



UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA

CAMPUS D'ALCOI

Process to obtain organic fertilizer from wastewater

ANNEX I: TENDER DOCUMENT PRESENTED BY:

José Carlos Valls Arenas

MECHANICAL ENGINEERING DEGREE

Defence convocation: September 2019

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Condition fold

1 SCOPE OF THIS FOLD

The scope of the following condition fold includes, establish the location of the industrial plant, the installation of the whole machinery to make possible the process to obtain organic fertilizer and the installation of the compressed air.

If during the installation, it is needed to make any change and it is not specified in this document, the responsible entity must take charge for the said changes according to the orders that at their judgement meet the regulation.

The installation of the machinery will be held in every moment to the conditions this document establish.

1.1 PROJECT DEFINITION

The project is defined by the following documents.

The project is fully defined by all the parts that compose it.

- The report describes the process of the project, having just informative character.
- The calculations justify the adopted solutions.
- The plans are graphic representations for the goal to achieve with this project.
- The budget wants to give a clear vision about the cost of the project.
- The catalog shows the specifications of the chosen machines

The condition fold is mandatory, so if there is any contradiction between the condition fold and the other documents, will prevail overall, this document.

2 LOCATION

The industrial plant is located at PL POLIGONO 7 RUSTICA 134, 28813 TORRES DE LA ALAMEDA (MADRID).

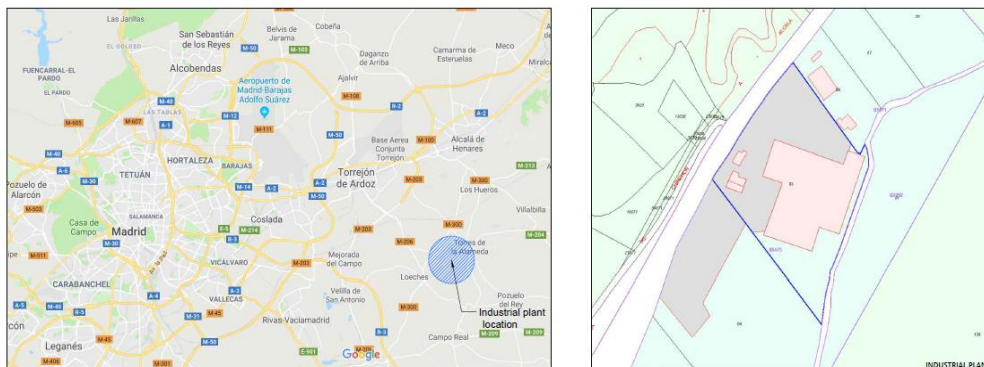


Figure 1 Site plan

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Figure 2 Industrial plant location



Figure 3 Composting area location

3 TECHNICAL CONDITION FOLDS

3.1 CONSTRUCTION UNITS

The work to run can be grouped into 3 groups.

- Cleaning the industrial plant.
- Installation of the composting line.
- Installation of the compressor and compressed air grid.

3.2 ELEMENTS SPECIFICATIONS

The machine manufacturer assures the machine that is going to be installed, comply with all the European Certifications.

3.3 INSTALLERS

The installation can and must be carried out by authorized and official installers.

3.4 MACHINERY INSTALLATION

To consider:

- The installation is done in the assigned place.
- Ensure that the area in which the installation is going to be carried out is free of dangerous objects and/or that may interfere with the installation.
- Use the appropriate machinery for the displacement and placement of the machine to be installed every time.
- Use the appropriate fixings tools to maintain the stability of the machines.
- Always use the necessary personal protection equipment.
- Avoid being in danger zone when the transport of machinery is being carried out.
- Always use nylon bands or slings in good condition.
- Avoid that the machinery suffers blows or frictions.

3.5 PROCESS TO BE PERFORMED

3.5.1 Cleaning the industrial plant

Before starting any type of installation, it will be ensured that the industrial plant is in perfect condition and there is no material left over, from the previous company that could suppose a problem when making the new installation.

The cleaning will be done before the installation and will be carried out by an external cleaning service.

3.5.2 Installation of composting line

To carry out a correct installation of the composting line, the order in which the machines/elements are positioned will be followed, ensuring that the previous element fits perfectly, allowing a continuous production without producing subsequent problems due to mismatches between them.

For those machines that must be screwed to the ground for proper installation and be fixed, the worker will be responsible for drilling, making sure to use the appropriate tools and place the screw properly.

3.5.3 Compressor and compressed air installation

The compressor to be installed has been previously calculated to meet the demand of the industrial plant. Being chosen after these calculations and designed a pipeline grid to supply air to those points and machines that require it.

3.6 INSTALLATION PROCESS

3.6.1 Composting line installation

Description of the installation process.

Once the material arrives, it will be verified that all the pieces are in good condition.

Steps to be taken

The following section will explain how the installation of the components of the composting line should be carried out.

If any element of the line is found in more than one occasion, the same process will be carried out for its assembly in each one of them.

