UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Escola Superior d'Enginyeries Industrial,
Aeroespacial i Audiovisual de Terrassa

FINAL DEGREE PROJECT

DOCUMENT 01: PROJECT REPORT

TITLE:

TECHNICAL ADEQUACY OF AN ALREADY EXISTING INDUSTRIAL BUILDING FOR THE DEVELOPMENT OF A CHEMICAL INDUSTRY.

PETITIONERS:

DLYTE CHEMICALS SL.

DISTRICT:

Barcelona (Barcelonès).

DATE:

January 2022 / Autumn call.

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TECHNICAL ADEQUACY OF AN ALREADY EXISTING INDUSTRIAL BUILDING FOR THE DEVELOPMENT OF A CHEMICAL INDUSTRY.

TECHNICAL ADEQUACY OF AN ALREADY EXISTING INDUSTRIAL BUILDING FOR THE DEVELOPMENT OF A CHEMICAL INDUSTRY.

RESUM

Aquest projecte inclou tant l'adequació tècnica d'una nau industrial com els càlculs i tràmits necessaris per a l'obtenció de la llicència d'activitat industrial, que en ser una empresa química, serà una llicència ambiental com es podrà veure al llarg de tot el projecte.

Per a desenvolupar la meva proposta d'adequació tècnica d'una nau industrial existent, adequant-la a l'activitat que volem desenvolupar, hem hagut d'estudiar totes aquelles mesures aplicables en el nostre projecte amb la definició de totes les característiques que compleix l'edificació, realitzar tots els càlculs pertinents de càrrega de foc, emissió sonora i tots els sol·licitats a partir dels documents RSCIEI i el Codi Tècnic de l'Edificació, que dicten les mesures a aplicar per arribar a l'objectiu final del projecte.

Una vegada determinades totes les característiques i sabent que l'edifici complirà amb tots els límits establerts, es calcularà el cost econòmic que suposaria l'execució d'aquesta adequació, en un document anomenat Pressupost.

Finalment, una vegada acabat l'estudi econòmic del treball, es treballarà amb el programa AUTOCAD per a l'elaboració de tots els plànols necessaris per a satisfer la normativa establerta i així acabar obtenint la llicència, complint doncs amb el propòsit marcat previ a l'execució del projecte.

TECHNICAL ADEQUACY OF AN ALREADY EXISTING INDUSTRIAL BUILDING FOR THE DEVELOPMENT OF A CHEMICAL INDUSTRY.

ABSTRACT

This project includes both the technical adaptation of an industrial building and the calculations and procedures necessary to obtain an activity license, which, being a chemical company, will be an environmental license as we will see. throughout the work.

In order to develop my proposal for the technical adaptation of the existing industrial building, adapting to the activity we want to implement, we have had to study all the applicable measures in our project with the definition of each one of the characteristics that the building fulfills, make the pertinent calculations of load of fire, sound emission and all the requested ones from the documents "*RSCIEI*" and the "*Codi Tècnic de l'Edificació*" that dictate the measures to apply in order to achieve the goal of this project.

Having determined all the characteristics and knowing that the building will comply with all the established limits, the rounded economic cost that would entail the execution of this adequacy has been calculated, in a document called budget.

Finally, once the budget has been completed, work is done on the AUTOCAD program to draw up all the plans necessary to comply with the regulations setted up in the report and thus, end up obtaining the license and achieve the purpose of this whole document.

TECHNICAL ADEQUACY OF AN ALREADY EXISTING INDUSTRIAL BUILDING FOR THE DEVELOPMENT OF A CHEMICAL INDUSTRY.

DECLARATION OF HONOR

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the work in this Degree Thesis is completely my own work,

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Marc Sallés Goula	Marc Sallés Goula	13/01/2022
Student Name	**Signature**	**Date**

TITLE OF THE PROJECT: TECHNICAL ADEQUACY OF AN ALREADY EXISTING INDUSTRIAL BUILDING FOR THE DEVELOPMENT OF A CHEMICAL INDUSTRY.

DEFINITIONS

ELECTROLYTE

A nonmetallic electric conductor in which current is carried by the movement of ions.

ELECTROPOLISHING

Electropolishing, also known as electrochemical polishing or electrolytic polishing, is an electrochemical process that removes material from a metallic workpiece. It is used to polish, passivate, and deburr metal parts. It is often described as the reverse of electroplating. It may be used in lieu of abrasive fine polishing in microstructural preparation.

RAW MATERIAL

Crude or processed material that can be converted by manufacture, processing, or combination into a new and useful product.

ADDITIVE

A substance added to another in relatively small amounts to effect a desired change in properties.

RESIN

Any of a class of nonvolatile, solid, or semisolid organic substances, as copal or mastic, that consist of amorphous mixtures of carboxylic acids and are obtained directly from certain plants as exudations or prepared by polymerization of simple molecules: used in medicine and in the making of varnishes and plastics.

POLYSTYRENE POLYMERS

Polystyrene (PS) is a clear, amorphous, nonpolar commodity thermoplastic that is easy to process and that can be easily converted into many semi-finished products like foams, films, and sheets. It is one of the largest volume commodity plastics, comprising approximately seven percent of the total thermoplastic market. PS is a very good electrical insulator, has excellent optical clarity due to the lack of crystallinity, and has good chemical resistance to diluted acids and bases. It is also easy to fabricate into many finished goods since it is a viscous liquid above its glass transition temperature (Tg) that can be easily molded. However, polystyrene has several limitations. It is attacked by hydrocarbon solvents, has poor oxygen and UV resistance, and is rather brittle, i.e., it has poor impact strength due to the stiffness of the polymer backbone. Furthermore, its upper temperature limit for continual use is rather low due to the lack of crystallinity and its low glass transition temperature of about Tg= 373 K (100°C). Below its Tg, it has medium to high tensile strength (35 - 55 MPa) but low impact strength (15 - 20 J/m). Despite all these weaknesses, styrene polymers are very attractive large-volume commodity plastics.

Some of its weaknesses can be overcome by copolymerization with other monomers. For example, polystyrene can be copolymerized with methyl methacrylate. The copolymer poly (styrene-co-methyl methacrylate) (PSMMA) has higher clarity and improved chemical and UV stability.

One of the most important styrene copolymers is poly(styrene-co-acrylonitrile) (PSAN). It has much improved chemical resistance, better heat stability, and improved mechanical properties. However, these copolymers often yield yellow products.

Probably of equal importance are poly(styrene-co-butadiene) (SBR, SBS) and poly(styrene-co-acrylonitrile-co-butadiene) (ABS). Both copolymers have very high stress and impact resistance, and ABS has higher tensile strength than pure PS.

To increase the heat resistance, styrene is sometimes copolymerized with small amounts of maleic anhydride, or it is copolymerized with this monomer to an alternating structure. The copolymer poly (styrene-co-maleic anhydride) (PSMA) has a higher Tg than pure polystyrene (400 - 430 K), improved heat resistance and high dimensional stability.

Many styrene derivatives have been synthesized on a laboratory scale and some have been extensively investigated. However, no other styrene polymer has become a large-volume commodity thermoplastic. Among those that are commercially produced are α-methylstyrene, o-, m-, and p-methylstyrene, methoxystyrene, chlorostyrene, divinylbenzene and p-divinylbenzene. The latter is used as a cross-linking agent in many different polymer materials.

Polystyrene is a not biodegradable plastic and resistant to photolysis. It is a major contributor to the debris in the ocean. Although recyclable, polystyrene is not recycled in many parts of the world. The biggest problem is expandable polystyrene (EPS); due to its low density, it takes up a relatively large amount of space in landfills.

In recent years, the (food) packaging industry has developed alternative insulating plastics for thermal applications, like Versatile which is an expanded polypropylene (PP) that can be recycled right along with other PP products in the general recycle stream. We expect other lower-cost and lower-density resins to gain market share in traditional large volume applications of expandable polystyrene.

DISTILLED WATER

Distilled water is water that has been boiled into vapor and condensed back into liquid in a separate container. Impurities in the original water that do not boil below or near the boiling point of water remain in the original container. Thus, distilled water is a type of purified water.

COMARCA

A comarca is a traditional region or local administrative division.

FORD

Modification of the sidewalks and curbs of public roads to facilitate the access of vehicles to the premises and homes.

