**1. General.**

Repair or installation of refractory of the heaters, heat recovery boilers, flue gas ducts, reactors, regenerators, vessels at PoHo units OS-1, OS-2, OS-3, as a part of routine maintenance or in cases of emergency.

**2. Attachments.**

- UOP Standard Specifications 3-22-10; 3-24-7; 3-25-9; API Standard 936 Refractory Installation Quality Control

**3. Description and specifics of work.**

**3.1. Description of work.**

Repair or installation of refractory of the heaters, heat recovery boilers, flue gas ducts, reactors, regenerators, vessels at OS-1, OS-2, OS-3 as a part of routine maintenance or in cases of emergency. Works shall be performed on hourly and/or unit rate basis.

1. Man-hour rates:

|  |  |
| --- | --- |
|  | Hourly rate, EUR/h |
| Work Manager |  |
| OHS Specialist |  |
| Technical Supervision Specialist |  |
| Shotcrete Specialist |  |
| Refractory Worker |  |
| Welder |  |
| Fire Watcher / Confined Space Entry Attendant |  |

1. Machinery hourly rates:

|  |  |
| --- | --- |
| **Equipment** | **Hourly rate, EUR/h** |
| Shotcrete equipment |  |
| Concrete mixer |  |
| Air compressor |  |
| Sandblaster |  |
| Electrode welding machine |  |
| Spot welding machine |  |
| Pneumatic rammer |  |
| Electric hammer |  |
| Pneumatic hammer |  |
| Planetary mixer (Hobart) |  |
| Telehandler |  |
| Diesel heater |  |
| Electric Heater |  |
| Angle grinder for preparation of surfaces |  |
| Water tank heater |  |
| Delivery of materials from OL warehouse to the site |  |