Except for forklifts and heavy machinery, installers must provide the necessary tools to carry out the installation properly.

For machines that come disassembled, they will be assembled on-site, so the installer will have to be responsible for making the assembly as indicated in the manufacturer's instructions.

The box in which all the elements will come will be transported with a wheelbarrow to the nearest point of the installation. Once the box is in the right place, it will be unpacked, and the installer will be responsible for making sure that all the items are in the box and perfect condition. Once reviewed, it will be installed.

If the machine is already assembled, the installer will be the one who makes sure to place it in the right place and proceed to its installation.

The fixing of the machines will be carried out whenever the manufacturer indicates so, and otherwise, if not indicated, the fixing of the machinery to the surface will be carried out if the responsible person sees it necessary.

To fix the machines to the floor it will be used an anchor bolt, the metric will vary depending on the machine.

The steps to use correctly the anchor bolt are the following one:

1. Mark the points to drill.
2. Drill with a drill equal in diameter to the diameter of the tube until the desired depth is achieved.
3. Insert the sleeve and anchor bolt into the holes.
4. Check that the screw protrudes from the floor as necessary.
5. Locate the machine anchor holes over the screws.

3.6.2 Compressor and compressed air installation

To obtain the compressor, the pertinent calculations have been done, just as the pipeline grid which will be dimensioned to supply the compressed air to all the machines and points that require it.

To proceed with the installation, all the material to be used will be subjected to compliance with the regulations in force at the time of installation.

The pipeline grid will supply the packing machine model SJIII-K5000 and 8 different points around the composting line.

The scheme to install the compressor and its accessories have been the result of following the recommendations found in Enrique Carnicer Arroyo's book and the scheme proposed by Puska's Catalog.

The installation is made up by:

- Compressor.
- Brass ball valve.
- Purge.
- Air deposit.
- Filters.
- Air dryer.
- Aftercooler.
- Water trap.
- Pipelines.
- Accessories

The compressed air grid is composed by the principal pipeline grid and the down pipelines. The first one is used to distribute the compressed air to the whole plant (where it is needed) and the downpipes are used to bring the air to an exact point, in this case, 8 down pipelines will conduct the compressed air to an 8 different blowguns and 1 down pipeline will conduct it to the packaging machine. Both, the principal pipeline and the downpipes follow the required standard EN 13480 and RAL colour 5012 for air pipes with a limit of 13 bar, interior diameter 17,4 mm and exterior diameter 20 mm.

All the pipes will be fastened with wall clamps, in the principal pipeline grid, when the direction change will be used 90° connectors, and for all the downpipes and the principal pipeline to the machine, will be used T connectors. The blowguns and the machine will be connected to the pipes with fast connectors.

4 REQUIRED COMPLIANCE STANDARDS

4.1 INSTALLATION OF MACHINERY

- Royal Decree 1495/1986, of May 26, by which the Regulation of Safety in Machines is approved.
- UNE-EN ISO 4871:2010 Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996).

4.2 INSTALLATION OF COMPRESSED AIR

- Royal Decree 2060/2008, of December 12, which approves the Regulation of pressure equipment and its complementary technical instructions.
- UNE-EN ISO 11011:2015 Compressed air - Energy efficiency - Assessment (ISO 11011:2013).
- UNE-EN 1012-1:2011 Compressors and vacuum pumps - Safety requirements - Part 1: Air compressors.
- UNE-EN 1012-2:1996+A1:2010 Compressors and vacuum pumps - Safety requirements - Part 2: Vacuum pumps.
- UNE-EN 1012-3:2013 Compressors and vacuum pumps - Safety requirements - Part 3: Process compressors (Endorsed by AENOR in January of 2014.).
- UNE-EN ISO 4414:2011 Pneumatic fluid power - General rules and safety requirements for systems and their components (ISO 4414:2010).
- UNE 62200:1991 Compressors. Classification.

4.3 USE, MAINTENANCE AND SAFETY OF THE MACHINERY

- UNE-EN 60447:2004 Basic and safety principles for man-machine interface, marking and identification - Actuating principles (Endorsed by AENOR in July of 2004.)
- UNE 15703:1993 Machine-tools. lubrication systems.
- UNE 115430:1999 Earth-moving machinery. hydraulic excavator and backhoe loader boom lowering control device. requirements and tests.
- UNE-EN ISO 11200:2014 Acoustics - Noise emitted by machinery and equipment - Guidelines for the use of basic standards for the determination of emission sound pressure levels at a workstation and at other specified positions (ISO 11200:2014).
- UNE-EN ISO 11202:2010 V2 Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a workstation and at other specified positions applying approximate environmental corrections (ISO 11202:2010).
- UNE-EN ISO 11203:2010 Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a workstation and at other specified positions from the sound power level (ISO 11203:1995).
- UNE-EN 415-1:2014 Safety of packaging machines - Part 1: Terminology and classification of packaging machines and associated equipment.
- UNE-EN 415-3:2000+A1:2010 Safety of packaging machines - Part 3: Form, fill and seal machines.
- UNE-EN 415-5:2007+A1:2010 Safety of packaging machines - Part 5: Wrapping machines.
- UNE-EN 415-6:2014 Safety of packaging machines - Part 6: Pallet wrapping machines.
- UNE-EN 415-8:2008 Safety of packaging machines - Part 8: Strapping machines.
- UNE-EN 415-9:2010 Safety of packaging machines - Part 9: Noise measurement methods for packaging machines, packaging lines and associated equipment, grade of accuracy 2 and 3.
- UNE-EN 415-10:2014 Safety of packaging machines - Part 10: General Requirements.