LIGHT POLLUTION

The emission of light flux from night artificial sources in intensities, directions, or spectral ranges unnecessary for the performance of the planned activities in the area in which they are installed the lights.

SOUND POLLUTION

Noise pollution is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms.

LOAD BEARING STRUCTURE

It is a structural system where the weight of building itself plus the live loads get transferred to the ground through walls. Walls bear the load of roofs, floor, and of course self-weight. The most constructive use of load bearing is seen in load bearing structural system wherein it performs a range of functions from supporting of loads, subdividing the space (creating room), providing thermal and acoustic insulation to structure, as well as fire and weather protection, which normally in a framed building must be accounted for separately by means of walls. However, as loads coming on the structure are taken care by walls of structure, the thickness of walls at bottom increases to a considerable extent.

FAÇADE

The front of the building.

ARCHITECTURAL BARRIERS

Any structure or design feature that makes a building inaccessible to a person with a disability.

PASSIVE FIRE PROTECTION

Passive fire protection (PFP) is components or systems of a building or structure that slows or impedes the spread the effects of fire or smoke without system activation, and usually without movement.

ACTIVE FIRE PROTECTION

Active fire protection (AFP) is an integral part of fire protection. AFP is characterized by items and/or systems, which require a certain amount of motion and response to work, contrary to passive fire protection.

DECIBEL (dB)

Decibel (Symbol: dB) is a logarithmic unit that indicates ratio or gain.

Decibel is used to indicate the level of acoustic waves and electronic signals.

The dB level can be viewed as relative gain of one level vs. other level, or absolute logarithmic scale level for well-known reference levels.

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D01: PROJECT REPORT

01. PURPOSE OF THE DOCUMENT

This technical adequacy document aims of the gathering of all the appropriate permissions to let DLYTE CHEMICALS SL. change its chemical workplace, where it will be developed the manufacturing of electrolyte at the new building located at Caracas Street 16, in the municipal district of Barcelona (Barcelonès).

This municipal district where the adequacy is going to take place, all the activities shown on the Annex II are going to be subjected to the municipal environmental license regime and control.

02. SCOPE OF THE PROJECT

The scope of this project that works towards the adequacy of an already existing building goes from the compliance of all regulations needed, comply with them, make a rounded economic cost that would entail the execution of this adequacy and then acclimate the whole building (with the use of AUTOCAD program) for its chemical purposes and then get accepted.

03. BACKGROUND

It is clear then that the purpose of this adequacy has its focus at the creation of electropolishing media, named as electrolyte. The main purpose of this project is to be able to bring the current workplace that the company has in Sils and bring it to Barcelona, just next to the building where all the engineers work with the current electropolishing machines.

From the company point of view this would help in getting more feedback from where the media is really used and work towards a common goal that would help the company with getting better results. Not only that, but the moving of the workplace to Barcelona would lower all the cost that has the transport of its media that goes mostly every day from the capital of the comarca of La Garrotxa to Barcelona and the possibility of getting the raw materials needed to produce the media in an easier way.

For all these reasons mentioned above and to obtain the corresponding environmental license which must be approved by the Environmental entities, the company orders this project that contains both a report and the blueprints in order to comply with all the standards.

04. AUTHOR OF THE PROJECT

The author's relevant information is:

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05. REGULATIONS APPLIED

Hereunder, I set out the most important laws in the execution of technical adequacy.

1) LAW 18/2020 OF DECEMBER 28 TH (simplification of the administrative activity of the Administration of the Generalitat and of the local governments of Catalonia and of impulse of the economic activity).

"The main objective of this law is to establish a series of criteria with the aim of clarifying and simplifying the obligations that the current regulations impose on the public administrations of Catalonia and, consequently, on citizens and companies.

Companies must meet multiple requirements when starting and maintaining their business. The existence of very complex and poorly regulated authorization procedures means that the possibility of starting an activity is much longer than would be recommended to ensure the necessary business competitiveness. It is a priority for the Government to promote a change in the relationship model between companies and the Administration that facilitates economic activity, places confidence in the business community and, at the same time, reduces excessive burdens and bureaucratic procedures.

Much of the economic activity carried out by citizens and companies requires the intervention of local councils. This means that local authorities have an essential role, as the responsible Administration, in the procedures established, on the one hand, by the consolidated text of the Municipal Law and Local Regime of Catalonia."

2) 20/2009 LAW (Prevention and environmental control of activities).

"This law integrates, with a desire for clear administrative simplification, the assessment of the environmental impact of the activities listed in Annex I of the same law in the procedure for granting the environmental permit.

This integration of different environmental administrative intervention regimes is part of the Lisbon European Council's strategy of 2000 and aims to combine the necessary reduction 2 of administrative burdens for people engaged in economic activities. with respect and guarantees in the prevention and control of the environment that society demands.

The objectives of facilitating procedures in economic activity and administrative simplification are present, in fact, in the whole system of environmental administrative intervention regulated by this law, in compliance with the commitments acquired to improve the competitiveness of the economy. eliminate unnecessary administrative obstacles imposed on us by the European Union.

Therefore, on the one hand, this law establishes a comprehensive intervention system, considering the greater or lesser environmental impact of the activities, but limited only to environmental aspects.

Administrative intervention due to other matters, such as the safety and health of people, is governed by local legislation and the relevant sectoral regulations.

On the other hand, although the law regulates strictly environmental intervention regimes, it also recognizes that mechanisms must be established that allow the set of mandatory interventions to be processed simultaneously with respect to the same activity.

It is also an objective of this law to establish, in a clear way, that the responsibility for the facilities, and the opening and operation of the activities, corresponds to both the owners and the technical staff of the activity. as well as the people who have to control its operation."

Figure 01: Company classification

5.17.a) Fabricació de productes de matèries plàstiques termoestables.
5.17.b) Fabricació de productes de matèries plàstiques termoplàstiques.

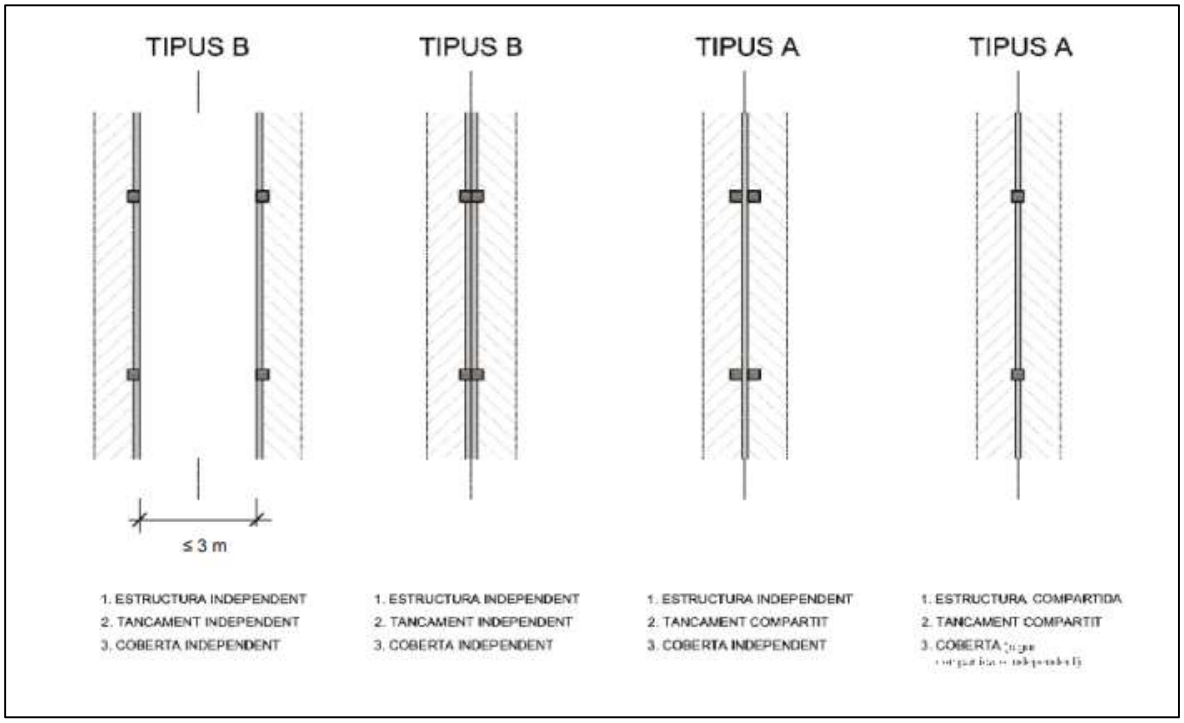
3) FIRE SAFETY REGULATIONS IN INDUSTRIAL ESTABLISHMENTS (ROYAL DECREE 2267/2004, OF DECEMBER 3RD).