3. Unit Rates:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item No.** | **Work Description** | **UoM** | **Labor Rates, EUR** | **\*Labor Rates (with materials), EUR** | **Comments** |
| 1 | Installation of shotcrete refractory on vertical surfaces, when the refractory thickness is 50÷100mm | 1 m² |  |  | Insulation type refractory |
| 2 | Installation of shotcrete refractory on horizontal surfaces, when the refractory thickness is 50÷100mm (ceiling) | 1 m² |  |  | Insulation type refractory |
| 3 | Installation of shotcrete refractory on vertical surfaces, when the refractory thickness is 101÷150mm | 1 m² |  |  | Insulation type refractory |
| 4 | Installation of shotcrete refractory on horizontal surfaces, when the refractory thickness is 101÷150mm (ceiling) | 1 m² |  |  | Insulation type refractory |
| 5 | Installation of shotcrete refractory with stainless steel reinforcing fibers on vertical surfaces, when the refractory thickness is 101÷150mm | 1 m² |  |  | Insulation type refractory |
| 6 | Installation of shotcrete refractory on horizontal surfaces, when the refractory thickness is 101÷150mm (ceiling) | 1 m² |  |  | Insulation type refractory |
| 7 | Installation of shotcrete refractory on vertical surfaces, when the refractory thickness is 151÷200mm | 1 m² |  |  | Insulation type refractory |
| 8 | Installation of shotcrete refractory on horizontal surfaces, when the refractory thickness is 151÷200mm (ceiling) | 1 m² |  |  | Insulation type refractory |
| 9 | Installation of shotcrete refractory on vertical surfaces, when the refractory thickness is 201÷250mm | 1 m² |  |  | Insulation type refractory |
| 10 | Installation of shotcrete refractory on horizontal surfaces, when the refractory thickness is 201÷250mm (ceiling) | 1 m² |  |  | Insulation type refractory |
| 11 | Installation of shotcrete refractory on vertical surfaces, when the refractory thickness is 251÷320mm | 1 m² |  |  | Insulation type refractory |
| 12 | Installation of shotcrete refractory on horizontal surfaces, when the refractory thickness is 251÷320mm (ceiling) | 1 m² |  |  | Insulation type refractory |
| 13 | Installation of shotcrete refractory on vertical surfaces, when the refractory thickness is 321÷450mm | 1 m² |  |  | Insulation type refractory |
| 14 | Installation of shotcrete refractory on horizontal surfaces, when the refractory thickness is 321÷450mm (ceiling) | 1 m² |  |  | Insulation type refractory |
| 15 | Installation of shotcrete refractory with stainless steel reinforcing fibers on vertical surfaces, when the refractory thickness is 125÷150mm | 1 m² |  |  | Rescocast17EG  Rescocast 9 |
| 16 | Installation of refractory lining on surfaces by ramming into reinforcing mesh, when refractory lining thickness is up to 25 mm | 1 m² |  |  | Rescobond AA-22S  Resco R-Max MP |
| 17 | Installation of refractory lining on surfaces by ramming when refractory lining thickness is up to 100 mm | 1 m² |  |  | Calderys Calde Plast 85S  Calderys CaldePlast Redd Ram |
| 18 | Installation of refractory lining on surfaces by ramming when refractory lining thickness is 101÷250 mm | 1 m² |  |  | Calderys Calde Plast 85S  Calderys CaldePlast Redd Ram |
| 19 | Installation of refractory on surfaces by concreting, when refractory lining thickness is up to 250 mm | 1 m² |  |  | Insulation type refractory |
| 20 | Installation of refractory on surfaces by concreting, when refractory lining thickness is 251÷500 mm | 1 m² |  |  | Insulation type refractory |
| 21 | Sealing of refractory lining joints using heat-resistant material | 1 m |  |  |  |
| 22 | Repairs of small areas, minor repairs of refractory | 1 m² |  |  |  |
| 23 | Partial repairs of burner embrasure refractory | 1 pc |  |  |  |
| 24 | Concreting of burner embrasures | 1 pc |  |  |  |
| 25 | Installation of burner embrasures from blocks | 1 pc |  |  | 1 burner, irrespective of the number of blocks |
| 26 | Installation of vertical burner embrasures from blocks | 1 pc |  |  | 1 burner, irrespective of the number of blocks |
| 27 | Manufacture of fire-proof concrete constructions weighing up to 100 kg. | 1 pc |  |  |  |
| 28 | Brick work (straight walls, floor) | 1 m³ |  |  |  |
| 29 | Brick work (dome, round walls) | 1 m³ |  |  |  |
| 30 | Removal of refractory | 1 m³ |  |  |  |
| 31 | Removal of refractory for FCC Unit R-201, R-202, SRU boilers and pre-heaters. | 1 m³ |  |  |  |
| 32 | Removal of refractory with amour mesh | 1 m² |  |  |  |
| 33 | Drilling of holes in refractory lining | 1 pc |  |  |  |
| 34 | Manufacture and installation of embrasure shuttering | 1 pc |  |  | Materials to be furnished by the Contractor |
| 35 | Surface preparation, grade SA1 (including materials) | 1 m² |  |  |  |
| 36 | Surface preparation, grade ST2 (including materials) | 1 m² |  |  |  |
| 37 | Electrode welding of anchoring elements to the shell | 1 pc |  |  |  |
| 38 | Point (contact) welding of anchoring elements to the shell | 1 pc |  |  |  |
| 39 | Welding of amour mesh to the shell | 1 m² |  |  |  |
| 40 | Installation and repairs of refractory made from multi-layer ceramic wool or wool blocks. | 1 m² |  |  |  |
| 41 | Repairs of hatches, manways, explosion release ports and other complex nodes made from multi-layer ceramic wool or wool blocks. | 1 m² |  |  |  |
| 42 | Cleaning of access platforms and area surrounding the unit | 1 m² |  |  |  |
| 43 | Preparation for refractory repairs by covering tube coils, burners, etc. | 1 m² |  |  |  |

\* maximum amount of supplied materials up to 1.5t (1 pallet)

4. Mobilization, demobilization and site costs.

**3.2. Special requirements (if any).**

All works shall be performed in strict compliance with legal regulations of the Republic of Lithuania as well applicable specifications, drawings, recommendations of manufacturers as well as applicable specifications, drawings, recommendations of material manufacturers and other documents, e.g. UOP Standard Specification, API Standard 936 Refractory Installation Quality Control—Inspection and Testing Monolithic Refractory Linings and Materials.

