.

**4.4.6.** The electrical automation system shall prevent the occurrence of a hazard when the power supply is cut off completely or partially, as well as means that prevent the spontaneous activation of actuators when the power supply is resumed.

**4.4.7.** The electrical automation system shall set off an alarm in case of violation of the normal operational mode of the equipment.

**4.4.8.** Metal non-current-carrying parts of the line, which due to insulation damage may be under voltage, shall have protective grounding clamps, next to which signs of grounding shall be located.

**4.4.9.** Electrical cabinets shall have locks with removable keys.

**4.4.10.** The equipment design shall ensure safety during installation, operation, repair, transportation and storage.

## **4.5. ENVIRONMENTAL REQUIREMENTS**

4.5.1. The atmosphere must be protected from the discharge of harmful substances and residual pollutants in accordance with the Law of Ukraine "On Protection of Atmospheric Air" of 1992 (<https://zakon.rada.gov.ua/laws/show/2707-12#Text>) and Directive 2010 / 75 / EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions for pollution prevention and control ([https://zakon.rada.gov.ua/laws/show/984\\_004-10#Text](https://zakon.rada.gov.ua/laws/show/984_004-10#Text)), etc.

4.5.2. The concentration of harmful substances in the air emissions shall not exceed the MPE (maximum permissible emission) values established for these substances.

4.5.3. Selection and analysis of relevant pollutants, including flue gas sampling, measurement of process parameters and quality assurance of automatic measurement systems, as well as control measurements for testing such systems should be carried out in accordance with CEN standards. If it is not possible to apply the CEN standards, it is necessary to apply ISO, national or other international standards that guarantee the provision of scientific information of equivalent quality.

#### **4.6. DESIGN REQUIREMENTS**

4.6.1. The equipment components shall be designed for ease of manufacturing, assembly, installation and handling, whilst ensuring excellence in the performance and quality of the specified product throughout the course of its manufacture, installation, maintenance, and repair.

4.6.2. The equipment design shall allow free access to its components for technical inspection, repair, and maintenance.

4.6.3. Technological units and blocks shall be delivered in a “newly created” state, the supply of technological units and blocks that were in consumption or restored is not allowed

4.6.4. The Contractor must provide the installation scheme and its basic requirements for the Project Recipient, (Cherkasy region, Cherkasy city), in its tender to enable the Project Recipient to develop an industrial premises design and plan installation works.

**4.7. REQUIREMENTS FOR STANDARDIZATION AND COMPLETENESS**

4.7.1. The equipment shall consist of structurally complete units and parts with a wide use of unified, standardized and standard units.

4.7.2. All required components that are not stated explicitly in this technical specifications, including instruments such as meters, pressure gauges and thermometers, that are nonetheless necessary to satisfy the specifications herein shall be supplied in order to ensure a smooth operation of equipment.

4.7.3. These technical specifications represent minimum requirements for the equipment to be purchased. Any equipment with better specifications will be accepted as compliant. In case of protocols, standards and software, any supplies offered with higher specifications and/or of the most recent versions must still be compatible with the requirements of these technical specifications.

**4.8. REQUIREMENTS FOR TRANSPORTATION AND STORAGE**

4.8.1. The equipment packed in a container shall be transported by road, ship, aircraft or rail in accordance with the carriage regulations being applicable to each mode of transportation.

4.8.2. After delivery to the place and checking the condition and consistency of the goods, the Recipient of the project, takes them under its responsibility and ensures safe storage until their installation.

4.8.3. The Contractor is responsible for providing the documents (permits and licenses) required to import the equipment. All certificates for components must be submitted to the Project Recipient.

Proposals must be accompanied by relevant technical documentation, technical documents and other printed materials or relevant information in English and Russian / Ukrainian on the cited items.

**5. DELIVERY TERMS**

Delivery must be no later than 12 months after signing the Contract. The bid shall indicate earliest possible delivery date.

The recipient of the project has the right to check and carry out pre-shipment acceptance of the equipment at the Contractor's plant before shipment. Inspection and acceptance before shipment are carried out by specialists of the Project Recipient. At the factory, the Contractor must provide everything necessary to test the equipment in different modes for at least two hours.

All goods must be delivered DAP Incoterms (2010) to Cherkasy, Cherkasy region, Ukraine . The exact address shall be provided at later stage to the awarded contractor.

The offer shall include all transportation costs, including insurance and unloading, to the final destination.