"The purpose of this regulation is to achieve a sufficient degree of safety in the event of a fire in establishments and installations for industrial use. The presence of fire risk in industrial establishments determines the likelihood of fires, causing damage and loss to people and property, which affect both them and their environment."

4) ITC SP 119:2012.

"Industrial establishments are type A or type B according to the published axonometric schemes. It is accompanied by floor plans that clarify this in relation to the independence or not of the structure, the enclosure and the roof."

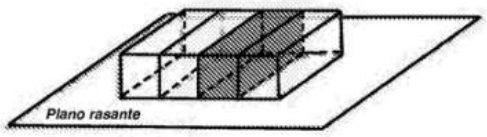
Figure 02: Typology of industrial establishments.



5) 3/2010 LAW OF FEBRUARY 18TH on prevention and safety in the matter of fires in establishments, activities, infrastructures, and buildings. (ANNEX 2: Establishments for industrial use subject to the preventive control of the Administration of the Generalitat).

Figure 03: Type B of industrial establishments.

En horizontal



Tipos B: El establecimiento industrial ocupa totalmente un edificio adosado a otros edificios, o está separado de otros edificios de otros establecimientos por una distancia igual o inferior a 3 metros, tanto si éstos son de uso industrial como si tienen otros usos.

6) ANNEX 3 OF DECREE 176/2009, OF NOVEMBER 10TH.

"The most significant features of the Law were the consideration of noise pollution from the point of view of emissions, the delimitation of the territory in areas of acoustic sensitivity according to quality objectives, the regulation of a specific regime for the infrastructures of transport and the establishment of a series of measures to minimize the acoustic impact on existing buildings affected by noise and / or vibration.

Specifically, the new state legislation implies that the acoustic zoning of the territory, which according to Catalan legislation is in relation to its acoustic capacity, considers the predominant land use, while increasing the degree of demand of the applicable acoustic quality objectives, mainly for new urban developments and inside buildings intended for noise-sensitive uses, such as residential, hospital, educational or cultural. These principles and objectives of acoustic quality must be considered by the planner in the performance of his task."

Figure 04: Emission limit values in construction area.

Usos del sòl	Valors límit d'immissió en dB (A)				
	L_{Ar} Període diürn (7 h – 21 h)	L_{Ar} Període vespre (21 h -23 h)	L_{Ar} Període nocturn (23 h – 7 h)	L_{AFmax}*	L_{AFmax}**
ZONA DE SENSIBILITAT ACÚSTICA ALTA (A)					
(A1) Espais d'interès natural i altres	55	55	45	80	80
(A1.1) Parcs d'especial protecció acústica	55	55	45	80	70
(A1.2) Parcs, jardins i platges	57	57	47	80	70
(A2) Predomini del sòl d'ús sanitari, docent i cultural	55	55	45	80	70
(A4) Predomini del sòl d'ús residencial	60	60	50	85	75
ZONA DE SENSIBILITAT ACÚSTICA MODERADA (B)					
(B1) Coexistència de sòl d'ús residencial amb activitats i/o infraestructures de transport existents	65	65	55	85	75
(B2) Predomini del sòl d'ús terciari diferent a (C1)	65	65	55	88	78
(B3) Àrees urbanitzades existents afectades per sòl d'ús industrial	65	65	55	88	78
ZONA DE SENSIBILITAT ACÚSTICA BAIXA (C)					
(C1) Recreatius i d'espectacles	68	68	58	90	80
(C2) Predomini de sòl d'ús industrial	70	70	60	90	80
(C3) Àrees del territori afectades per sistemes generals d'infraestructures de transport, o altres equipaments públics que els reclamin	70	70	60	90	80

7) DECREE 190/2015 OF AUGUST 25TH.

"Natural daylight has the most suitable properties for the vision of the human eye. Anthropogenic activities that can be developed with natural light allow an unbeatable visibility of the environment, so whenever possible you should avoid doing activities with artificial lighting and take advantage of natural light.

Artificial lighting at night is one of the essential requirements for the habitability of modern urban areas and, to a lesser extent, of rural areas, and is also necessary for the performance of many recreational, commercial, or productive activities, it also improves public safety, strengthens the prevention of occupational hazards in specific areas, and is necessary to ensure the industrial safety of certain facilities.

Improper design or use of lighting fixtures causes light pollution, as it disrupts the natural conditions of the night environment and can affect ecosystems and biodiversity and have detrimental consequences for the environment in general.

Light pollution makes it difficult to see the sky, which is part of the natural landscape and is an intangible asset and common heritage that must be protected. In addition, excessive or incorrect night lighting can cause discomfort when invading the private area.

Night lighting that meets consistent and rational criteria makes significant energy savings possible, and indirectly, a reduction in greenhouse gas emissions.

Energy efficiency and savings are priority goals for any modern society, they bring dynamism and value to economic activities, improve the competitiveness of production processes, reduce energy consumption, protect the environment and reduce pollutant emissions."

8) LAW 6/2001 OF MAY 31ST.

"Law 6/2001, of 31 May, on the environmental management of lighting for the protection of the night environment, regulates the environmental management of lighting for the protection of the night environment in order to maintain, as far as possible, the natural conditions of these hours for the benefit of people, fauna, flora and ecosystems in general, to promote the energy efficiency of outdoor lighting, to prevent the intrusion of artificial light into the home environment and the environment, and to prevent and correct the disruptive effects of light pollution on ecosystems and the view of the sky."

9) ROYAL DECREE 1316/1989.

"The legal criteria set out, in guiding the activity of the Government, determine that it should be considered that exposure to certain agents during work can have negative effects on the health and integrity of workers; therefore, by means of the corresponding rule, the minimum or basic measures to be adopted in the field of labor relations for the adequate protection of workers should be laid down.

In the same sense, it is necessary to consider how, in the field of the European Economic Community, general criteria have been set, by means of the corresponding Directives, for actions on safety and health in the Workplace, as well as specific criteria. referred to protection measures against accidents and dangerous situations. This is the case for measures to protect workers from the risks related to exposure to noise at work set out in Directive 86/188 / EEC.

Likewise, Convention No. 148 of the International Labor Organization, ratified by Spain on 24 November 1980 and published in the Official State Gazette of 30 December 1981, contains rules on the protection of workers from occupational hazards due to noise in the workplace.

This Regulation transposes the content of that Directive into Spanish law, thus establishing a series of measures aimed at reducing exposure to noise at work, to reduce the risks to the health of workers, particularly hearing, derived from such exposure; These risks occur in many workplaces."

10) TABLES 1.2 OF ANNEX 1 OF THE RSCIEI DOCUMENT

Figure 05: 1.2 TABLES (1).

ACTIVIDAD	Fabricación y venta			Almacenamiento		
	q_s		Ra	q_s		Ra
	MJ/m²	Mcal/m²		MJ/m²	Mcal/m²	
Antigüedades, venta de	700	168	1,5			
Aparatos de radio, fabricación	300	72	1,0	200	48	1,0
Aparatos de radio, venta	400	96	1,0			
Aparatos de televisión	300	72	1,0	200	48	1,0
Aparatos domésticos	300	72	1,0	200	48	1,0
Aparatos eléctricos	400	96	1,0	400	96	1,0
Aparatos eléctricos, reparación	500	120	1,0			
Aparatos electrónicos	400	96	1,0	400	96	1,0
Aparatos electrónicos, reparación	500	120	1,0			
Aparatos fotográficos	300	72	1,0	600	144	1,5
Aparatos mecánicos	400	96	1,0			
Aparatos pequeños, construcción de	300	72	1,0			
Aparatos sanitarios, taller	100	24	1,0			
Aparatos, expedición de	700	168	2,0			
Aparatos, prueba de	200	48	1,0			
Aparatos, talleres de reparación	600	144	1,0			
Aparcamientos, edificios de	200	48	1,5			
Apósitos, fabricación de artículos	400	96	1,5	800	192	1,5
Archivos	4.200	1.010	2,0	1.700	409	2,0
Armarios frigoríficos	1.000	240	2,0	300	72	1,0
Armas	300	72	1,0			
Artículos de metal	200	48	1,0			
Artículos de yeso	80	19	1,0			
Artículos metal fundidos por inyección	80	19	1,0			
Artículos metálicos, amolado	80	19	1,0			
Artículos metálicos, barnizado	300	72	1,0			
Artículos metálicos, cerrajería	200	48	1,0			
Artículos metálicos, chaterras	80	19	1,0			
Artículos metálicos, dorado	80	19	1,0			
Artículos metálicos, estampado	100	24	1,0			
Artículos metálicos, forjado	80	19	1,0			

Figure 06: 1.2 TABLES (2).

