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***R E P O R T***

***regarding the quality verification at the essential requirement***

***"FIRE SAFETY"*** of project no. 1057/2018 DTAC *(Technical Documentation for obtaining the Building Permit)* phase

***Waste Oil Recycling Plant***

1. **Identification data:**

**GENERAL DESIGNER AND SPECIALIST: SC Pureworld Engineering SRL Ploiesti**

* Beneficiary - **S.C. GREEN OIL AND LUBES SRL**, 2E Anton Pavlovici Cehov St., 1st District, Bucharest, tax identification number: RO 34450328; Trade Registry no.: J40/5301/2015
* location - Oltenita, Calarasi county.
* ***Date of submission for verification - 20.08.2018***.

1. **Main features of the project and construction:**

*Category and class of importance:*

***According to G.D. no. 766/1997 “Decision for approval of regulations on quality in construction” Annex 3, the objective under consideration falls within the major “C” category***.

***The major building class is “III” according to Table 5.1 of Code P100/1/2006 - Seismic Design Code.***

*Types and specific features of constructions:*

* ***Type of construction: for warehouse production - with functions***:

Main function: Production of oil by recycling used oils;

Secondary functions: storage, handling, receipt and delivery of raw materials and finished products to the car;

Related functions: social administration building, command room, utilities assurance

**BUILDINGS:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Name | Number of levels  Height, m | Sizes, m | Built area, m2  Surface developed, m2 | Volume, m3 |
| 1 | Administrative building | Ground floor H=5.50 | 29.70 x 18.45 | Ac =547.97 | V=2900 |
| 2 | Mixed building  laboratory, control room  changing rooms  toilets | Ground floor H=5.50 | 30.70 x 9.60 | Ac =300.00 | V=1650 |
| 3 | Electrical substation together with 2 enclosures on 3 sides with PT | Ground floor  (cable house) + l Floor  H = 9.30  Hp = 5.50 | Ground floor  30.70 x 22.80  Floor  30.70 x 11.80  Outer  2 x (6.00 x 6.30) | Ac = 762.40  Afloor = 358.40  Ad = 1101 | V = 5200 (value for the entire building:  Substation + command room) |
| 4 | Fire Pump House | Ground floor  H = 5.00 | 20.70 x 11.1 | Ac = 191.10  Ad =229.77 | V = 955 |
| 5 | Maintenance workshop | Ground floor  Hrake = 9.30  Hmax = 10.30 | 30.20 x 15.20 | Ac = 459.04 | V = 3400 |
| 6 | Guard Cabin and Security + | Ground floor  H = 4.50 | 5.00 x 5.00 | Ac = 25.00 | V = 52 |
| 7 | Hydrogen plant  Compressor compartment | Ground floor  Hrake = 9.5  Hridge = 10.8 | 15.30 x 25.72  6.90 x 9.25 | Ac = 394  Ac = 63.83  Total Ac = | V = 3100 |
| 8 | Utilities house | High ground floor  H = 13.52 and 15.50 at the rake | 44.65 x 14.70 | Ac = 656.35 | V = 8932 |