- UNE-EN ISO 14122-1:2017 Safety of machinery - Permanent means of access to machinery - Part 1: Choice of fixed means and general requirements of access (ISO 14122-1:2016).
- UNE-EN ISO 14122-2:2017 Safety of machinery - Permanent means of access to machinery - Part 2: Working platforms and walkways (ISO 14122-2:2016).
- UNE-EN ISO 14122-3:2017 Safety of machinery - Permanent means of access to machinery - Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2016).
- UNE-EN ISO 14122-4:2017 Safety of machinery - Permanent means of access to machinery - Part 4: Fixed ladders (ISO 14122-4:2016).

4.4 GENERAL STANDARDS FOR THE FERTILIZER PLANT

- UNE 142402:1994 Fertilizers. presentation of sampling reports.
- UNE 142403:1994 Fertilizers and soil conditioners. final samples. practical arrangements.
- UNE 142405-2:2010 Fertilizers products. Requirements for labelling of fertilizers different from CE fertilizers. Part 2: Organic fertilizers.
- UNE 142405-3:2010 Fertilizers products. Requirements for labelling of fertilizers different from CE fertilizers. Part 3: Organic-mineral fertilizers.
- UNE 142405-4:2010 Fertilizers products. Requirements for labelling of fertilizers different from CE fertilizers. Part 4: Other fertilizers and special products.
- UNE 142405-6:2010 Fertilizers products. Requirements for labelling of fertilizers different from CE fertilizers. Part 6: Organic soil improvers
- UNE 142405-7:2010 Fertilizers products. Requirements for labelling of fertilizers different from CE fertilizers. Part 7: Other soil improvers
- UNE 142500:2017 Inputs to be used in organic plant production. Fertilizers, soil conditioners and substrates
- UNE 66500:2017 Minimum requirements for the certification of inputs to be used in organic plant production according to UNE 142500 and UNE 315500
- UNE 68088:1988 Full width fertilizer distributors. TEST methods
- UNE-CR 12333:1998 Fertilizers. crushing strength determination on fertilizers grains.
- UNE-CR 13456:2003 Soil improvers and growing media. Labelling, specifications and product schedules.
- UNE-CR 13960:2001 Solid fertilizers - Study on homogeneity.
- UNE-CR 14061:2001 Fertilizers - Determination of dust content.
- UNE-EN 12048:1997 Solid fertilizers and liming materials - Determination of moisture content - Gravimetric method by drying at $(105 \pm 2)^{\circ}\text{C}$ (ISO 8190:1992 modified).
- UNE-EN 1235:1996 Solid fertilizers - Test sieving (ISO 8397:1988 modified).
- UNE-EN 1236:1996 Fertilizers. determination of bulk density (loose).
- UNE-EN 1237:1996 Fertilizers. determination of bulk density (tapped).
- UNE-EN 12580:2014 Soil improvers and growing media - Determination of a quantity.
- UNE-EN 13039:2012 Soil improvers and growing media - Determination of organic matter content and ash.
- UNE-EN 13040:2008 Soil improvers and growing media - Sample preparation for chemical and physical tests, determination of dry matter content, moisture content and laboratory compacted bulk density.

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- UNE-EN 13041:2012 Soil improvers and growing media - Determination of physical properties - Dry bulk density, air volume, water volume, shrinkage value and total pore space.
- UNE-EN 13080:2003 Agricultural machinery - Manure spreaders - Environmental protection - Requirements and test methods.
- UNE-EN 13266:2002 Slow-release fertilizers - Determination of the release of the nutrients - Method for coated fertilizers.
- UNE-EN 13406:2003 Agricultural machinery - Slurry tankers and spreading devices - Environmental protection - Requirements and test methods for the spreading precision.
- UNE-EN 14069:2018 Liming materials - Denominations, specifications and labelling
- UNE-EN 15428:2008 Soil improvers and growing media - Determination of particle size distribution.
- UNE-EN 15761:2010 Pre-shaped growing media - Determination of length, width, height, volume and bulk density.
- UNE-EN 15962:2011 Fertilizers - Determination of the complexed micro-nutrient content and of the complexed fraction of micro-nutrients.
- UNE-EN 690:2014 Agricultural machinery - Manure spreaders – Safety.
- UNE-EN ISO 7837:2001 Fertilizers. determination of bulk density (loose) of fine-grained fertilizers. (iso 7837:1992).