ACTIVIDAD	Fabricación y venta			Almacenamiento		
	q_s		Ra	q_s		Ra
	MJ/m²	Mcal/m²		MJ/m²	Mcal/m²	
Bebidas sin alcohol, zumos de fruta	200	48	1,0	300	72	1,0
Bibliotecas	2.000	481	1,0	2.000	481	2,0
Bicicletas	200	48	1,0	400	96	1,0
Bodegas (vinos)	80	19	1,0			
Bramante	400	96	1,5	1.100	264	2,0
Bramante, almacén de				1.000	240	2,0
Cables	300	72	1,0	600	144	1,5
Cacao, productos de	800	192	2,0	5.800	1.394	2,0
Café crudo, sin refinar				2.900	697	2,0
Café, extracto	300	72	1,0	4.500	1.082	2,0
Café, tostadero	400	96	1,5			
Cajas de madera	1.000	240	2,0	600	144	1,5
Cajas fuertes	80	19	1,0			
Calderas, edificios de	200	48	1,0			
Calefactores	300	72	1,0			
Calzado	500	120	1,5	400	96	1,0
Calzado, accesorios de				800	192	1,5
Calzados, expedición	600	144	1,5			
Calzados, venta	500	120	1,0			
Cantinas	300	72	1,0			
Caramelos	400	96	1,0	1.500	361	2,0
Caramelos, embalado	800	192	1,5			
Carbón de coque				10.500	2.524	2,0
Carnicerías, venta	40	10	1,0			
Carretería, artículos de	500	120	1,5			
Cartón	300	72	1,5	4.200	1.010	1,5
Cartón embreado	2.000	481	2,0	2.500	601	2,0
Cartón ondulado	800	192	2,0	1.300	313	2,0
Cartón piedra	300	72	1,5	2.500	601	1,5
Cartonaje	800	192	1,5	2.500	601	1,5
Cartonaje, expedición de	600	144	1,5			
Caucho				28.600	6.875	2,0
Caucho, artículos de	600	144	1,5	5.000	1.202	2,0
Caucho, venta de artículos de	800	192	1,5			
Celuloide	800	192	1,5	3.400	817	2,0
Cemento	40	10	1,0			
Central de calefacción a distancia	200	48	1,0			
Centrales hidráulicas	80	19	1,0			
Centrales hidroeléctricas	40	10	1,0			
Centrales térmicas	200	48	1,0			
Cepillos y brochas	700	168	1,5	800	192	1,5
Cera				3.400	817	2,0
Cera, artículos de	1.300	313	2,0	2.100	505	2,0
Cera, venta de artículos de	2.100	505	2,0			

Figure 07: 1.2 TABLES (3).

ACTIVIDAD	Fabricación y venta			Almacenamiento		
	q_f		Ra	q_f		Ra
	MJ/m²	Mcal/m²		MJ/m²	Mcal/m²	
Médica, consulta	200	48	1,0			
Medicamentos, embalaje	300	72	1,0	800	192	1,5
Medicamentos, venta	800	192	1,5		0	
Melaza				5.000	1.202	2,0
Mercería, venta	700	168	1,5	1.400	337	2,0
Mermelada	800	192	1,5			
Metales preciosos	200	48	1,0			
Metales, manufacturas en general	200	48	1,0			
Metálicas, grandes construcciones	80	19	1,0			
Minerales	40	10	1,0			
Moetaza	400	96	1,0			
Motocicletas	300	72	1,0			
Motores eléctricos	300	72	1,0			
Muebles de acero	300	72	1,0			
Muebles de madera	500	120	1,5	800	192	1,5
Muebles de madera, barnizado	500	120	1,5			
Muebles, barnizado de	200	48	1,5			
Muebles, carpintería	600	144	1,5			
Muebles, tapizado sin espuma sintética	500	120	1,5	400	96	1,0
Muebles, venta	400	96	1,5			
Muelles de carga con mercancías	800	192	1,5			
Municiones	Especial	Especial	Especial	4.500	1.082	2,0
Museos	300	72	1,0			
Música, tienda de	300	72	1,0			
Negro de humos, en sacos				12.600	3.029	2,0
Neumáticos	700	168	1,5	1.800	433	2,0
Neumáticos de automóviles	700	168	1,5	1.500	361	2,0
Nitrocelulosa	Especial	Especial	Especial	1.100	264	2,0
Oficinas comerciales	800	192	1,5			
Oficinas postales	400	96	1,0			
Oficinas técnicas	600	144	1,0			
Orfebrería	200	48	1,0			
Oxígeno	Especial	Especial	Especial			
Paja prensada				800	192	1,5
Paja, artículos de	400	96	1,5			
Paja, embalajes de	400	96	1,5			
Paletas de madera	1.000	240	2,0	1.300	313	2,0
Pasillos	500	120	1,5			
Panaderías industriales	1.000	240	1,5			
Panaderías, almacenes	300	72	1,0			

Figure 08: 1.2 TABLES (4).

ACTIVIDAD	Fabricación y venta			Almacenamiento		
	q_f		Ra	q_f		Ra
	MJ/m²	Mcal/m²		MJ/m²	Mcal/m²	
Placas de resina sintética	300	72	1,0	4.200	1.010	1,5
Planeadores	600	144	1,5			
Porcelana	200	48	1,0			
Prendas de vestir	500	120	1,5	400	96	1,0
Prendas de vestir, venta	600	144	1,5			
Proceso de datos, sala de ordenador	400	96	1,5			
Producto de lavado (lejía materia prima)				500	120	1,5
Productos de amianto	80	19	1,0			
Productos de carnicería	40	10	1,0			
Productos de lavado (lejía)	300	72	1,0	200	48	1,0
Productos de reparación de calzado	800	192	1,5	2.100	505	2,0
Productos farmacéuticos	200	48	1,5			
Productos lácteos	200	48	1,0			
Productos laminados salvo chapa y alambre	100	24	1,0			
Productos químicos combustibles	300	72	2,0	1.000	240	2,0
Puertas de madera	800	192	1,5	1.800	433	2,0
Puertas plásticas	700	168	1,5	4.200	1.010	2,0
Quesos	100	24	1,5	2.500	601	2,0
Quioscos de periódicos	1.300	313	2,0			
Radiología, gabinete de	200	48	1,0			
Refinerías de petróleo	Reglamentación específica					
Refrigeradores	1.000	240	2,0	300	72	1,0
Rejilla, asientos y respaldos	400	96	1,0	1.300	313	2,0
Relojes	300	72	1,0	400	96	1,0
Relojes, reparación de	300	72	1,0			
Relojes, venta	300	72	1,0			
Resinas naturales	3.000	750	2,0			
Resinas sintéticas	3.400	817	2,0	4.200	1.010	2,0
Resinas sintéticas, placas de	800	192	1,5	3.400	817	2,0
Restaurantes	300	72	1,0			
Revestimientos de suelos combustibles	500	120	1,5	6.000	1.442	2,0
Revestimientos de suelos combustibles, venta	1.000	240	2,0			
Rodamientos o cojinetes de bolas	200	48	1,0			

Figure 09: 1.2 TABLES (5).