**LIQUID SUBSTANCES WAREHOUSE, OUTDOORS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Name | Tank number | Diameter, m | Height, m | Tank Volume, m3 |
| 1 | **Waste oil storage depot**  D4 storage depot category with capacities between 2501-12500 cubic meters  Class IV liquids  3 tanks in a box, separated by 2 concrete dams  One box for each tank | **Storage depot with 3 thermally insulated vertical cylindrical tanks with fixed cap, capacity 3 x 2020 m3 and useful 5454 m3 or 4908 tons** | | | |
| 3 cylindrical vertical tanks  T 101 1A  T 100 1B  T 100 1C | D = 13.00 | H = 15.20 | Vtank = 2020 m3  Vuseful = 1818 m3 |
| 2 | **Finished oil product warehouse**  **Capacity 4 x 999 m3**  capacities between 2501-12500 cubic meters  Class IV liquids (heavy distillate  4 tanks in a box, separated by 3 concrete dams  One box for each tank | **4 thermally insulated vertical cylindrical tanks with fixed cap, x 999 m3, warehouse capacity 3996 m3 and useful 3599 m3 or 3239 tons** | | | |
| 4 cylindrical vertical tanks  T 100 2A  T 100 2B  T 100 3A  T 100 3B | D = 10.00 | H = 12.70 m | V = 999 m3  Vuseful= 899 m3 |
| 3 | Warehouse for others  4 vertical cylindrical tanks with other products  Class LIII-LIV  D 5-501-2500 m3 with light and heavy oil and diesel  In its own reinforced concrete box | **4 thermally insulated vertical cylindrical tanks with fixed cap** | | | |
| T 100 4  T 100 5 A  T 100 5 B  T 100 6 | D = 8.00  D = 6.5  D = 6.5  D = 6.5  D = 8.00 | H = 10.20  H = 8.00  H = 8.00  H = 10.20 | **V = 513 m3**  **V = 266 m3**  **V = 266 m3**  **V = 513 m3** |
|  | Warehouse. Oil  4 vertical cylindrical oil tanks  Class III-IV  D4 with 2501 – 12.000  Own box with separating dig | 2 Vertical cylindrical tanks x 2000 cubic meters, each thermal insulated with storage capacity of 1800 m3 and 1620 tons | | | |
| R100 3 C  R100 2 C | D=13 | H=15.20 | Vtank = 2020m3  Vuseful = 1818 m3 |

**REINFORCED CONCRETE SPILL BOX**

Since the products stored in the tanks park are liquids classified according to P118 in class LIII-LIV with flammability temperatures above 55°C (for used or heavy or light crude oils, the ignition temperature is above 200°C), a reinforced concrete spill box with the sizes of 107.50 x 19.20 m was chosen in which the following are to be located:

* 5 tanks x 2020 m3,
* 4 tanks x 999 m3, 1
* - tank x 515 m3
* - 3 tanks x 226 m3

The total storage capacity of the warehouse is V = 15289 m3 and the volume of products at a 90% load of 13760 m3 tanks in total weight G = 12384 tons, enclosing the warehouse according to table 6.2.21 of P118 in category D3, with capacity for liquids class III - IV between 12501 m3 - 150,000 m3

**OUTDOOR TECHNOLOGICAL INSTALLATIONS**

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Name | Phases | Capacity |
| 1 | Distillation plant | Dehydration | Input: 200 t/day used oil from auto cisterns  Output: ~184.5 t/day dehydrated oil for section supply Separate light oil  Output: ~10.5 t / day light oil for storage, for distribution/supply  Hydrotherapy installation |
|  | Separation of light oil | Input: ~174 t/day medium distillated from the base of the light oil separator |
|  | Medium distilled recovery | Output: ~74.2 t/day environmentally distilled to the medium distillate day tank for supplying the hydrotreatment plant  Input: ~99.8 t/day hardly distilled from the bottom of the medium distillate separator |
|  | Hard distilled recovery | Output: ~23.7 t/day heavy lubricating oil (HLO) to the HLO and/or distribution tank  Output: ~76 t/day heavy distillate to the distillation tank for supplying the hydrotreatment plant |
| 2 | Hydrotreatment plant | Treatment of used oil with hydrogen in reactors with fixed catalyst coating (NifMo-CoMo and DeMet)  fractional  Amine installation  Gas flare | Input: 183 t/day distilled oil from Medium Distillation Recovery section  Output: 165 t/day, hydrotreated base oil SN-150 & SN-500 for distribution  - 7,8 t/day H2-waste gases & 9,78 t/day natural gas used as fuel for the high temperature heat-smelting furnace burner  - 8,84 t/day natural gas used as fuel for the burner of the heating medium with low temperature thermal fluid  - 6.04 t/day natural gas used as fuel for the steam generator and burner for the gas flame burner |
| 3 | Hydrogen plant | Electrolysis of water in the presence of potassium hydroxide (KOH). | Input:  - 3 tonnes per year leach (25% KOH solution) - Note 1  - 60 t / day demineralized water  Output: 1.08 t/day H2 - H2 Factory Design Capacity (Max H2 consumption = 0.96 t/day) |
| 4 | SO2 removal plant | Absorption section for waste gas desulphurization  The solution for treatment with caustic soda was adopted  H2S burning | Input:  - ~ 185 t/day waste gases from the high-temperature heat-fired heating furnace  - 9 t/day caustic soda (32% solution)  - 96 t/day demineralized water for completion  Output:  - ~ 65 t/day drainage of waste gases |