Contractor shall be liable for defects (if any) identified:

1) within a period of five years;

2) within a period of ten years - for hidden defects in structural elements (structures, piping, etc.);

3) within a period of twenty years - for intentionally hidden defects.

Liability period shall be counted from the date when the result of work has been handed over to the Owner for use.

The Contractor shall be liable for all and any actions that affect the quality. Contractor shall sort out (separate) metal and remove from the site all construction waste and debris generated in the course of works performed by Contractor to the location designated by the Owner within the territory (within 2000 m distance) of Public Company ORLEN Lietuva.

Upon completion of the inspection and any associated works, the Contractor shall remove all tools, materials, and equipment from the Owner’s premises and leave the site clean, safe, and ready for use. Removal and replacement of unacceptable refractory will be performed at the Contractor's cost.

Contractor shall clean the fouled refractory and internals (piping, burners, etc.) and commission them to the responsible OL employee.

**3.3. Requirements for work execution and documentation.**

Contractor must present filled-in Construction Logbook with specified sequence of work, hidden work reports, method statement, etc. Contractor shall provide a precise diagram defining the places of replaced or repaired refractory, indicating thickness, make, technology, equipment used, material certificates. All of this shall be available in the work execution logbook. Contractor shall provide an example of the documentation for evaluation.

**3.4. Qualification requirements for Contractor.**

To be considered eligible, the Contractor shall submit the following documentation as proof of qualification:

- A valid copy of the company’s registration certificate.

- Certificate issued by the National Energy Regulatory Council (NERC) for maintenance of crude oil refining facilities;

- A license (permit) issued by the Ministry of Environment or similar document of another country recognized in the Republic of Lithuania confirming the right to perform such construction works (STR 1.02.01:2017 ‘Procedure for Certification and Recognition of Rights of Construction Project Participants’);

- A qualification certificate of construction manager for execution of exceptional significance construction works or similar document of another country recognized in the Republic of Lithuania confirming the right to perform such construction works (STR 1.02.01:2017 ‘Procedure for Certification and Recognition of Rights of Construction Project Participants’).

- Employees working at height shall hold certificates authorizing the performance of such work;

- Employees performing rigging works shall hold respective certificates.

1. At least 3 years of experience performing similar type of works, installing refractory according to the methods indicated in the specifications and in the table of unit rates. The Contractor shall provide a list of completed works.

2. All the works in the table shall be completed.

3. Number of trained employees: at least 20.

4. Performance of works at least in three (3) different locations using the refractory installation equipment;

5. Equipment for refractory removal at least for three (3) different locations;

6. Welders for anchor welding at least in three (3) different locations,

Contractor shall be certified for all the works and be experienced in the area of refractory lining.

Contractor shall have a quality control engineer with the qualification of respective work and such qualification proving certificate for the supervision of the quality of works.

Refractory lining employees shall be trained to use the equipment, materials, know the specifics of the work. Contractor shall provide the trained personnel qualification certificates, training program.

**4. Materials, equipment, and services provided by OWNER.**

Owner shall provide electricity, water, scaffolding, refractory materials, anchors, etc.

**5. Materials, equipment, and services provided by Contractor.**

Contractor shall provide all equipment and tools, transport, slag for blasting, lighting (temporary connection cables and extensions and other temporary means for lighting and protection means for temporary lighting equipment with valid verification), cutting discs, formwork, etc. required for work performance.

**6. Requirements for work completion.**

Work shall be deemed completed after presentation of filled-in Construction Logbook, technical documentation, statements of material write-off and return of the site to the Owner.

**7. Requirements for work acceptance.**

Work shall be deemed completed after presentation of filled-in Construction Logbook, technical documentation, statements of material write-off and return of the site to the Owner.

**8. Requirements for work schedule.**

- Date of works: 01.03.2026.–31.12.2027.