ACTIVIDAD	Fabricación y venta			Almacenamiento		
	q_f		Ra	q_f		Ra
	MJ/m²	Mcal/m²		MJ/m²	Mcal/m²	
Sacos de papel	800	192	1,5	12.600	3.029	2,0
Sacos de plástico	600	144	2,0	25.200	6.058	2,0
Sacos de yute	500	120	1,5	800	192	1,5
Salinas, productos de	80	19	1,0			
Servicios de mesa	200	48	1,0			
Silos				Según material almacenado		
Sombrererías	500	120	1,5			
Sosa	40	10	1,0			
Sótanos, bodegas de casas residenciales	900	216	1,0			
Tabaco en bruto				1.700	409	2,0
Tabacos, artículos de	200	48	1,5	2.100	505	2,0
Tabacos, venta de artículos	500	120	1,5			
Talco	40	10	1,0			
Tallado de piedra	40	10	1,0			
Talleres de enchapado	800	192	1,5	2.900	697	1,5
Talleres de guarnicionería	300	72	1,0		0	
Talleres de pintura	500	120	1,5			
Talleres de reparación	400	96	1,0			
Talleres eléctricos	600	144	1,5			
Talleres mecánicos	200	48	1,0			
Tapicerías	800	192	1,5			
Tapicerías, artículos de	300	72	1,5	1.000	240	2,0
Tapices	600	144	1,5	1.700	409	2,0
Tapices, tintura	500	120	1,5			
Tapices, venta	800	192	1,5			
Teatros	300	72	1,0			
Teatros, bastidores				1.100	264	2,0
Tejares, cocción	40	10	1,0			
Tejares, hornos de secado y estanterías de madera	1.000	240	1,5			
Tejares, prensado	200	48	1,0			
Tejares, preparación de arcilla	40	10	1,0			
Tejares, secadero, estanterías de madera	400	96	1,0			
Tejares, secadero, estanterías metálicas	40	10	1,0			
Tejidos cáñamo, yute, lino				1.300	313	2,0
Tejidos de rafia	400	96	1,5			
Tejidos en general, almacén				2.000	481	2,0

11) TABLES 1.3 OF ANNEX 1 OF THE RSCIEI DOCUMENT.

Figure 10: Fire level of intrinsic risk in the establishment.

Nivel de riesgo intrínseco		Densidad de carga de fuego ponderada y corregida	
		Mcal/m²	MJ/m²
BAJO	1	$Q_s \leq 100$	$Q_s \leq 425$
	2	$100 < Q_s \leq 200$	$425 < Q_s \leq 850$
MEDIO	3	$200 < Q_s \leq 300$	$850 < Q_s \leq 1.275$
	4	$300 < Q_s \leq 400$	$1.275 < Q_s \leq 1.700$
	5	$400 < Q_s \leq 800$	$1.700 < Q_s \leq 3.400$
ALTO	6	$800 < Q_s \leq 1.600$	$3.400 < Q_s \leq 6.800$
	7	$1.600 < Q_s \leq 3.200$	$6.800 < Q_s \leq 13.600$
	8	$3.200 < Q_s$	$13600 < Q_s$

12) ANNEX 6.1 OF THE RSCIEI DOCUMENT.

"For the application of the requirements relating to the evacuation of industrial establishments, their occupancy will be determined, P, deducted from the following expressions:

Equation 01: Evacuation protocol.

$$P = 1{,}10\ p, \text{ when } p < 100.$$

$$P = 110 + 1{,}05\ (p - 100), \text{ when } 100 < p < 200.$$

$$P = 215 + 1{,}03\ (p - 200), \text{ when } 200 < p < 500.$$

$$P = 524 + 1{,}01\ (p - 500), \text{ when } 500 < p.$$

Where p represents the number of people employed in the fire sector, according to the labor documentation that legalizes the operation of the activity.

The values obtained for P, according to the previous expressions, will be rounded to the next higher integer."

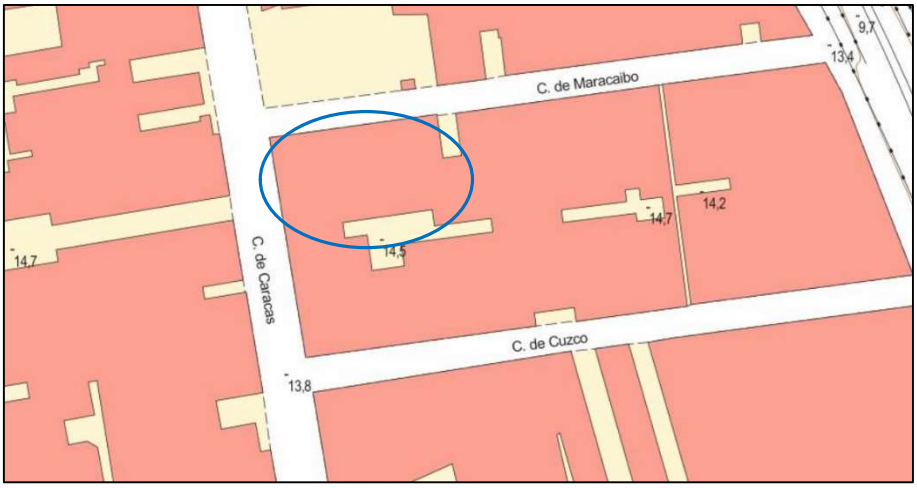
06. LOCATION OF ACTIVITY

The workplace where the activity is going to be developed is located at "Polígon industrial de Bon Pastor", at Caracas Street number 16, in the municipal district of Barcelona (Barcelonès), having its entries by both streets that are touching, the one mentioned previously and Maracaibo Street.

The location of the establishment is, according to UTM coordinates:

- X= 433481,6 m
- Y= 4588110,7 m

Figure 11: Location of activity.



07. URBAN INFORMATION

The workplace will be located at the industrial area of Bon Pastor and the activity that is wanted to take place is supported by the "*Pla General d'Ordenació Urbana del municipi de Barcelona (Barcelona)*".

08. ACTIVITY

08.01. ACTIVITY CLASSIFICATION

Following the 16/2015 law from July 21th and later repealed in part by 18/2020 law from December 28th, "*simplificación de la actividad administrativa de la Administración de la Generalidad y de los gobiernos locales de Cataluña y de impulso de la actividad económica*", and the 20/2009 law "*prevención y control ambiental de las actividades*", their annexes, modifications and extensions, the activity that is going to be carried out is classified as Annex II so the workplace is going to be subjected to the environmental license regime.

The activity, annex and code that is going to be developed are the ones that follow:

- ANNEX II.
- GROUP 5: Chemical Industry.
- SUBGROUP 21: Manufacturing of thermostable plastic products.

08.02. ACTIVITY DESCRIPTION

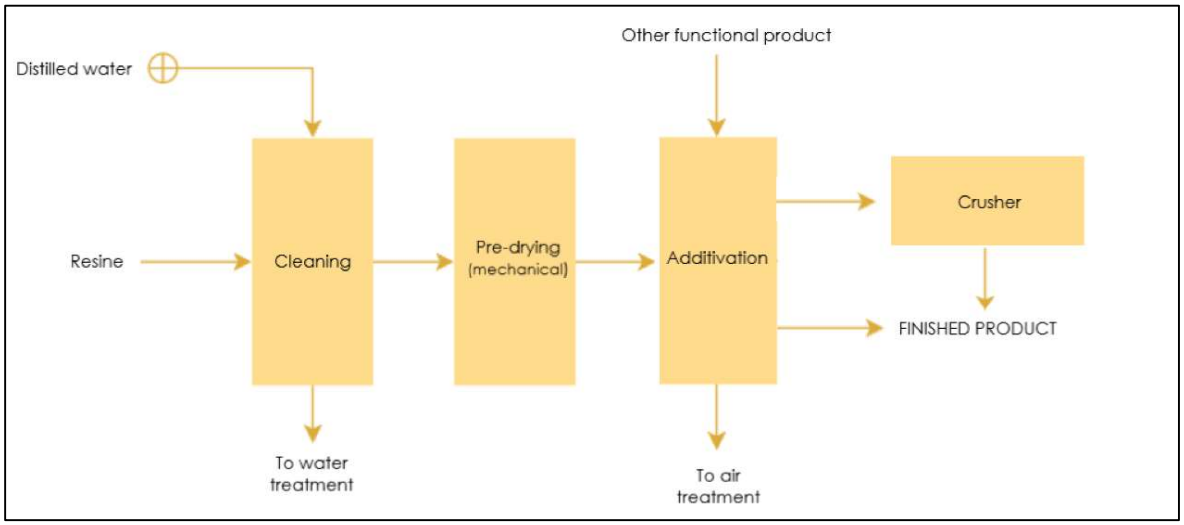
The activity that the company is going to be doing at the facility consists on the production of a solid electrolyte based on ion exchange resins partially dehydrated and added with a functional product. The most used resins are crosslinked polystyrene polymers.