**6. INSTALLATION, COMMISSIONING AND ACCEPTANCE**

The Contractor is responsible for the installation, testing and commissioning of the plant at the end-user site and shall include all costs related to this in the commercial offer. During the test run, the contractor must ensure control of the composition of exhaust gases, including analysis for dioxins.

The Contractor shall be responsible for and provide all materials needed to assemble and install the equipment at the facility and shall provide all services needed for the technical reception of the equipment at the time of the installation of equipment. The Contractor must provide support for the equipment to reach its designed capacity. All inspection, measurement and testing equipment must be calibrated by the Contractor.

## 7. TRAINING

The Contractor shall provide appropriate on-site training to the personnel designated by the Project Recipient. The training is conducted by an authorized trainer on the number of participants listed in the table below, so that they can operate and maintain the equipment without any support (start-up, adjustment, operation and use, health and safety related to provided equipment). The Contractor shall be responsible for advising on any health and safety risks associated with the equipment provided and on appropriate protection measures.

All didactic materials related to the training must be submitted both on paper and in electronic format in English and / or Ukrainian.

All necessary tools and training materials must be provided by the Contractor. The contractor takes into account all training costs, including translation into Ukrainian. Training costs must be included in the commercial offer.

The contractor must provide information on the proposed key personnel for project management and training, in addition to any requirements for the required qualifications and level of education (secondary, secondary special, higher) or experience in this field, for the project recipient's staff.

Training should be conducted in English and / or Ukrainian. The table of contents, the minimum number of end users to be trained, and the minimum duration of training are illustrated in the table below:

Number of participants	Minimum number of days	Training requirements (if any)
Maintenance: 2 persons  Operation: 5 persons	10 days	The training on use and correct manipulation of the equipment shall be carried out within 30 days after installation, commissioning and testing of the equipment. The training shall cover: the purpose of the equipment, detailed information on the operation of each unit, routine work, daily checks, user maintenance, health and safety measures and troubleshooting procedures.  Place of study: Cherkasy city

## 8. MANUALS AND DOCUMENTS

A complete manual (Technical Passport) for operation and maintenance in English, as well as in Ukrainian with a complete description of the operation and safety systems must be provided for all equipment. Detailed instructions on the operation of the installation and assembly, basic maintenance and troubleshooting, and replacement of components must be provided for the entire set of equipment.

**9. GUARANTEE / WARRANTY REQUIREMENTS**

The Contractor shall warrant that the goods supplied under the contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The Supplier further warrants that all goods supplied under the contract have no defect, arising from design, materials, or workmanship or from any act or omission of the Contractor, that may develop under normal use of the supplied Goods in the conditions prevailing in the country of final destination.

This warranty shall remain valid for twelve (12) months from the date of issuance of the certificate of acceptance. The Contractor shall commit to repair or replace, at his own expense and as soon as practicable and no later than three (3) months, any of the goods which, within the warranty period, prove to be defective as mentioned above or as a result of any erroneous or inadequate engineering drawings, technical specifications and/or operating instructions of the Contractor.

**10. LANGUAGE REQUIREMENTS**

The official language of the project is English. The offer, drawings, catalogs, illustrations, printed technical specifications and other documentation on the equipment (one manual per set of each product) must be in English and Ukrainian.

**11. DELIVERABLES/REPORTS**

The Contractor will be paid upon receipt and acceptance of UNIDO of the deliverables/reports listed in the table below:

<b>Deliverable / Report:</b>	<b>Activity covered by the report and/or content:</b>	<b>Submission Date*</b>
Design of the equipment	Detailed technical specifications; technical guidance on design of facility to house disposal equipment and supplies	Month 2
Manufacturing report	List of equipment manufactured and its testing results at the Contractor's site	Month 8
Shipment of the equipment	Shipping documents (bill of lading, packing list identifying contents of each package)	Month 9
Steady operation report	Assembling of the equipment at the project site; steady operation report; training report	Month 11
Final report	Performance testing; Certificate of acceptance	Month 12

\* The time of submission is expressed in months and is calculated from the signature of the Contract



The issuance of a payment hereunder by UNIDO shall not be construed as an unconditional acceptance by UNIDO of the work accomplished, or the equipment or technical documentation delivered by the Contractor up to the time of such payment.

**12. EXPERIENCE AND REFERENCE**

Bid shall include at least two (2) reference projects and previous experience in successfully fulfilling contracts of a similar nature/size to the subject of this scope of supply