**CONSTRUCTION FOR UTILITIES**

**Pre-treatment station** - includes the hydrocarbon separator that will treat the water from the carriageways in the premises;

**Water fire extinguishing house**, including pump house, foam station and intangible water reserve in 2 tanks x 250 cubic meters;

**Transformation Post** - includes 2 transformation points (medium voltage / low voltage) and the electrical connection of the lens attached to the electrical substation and separated by a fire wall

**Cooling tower** - includes the cooling water cooling system running in the installation;

**Water management** **unit** - includes the connection to the public water network, the pressurization station and the general technological water distributor;

The **loading/unloading platform** - includes the access area of the tanks for unloading the raw material (used oil) and loading the finished products

**Car scale**

**Access, gateway, inner traffic routes**

**Car parking**

* ***8 fire compartments***

|  |  |  |
| --- | --- | --- |
| No. | Name | Built area m2 |
| 1 | **Compartment 1**  Administrative building | Ac = 547.96 |
| 2 | **Compartment 2**  Mixed building: laboratory, control room, dressing room, bathrooms | Ac = 300.00 |
| 3 | **Compartment 3**  Electrical substation together with 2 enclosures on 3 sides with PT | Ac = 762.40 |
| 4 | **Compartment 4**  Fire pump house | Ac = 220.18 |
| 5 | **Compartment 5**  Maintenance workshop | Ac = 459.04 |
| 6 | **Compartment 6**  Guard and security cabin | Ac = 25.00 |
| 7 | **Compartment 7**  Hydrogen factory and hydrogen compressor room | Ac = 457.83 |
| 8 | **Compartment 8**  **Utilities building** | Ac = 656.35 |

Waste oil depots, refined oil, cooling and purification plants, car ramps and fire water tanks are outdoor installations and / or equipment

The level of fire risk (category)

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Construction/equipment/installation/warehouse** | **Category of danger** | **Fire risk** |
| 1 | Administrative building |  | Low risk |
| 2 | Mixed building  Laboratory - medium risk  control room - low risk  lockers - low risk  toilets - low risk |  | Low risk |
| 3 | Electrical substation | Category E | Low risk |
| 4 | Fire pump house | Category E | Low risk |
| 5 | Maintenance workshop | Category E | Low risk |
| 6 | Access, Guard and Security Cabin |  | Low risk |
| 7 | Hydrogen compressor room | Category A | Very high risk |
| 8 | Distillation plant | Category C | High risk |
| 9 | Hydrotreating plant | Category C | High risk |
| 10 | Hydrogen factory | Category A | Very high risk |
| 11 | SO2 removal plant | Category A | Very high risk |
| 12 | Raw materials warehouse - used oil | Category C | High risk |
| 13 | Base oil warehouse - refined | Category C | High risk |
| 14 | Oil fractions warehouse on phases and diesel | Category C | High risk |
| 15 | Loading/unloading oil ramp | Category C | High risk |
| 16 | Wastewater pre-treatment plant | Category E | Low risk |
| 17 | Cool tower | Category E | Low risk |
| 18 | Transformer station with oil | Category C | High risk |
| 19 | Fire water tanks | Category E | Low risk |
| 20 | Technological and sewage water management unit | Category E | Low risk |
| 21 | 1 Car scale | Category E | Low risk |