The main activity of the production plant includes:

- Receipt and storage of raw materials.
- Production process, consisting of stages of washing with water, drying, additivated with a functional product, and the packaging of the final product.
- Storage and shipment of the palletized finished product.

The finished product is shipped in disposable or returnable packaging. In the case of returnable packaging, it is cleaned before reuse. Cleaning involves dragging any remaining solid product with water - and any other dirt that may have entered the container once it has been used.

Figure 12: Production process.



The processes to be performed for each space required are:

- Reception/dispatch areas: they will be used to receive the trucks transporting the raw materials, as well as to deliver the finished products once loaded to the transport trucks, to the point of sale.
- Warehouses: areas where the different stacks of materials will be for the disposal of the raw materials and the finished products of the company in a palletized way.
- Production areas: these will be the parts of the establishment where the production process will take place, from the raw materials to the obtaining of the finished products.
- Services: other areas that will be used to support production.
- Offices: spaces that will be dedicated to the administrative tasks inherent in the activity.

08.03. ACTIVITY START DAY

The start day of the activity is planned to be at the end of 2022.

08.04. RAW MATERIALS, PACKAGING AND ANNUAL PRODUCTION

The expected annual consumption of raw materials and packaging are summarized in the following table.

Table 01: Annual consumption of raw materials.

Raw material	Annual quant.	Classification
Ionic Exchange resin	310.000 L	H319
Other functional products	2.000 kg	-
Other functional products	20.000 kg	-
Additive for fluid electrolyte	25.000 kg	H304
Additive for fluid electrolyte	10.000 kg	H319

Table 02: Annual consumption of packaging.

Plastic containers	Annual quant.	Classification
800 L packages	40 un	–
300 L packages	600 un	–
16 L packages	2.000 un	–
9 L packages	2.000 un	–
6 L packages	2.000 un	–
3 L packages	2.000 un	–

Table 03: Annual consumption of finished product.

Finished product	Annual quant.	Classification
Solid electrolyte	200.000 L	H315, H318
Liquid electrolyte	50.000 L	

08.05. MAXIMUM STORAGE

The maximum storage capacity that we are going to allow in the building is summarized in the following table.

Table 04: Maximum storage capacity of raw materials.

Raw material	Annual quant.	Classification
Ionic Exchange resin	8.000 L	H319
Other functional products	200 kg	-
Other functional products	1.000 kg	-
Additive for fluid electrolyte	2.000 kg	H304
Additive for fluid electrolyte	1.000 kg	H319

Table 05: Maximum storage capacity of packaging

Plastic containers	Annual quant.	Classification
800 L packages	4 un	–
300 L packages	30 un	–
16 L packages	500 un	–
9 L packages	500 un	–
6 L packages	500 un	–
3 L packages	200 un	–

Table 06: Maximum storage capacity of finished product.

Finished product	Annual quant.	Classification
Solid electrolyte	8.000 L	H315, H318
Liquid electrolyte	2.000 L	

09. BUILDING DESCRIPTION

09.01. BUILDING CHARACTERISTICS.

The establishment where the activity will take place is going to be used for the manufacturing of electrolytes, with the corresponding warehouse and offices.

Access to the building is direct from Caracas Street and Maracaibo Street, with the main pedestrian entrance being in the first named street and with a rolling entrance door measuring 4 m x 4 m located at the lateral façade (Maracaibo Street) for the entry of trucks.

The load-bearing structure of the ground floor and the attic will be prefabricated with concrete. Despite this, during 2009 works were carried out on the establishment to gain one more floor (first floor) in the building, up to the maximum permitted built-up area. This height extension was made with a metal structure. The pillars and porticos of the structure, however, were conveniently lined with fire-resistant laminated plywood panels to meet the characteristics set out in the RSCIEI document.

The structure itself is going to be formed vertically by pillars, horizontally by beams, and the necessary bracing.

The perimeter enclosures are made by a 30 cm thick wall formed by brick of 30 long, 5 cm high and 15 cm thick with a posterior air chamber 10 cm thick coming with insulation included (polyurethane projected) and finished with an interior partition 5 cm thick. For the upper floors (attic and first floor) the façade of the offices is lined with a metal sheet coating of two different colors.

As for the interior of the building, it is completely transparent where you can see the presence of two different sectors separated by concrete block partitions 20cm thick and metal doors against fire.

The roof will be sandwich type, that between sheets it brings a thermal protection plate that gives the isolation with the exterior that is needed.

The interior pavement of the building is made of concrete with a smooth finish and in areas of different activity, such as bathrooms and offices are made of either ceramic flooring or wood flooring.

As for the bathrooms we talked about, they will be tiled to the ceiling.

09.02. SURFACES.

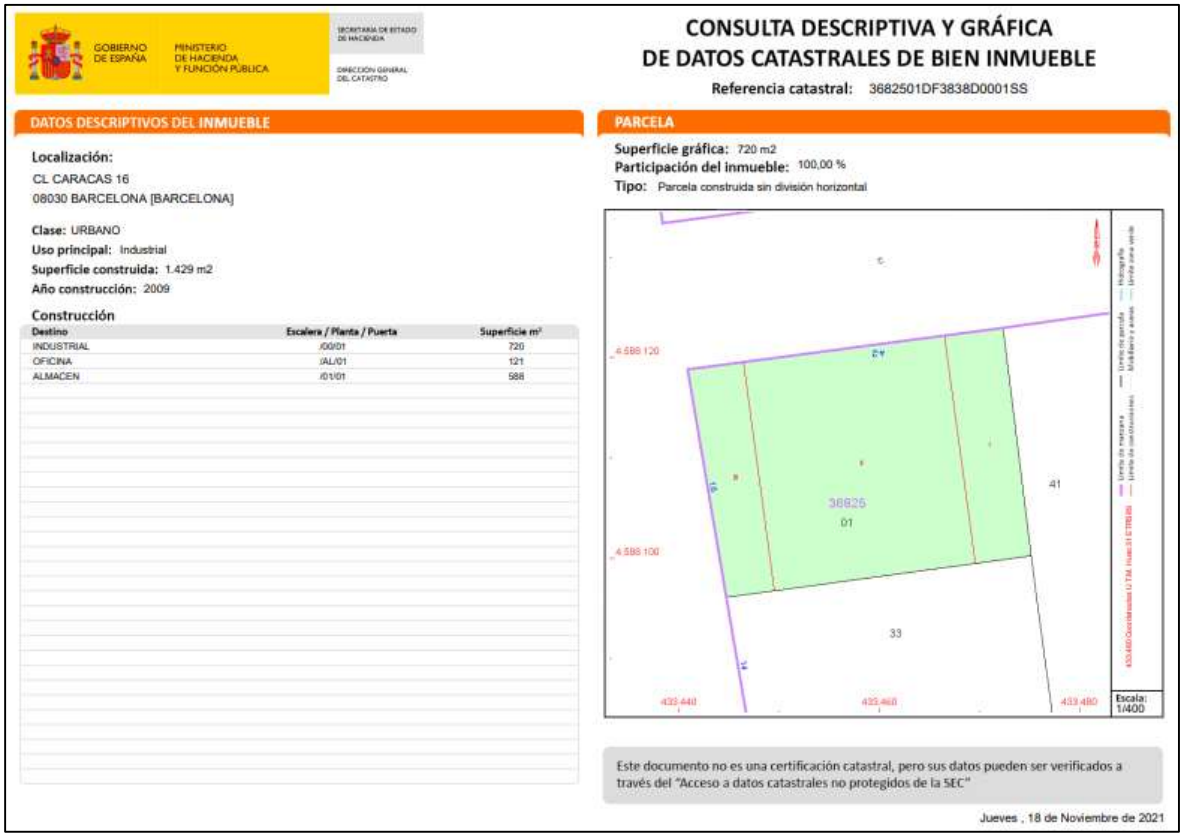
The total area of the building that is going to be carried the activity occupies 1429,51 m^2, that are distributed as seen in the table below.

Table 07: Floor surfaces.

SITUATION	SURFACE (m^2)
Ground Floor	704,36
Loft	144,64
First floor	580,51

The total surface, as we can see in the following photograph, corresponds to the values obtained from the "cadastre" seen below.

Figure 13: Surface from the "cadastre".



In addition, in the following table we will see the distribution of surfaces in the different areas of the establishment. The whole establishment will be made up of two sectors, as explained later on the report.

It is also important to note that since the offices do not exceed 250 m^2, the document "*codi tècnic de l'edificació*" is not applicable.

Table 08: Zone surfaces inside sector.

SECTOR	DESCRIPTION	SURFACE (m^2)
01	Loading and unloading zone	41,88
01	Warehouse	830,77
01	Production	247,54
01	Offices	137,8
01	Production auxiliar zone	247,54
02	Accesses and others	74,68

This gives us a total usable area of 1332.67 m^2.

09.3. ACCESSES.

The configuration of the establishment will be rectangular, with possible entries from the two border streets that the building is limited, Maracaibo Street and Caracas Street.

As the establishment has direct access from the named streets, rapid evacuation in case of emergency will be allowed, as well as the rapid action of the emergency services if necessary.

The access of transport vehicles will take place by Maracaibo Street using a rolling entrance door measuring 4 m x 4 m.

The named access will be used for entry and the exit of trucks and therefore a ford is going to be requested to the corresponding municipal authorization.

Other pedestrian accesses to the establishment are:

- Two swing doors of 80 cm x 2.10 m from Maracaibo Street.
- A two-leaf door with total dimensions of 1.60m x 2.10m access from Caracas Street.
- A two-leaf door with total dimensions of 1.50m x 2.10m access to the terrace from the first floor.

10. PERSONNEL

The staff will consist of 16 people.

The staff will have sufficient training to be able to do any of the tasks of the activity.

The establishment will be open from 7:00 am to 11:00 pm, in two working shifts, from Monday to Friday, being always closed and will only be opened to give access to authorized personnel and transport vehicles.

During the weekends, as well as in certain festivities, the enclosure will be closed, not realizing any type of own activity, being able to use these festive intervals for updates of inventory or preventive maintenance of the facilities.

11. MACHINERY RELATION

Production equipment:

- Washing, drying and addition of other functional product: these are the main stages on the production of electrolyte. They are going to be done in different machines named on the table below and located as seen on the blueprints of the establishment.
- Packaging: the finished product would be transferred with the use of a forklift to the packaging equipment, consisting of a dosing hopper and a scale.

Table 09: Production machines.

Production	Units
Distilled water tank (volume of 3 m^3)	2
Raw resin tank (volume of 4 m^3)	1
Resin cleaning and mixing tank with water	1
Dirty water tank (volume of 1 m^3)	1
Drying equipment	1
Other functional product tank (volume of 4 m^3)	2
Dry resin and other functional product mixer in the additive	2
Crusher	1
Air compressor (0,3 m^3)	1
Water pump	1
Forklift	2

12. BUILDING CLASSIFICATION

12.01. ACCORDING TO THE CONFIGURATION

According to the regulation on fire safety in industrial establishments and ITC SP 119:2012, it is a Type B building, as it is a semi-detached building with an independent structure, enclosure, and roof by itself.

A low intrinsic risk 2 (as seen on the following 12.03 section) is foreseen and the built surface of the establishment is lower than 1,500 m^2 therefore the establishment will not be obliged to the presentation of the application of the report of the preventive control of the administration of the Generalitat, as set out in Annex 2 of Law 3/2010, of 18 February, on fire prevention and safety in establishments, activities, infrastructures, and buildings.

Figure 14: Presentation of preventive report depending on typology.

	Tipus Av	Tipus Ah	Tipus B	Tipus C	Tipus D	Tipus E
Risc baix 1, 2	> 500 m^2	> 1.500 m^2	> 1.500 m^2	En cap cas	En cap cas	En cap cas
Risc mitjà 1, 2	Sempre	Sempre	Sempre	> 5.000 m^2	En cap cas	En cap cas
Risc alt 1, 2	No admès	No admès	Sempre	> 2.500 m^2	En cap cas	En cap cas
	s/RSCIEI3	s/RSCIEI				

12.02. SECTORIZATION

Given the characteristics of the establishment, we will consider two different sectors. The first one being the loading and unloading zone, warehouse where all the products necessary to produce electrolytes remain, waiting to be moved for use, production zone, the offices, and the production auxiliar zone and then the second sector being it the stairs.

As for the stairs, we must consider them as a separate sector because otherwise the evacuation route could not be viable from the highest floor as the meters that have to be walked have to be counted all the way both in floor and in stair. If we separated the stairs from sector 01 creating this way a sector 02 then, the evacuation meters are going to change because we can create a floor jump from the initial point of the stairs to the last, not counting this way the meters that the stairs must go through.

12.03. FIRE LOAD CALCULATION

In order to obtain the fire load of the establishment, the fire load density of all those products that may be inside the industrial building at a possible time of fire must be taken into account. To find these load densities, I have used some tables (see illustrations 05-09) that according to the type of product, they give you an exact amount of density.

We must also take into account the amount in Kg we have at that time as all load values will be according to the weight at that time, as well as the m^2 of all of those areas that take place in the measurement.

In calculating the intrinsic risk, the following data were considered:

Table 10: Fire load calculation.

Id	Type	Activity	Ra	qvi(MJ/m³) qsi(MJ/m²) qi(MJ/Kg)	Ci	hi(m)	Si(m²)	Gi(Kg)	∑(MJ)
1	Offices	Technical offices	1	600	1		130,2		78120
2	Production	Synthetic resin plates	1	300	1		573,8		172140
3	Warehouse	Workshop stores	1	200	1	3	0		0
4	Warehouse	Electronic devices	1	400	1,3	2	200		208000
5	Warehouse	Wooden pallets	2	1300	1,3	2	4		13520
6	Warehouse	Corrugated cardboard	2	1300	1,3	2	2		6760
7	Warehouse	Other functional products	1,5	42	1,6			1200	80640
8	Warehouse	Plastic containers	1,5	45,98	1,3			2000	119548
9	Warehouse	Petroleum-derived additive	1,5	42	1,3			2000	109200
10	Warehouse	Ion exchange resins	1,5	19,87	1			6000	119220
11	Warehouse	Dry electrolyte	1,5	22	1			6000	132000
12	Warehouse	Fluid electrolyte	1,5	27,3	1,3			2000	70980
		TOTAL							**1110128**

In some cases, these products are not introduced in the tables and density approximations have had to be made with other similar products always taking into account the worst-case scenario.

In the office and production areas, this calculation has been made according to tables 1.2 of Annex 1 of the RSCIEI, by using the average fire load density value of this activity and its activity risk. associated (Ra), directly or assimilating some activity.

In the warehouse area, this calculation has been made considering the masses of all the combustible products existing in this fire sector and considering in detail the maximum quantity of the different combustible materials. These total quantities refer to the maximum storage conditions and the type of container, containers, shelves, pallets, or packaging, as appropriate, has been taken into account.

In terms of production activity, it has been assimilated to the manufacture of synthetic resin plates. The main raw material for the application process is ion exchange resin. This resin is a copolymer of styrene-divinylbenzene sulfonate that does not undergo any chemical transformation. It is a porous resin, with the ability to retain water (these resins usually have a water content of more than 50% by weight), which is replaced by a part of the water retained by a solution made of other functional products.

As for the quantities of products stored, they correspond to those indicated in the section Quantities of raw material and finished and annual product and stored. These are the quantities needed to maintain the planned manufacturing and marketing activity.

The establishment has a usable total area of **1429,51 m²**.

Equation 02: Fire load calculation.

$$Qs = \frac{\sum Gi \cdot Qi \cdot Ci}{Ai} \cdot Ra$$

The fire load presented above, and this surface give a specific fire load of $\mathbf{776,58}\ \frac{MJ}{m^2}$ that looking at figure number 10 of the table of figures: Fire level of intrinsic risk in the establishment, represents a **LOW 2 fire intrinsic risk level**.

13. ACCESSIBILITY AND EVACUATION OF THE BUILDING

13.01 ACCESSIBILITY

All the façades that are facing street (pedestrian access) are with accessible openings, which are at least 0.8 m wide and 1.2 m high.

The width of the street that gives access to the establishment is more than 6 m so in case of emergency the firefighting brigade will not have problem accessing the building.

13.02 OCCUPANCY CALCULATION

As this is an industrial establishment, we will consider its occupation according to section 6.1 of Annex II of the RSCIE which considers it equal to the number of employees of activity, which is 16 people.

For evacuation, the number of people to be evacuated will be obtained according to the following formula:

Equation 03: Number of people to be evacuated

$$P = 1{,}1 \times p$$

where:

P: People to evacuate

p: Company staff.