**Fire resistance of construction/fire compartment:**

***In accordance with the minimum conditions set out in Art. 2.19 of P118/1999****:*

|  |  |  |
| --- | --- | --- |
| No. | Construction | Fire resistance of the building / Fire stability |
| 1 | Administrative building | Grade II RF |
| 2 | Mixed building: laboratory - control room, dressing room, bathrooms | Grade II RF |
| 3 | Electrical substation | Grade II RF |
| 4 | Fire pump house | Grade II RF |
| 5 | Maintenance workshop | Grade II RF |
| 6 | Access, guard and security cabin | Grade II RF |
| 7 | Hydrogen factory and hydrogen compressor room | Grade II RF |
| 8 | Utilities building | Grade II RF |

*Level of equipment and equipment with technical fire protection:*

* Detection and signaling of fire and gas emissions through a Common FGDS Fire and Gas Signaling and Signaling Equipment, mounted in the control room and retransmitted to 2 FCAP fire alarm repeaters, in the administration building and in the security cabin, with visualization on 2 display boards and FGWS operator control for FGDS in the control room and in the security cabin. Hydrogen, hydrogen sulphide, flame, smoke and smoke and heat detectors were provided, manual triggers, indoor and outdoor sirens
* The fire extinguishing system will cover the whole surface of the investment by building a firewater network with external oversized hydrants of ring-type.
* The water requirement for the external hydrant network (26 pieces) will be ensured from a water tank - a metal structure with a capacity of 250 cubic meters with automatic level and incidence indication system, and a pumping group with a flow pump of 108 m3/h at 8 bar (main) and a power pump of 108 m3/h (reserve), with a Jokey-type pilot pump of 10 m3/h to maintain the pressure in the network.
* Foam Fire Extinguishing System for powering the internal generators from the tanks of the 4 parks, the TFAS 3000 towers and the fixed generators from the spill boxes will be provided from another 350 m3 metal tank with its own pumping group. The concentrated liquid spumogen is in a tank with a capacity of 5.5 m3 of concentrated liquid foam, the preparation of the foam being made with a mixer and the foam discharge is provided with a separate pumping group with 2 x 108 m3 electropumps each (main pumps) with a cascade, a 216 m3/h motor pump (reserve) of foam transport along the pipeline route separated from the firewater route.
* 9 automatic-operated towers and 10 foam generators for tanks from tanks were provided.
* A dry column provided for the multistage structure of the waste oil processing plant powered by the hydrant network
* Provide a fixed Sprinkler Extinguishing System open for the 2 oil loading / unloading stations equipped with electric valves.
* Expected extinguishing system will be semi-automatic, mounted electrically with quick opening for water or foam discharge and PLC extinguishing, aspiration and discharge of the pumps are provided with valves mounted in normally open position
* Refueling of water reserve in 24 hours.

**Maximum operation time of extinguishing systems**

* at external hydrants, 180 min.
* at fixed cooling installation, 60 min.
* Indoor foam installation, 60 min.
* at the foam extinguishing plant in 3 rounds of 15 minutes (45 min.)

Portable powder P6 and carbon dioxide G5 and portable P50 Powder extinguishers for ABCE fire extinguishing and portable foam SM 6 and B-type foams will be provided.

Within the administrative areas, one P6 powder extinguisher at 250 sqm, but not less than 2 per level, one G5 at TEG and servers, one SM 50 foam extinguisher, and one SM 6 at the Diesel generator, a P50 extinguisher at PT

At the production and storage areas, a P6 extinguisher at 200 sqm and two P50 extinguishers

1. **Documents to be submitted for verification:**

* fire safety scenario;
* technical report and plans, architecture, fire safety installations (for signaling, extinguishing detection).

1. **Conclusions on the verification:**

***Following the verification, the corresponding report is considered, for the verified phase being signed and stamped according to the instructor***

***I received 2 copies***

***Designer Investor***

*I handed over 2 copies*

*Certified technical verifier*

*Eng. Vale Ion*