As we know that p = 16 workers, applying the formula we obtain that the maximum number of people to be evacuated will be 18.

13.03 EVACUATION EXITS

The following pedestrian swing doors will be considered for evacuation purposes:

- Two single-leaf doors on the lateral façade facing Maracaibo Street.
- A two-leaf door on the main façade (main entrance), facing Caracas Street.

It should also be explained that on the upper floors, both on the attic and on the first floor, there will be a floor jump as stated in SP 135 of other technical instructions, as we consider the stairs as a sector. To make this leap and consider the stairs as a new sector, the sectors with the EI120 block had to be separated (see image 17). As for the first floor, when coming from an industrial place such as the warehouse, we had to put an independent lobby between the entrance of the stairs and the exit of the warehouse to comply with the regulations.

All of them will remain open during the ship's working hours.

These doors will be properly signposted and will connect the property with a secure outdoor space.

13.04 EVACUATION PATHWAYS

In compliance with current regulations, section SI3 of the Technical Building Code, length maximum number of evacuation routes from any point of origin may not exceed 50 m in medium risk activities and more than one evacuation exit.

None of the planned evacuation routes exceed 50 m, also fulfilling the length of the evacuation routes from their origin to some point from which they exist at least two alternative routes does not exceed 25 m.

To guarantee evacuation routes, it will be forbidden to deposit objects and materials which prevent the normal use of these.

The evacuation routes and exits are represented in the document number 3, blueprints.

13.05 STAIR, CORRIDOR AND DOOR CHARACTERISTICS

As for the stairs, all the ones that connect the different floors of the establishment and that are considered are made of reinforced concrete, except for the external staircase that ascends to the attic from production that is metallic and not fireproof. Therefore, as we will see later, we will not be able to consider it as an evacuation route.

All interior evacuation stairs are protected in order to guarantee a space where the occupants can rest for a certain time. With the stair of the first floor, there is an exception because as the document "*Ordenança De Protecció Contra Incèndis De Barcelona – SP 140 document*" says, in order to guarantee the 35 meters augmentable to 50 meters as the RSCIEI document says "*Longitud del recorrido de evacuación según el número de salidas*" evacuation from other floors, we have to establish this stair as special protected with a separation vestibule. This vestibule is needed because we come from a Industrial sector of the building to a non-industrial sector, making an obligation of the building of the vestibule.

With the current occupation, the width of the unprotected stairs, the corridors and the doors shall be at least the following:

- Unprotected ladder: 1m.
- Corridors: 1m.
- Evacuation doors: 0.80m.

Corridors that are evacuation routes will be unobstructed, although they may be protruding elements located in the walls, such as supports or fixed elements of equipment, it is guaranteed that, except in the case of fire extinguishers, the width is respected to the minimum clearance established in this basic standard, and that the calculated width is not reduced by more than 10 cm.

The evacuation doors will have a vertical axis of rotation and an automatic closing mechanism, expressly prohibiting the use of keys or similar locking systems and they will only open in the direction of evacuation.

13.06 EVACUATION SIGNAGE

The doors considered for evacuation will be marked with an exit sign according to the usual operating instructions of the UNE 23034 standard and in the changes of direction, where there are alternatives to the evacuation route that could be misleading, signs will be placed indications of the direction of the routes, visible from all origins.

13.07 SUPPRESSION OF ARCHITECTONICAL BARRIERS

In the establishment, it is necessary to differentiate between the following two zones:

- Areas where the activity of the industrial process takes place, which are governed by the current industrial safety and occupational safety and health regulations: manufacturing and warehouse operating units.
- Areas with other types of complementary activity where the DB-SUA is applicable: dependencies office and service operations.

Also, according to the tables TAAC (Taula d'accessibilitat a les activitats a Catalunya), the document DT-5.9 "zones d'ús secundari en edificis i establiments d'ús industrial" establish a set of accessibility conditions applicable to these secondary activities provided be the subject of intervention, and this is not our case as it is an existing building will not be the object of any kind of work.

Therefore, the establishment should not be adapted for the use of people with reduced mobility, taking into account for the ownership of the activity that if you ever do any kind of intervention that partially affected by the complementary activity of offices, should fulfill the following conditions if the current regulations and the surface of this area are maintained and taking into account that are partially located on the floor of the access to the establishment and its surface is between 100 and 250 m^2:

- It will have practicable itineraries that do not contain any steps and comply with the rest of conditions of D.135 / 1995, up to a representative part of the offices.

You shouldn't make any adjustments in the service area because of the features typical of the industrial process.

14. FIRE PROTECTION INSTALLATION OF THE BUILDING

14.01 PASSIVE PROTECTION

The degrees of stability and fire resistance of the different elements will be equal to or higher than determined in the Fire Safety Regulations in Industrial Establishments according to the use, the situation, the configuration of the establishment (type B) and the type of intrinsic risk calculated (low risk).

14.01.01 FIRE STABILITY OF LOAD-BEARING STRUCTURAL ELEMENTS

As for the structure, in recent years it has undergone a coating with fire-resistant plasterboard-type laminar plate and with the necessary characteristics.

Royal Decree 2267/2004 describes the fire behavior requirements of the various load-bearing structural elements. These are defined as the length of time the item must be able to last its mechanical stability in the event of fire. So, the minimum values are described in the table lower:

Figure 15: Fire stability of element bearers of the building.

NIVEL DE RIESGO INTRÍNSECO	TIPO A		TIPO B		TIPO C	
	Planta sótano	Planta sobre rasante	Planta sótano	Planta sobre rasante	Planta sótano	Planta sobre rasante
BAJO	R 120 (EF -120)	R 90 (EF - 90)	R 90 (EF - 90)	R 60 (EF - 60)	R 60 (EF - 60)	R 30 (EF - 30)
MEDIO	NO ADMITIDO	R 120 (EF-120)	R 120 (EF-120)	R 90 (EF - 90)	R 90 (EF - 90)	R 60 (EF - 60)
ALTO	NO ADMITIDO	NO ADMITIDO	R 180 (EF -180)	R 120 (EF -120)	R 120 (EF -120)	R 90 (EF- 90)

Considering the table above and the risk calculated in the previous section, we can conclude that the elements bearers of our building must have at least a fire stability of R-60 and EF - 60 for non-elements bearers.

14.01.02 FIRE RESISTANCE OF ENCLOSING COMPONENTS

In the case of closing elements such as doors, the requirements are defined by the times which must maintain the following conditions:

- Thermal insulation I.
- Carrying capacity R.
- Integrity in the face of the passage of flames and hot gases E.
-

In the case of delimiting elements such as gateways between sectors, the minimum resistance must be EI 120.

Figure 16: Fire stability of enclosing components.

	Sin función portante	Con función portante
Riesgo bajo	EI 120	REI 120 (RF-120)
Riesgo medio	EI 180	REI 180 (RF-180)
Riesgo alto	EI 240	REI 240 (RF-240)

In summary, in the table below we see a summary of the characteristics we are in.

Table 11: Fire stability of different building elements.

SECTOR	DESCRIPTION	FIRE LOAD	STABILITY	RESISTANCE	EVACUATION
01	Production	Low	R60	EI120	50 m
01	Offices	Low	R60	EI120	50 m
01	Warehouse	Low	R60	EI120	50 m
01	Loading and unloading zone	Low	R60	EI120	50 m
02	Stairs	-	R60	EI120	50 m

14.02 ACTIVE PROTECTION

To consult the active protection that our establishment must have, we rely not only on the "*RSCIEI"* but also on the "*Ordenança municipal de condicions de protecció contra incendis de l'ajuntament de Barcelona*", the latter we will see how at certain points, will beyond and will make us adopt more protections than the first document.

14.02.01 AUTOMATIC FIRE DETECTION SYSTEMS

In our case, as it is a type B building with a low intrinsic risk, the Royal Decree does not oblige in the installation of such detectors.

14.02.02 MANUAL FIRE ALARM SYSTEMS

When not using automatic systems, we will need to install manual detectors, these must be located next to each evacuation exit of the sector and the maximum distance to be covered between any point and a pushbutton may not exceed 25 meters.

14.02.03 ALARM COMMUNICATION SYSTEMS

In our case, and because the area is less than the 10,000 square meters set by the Royal Decree, the installation of emergency communication equipment is not required.

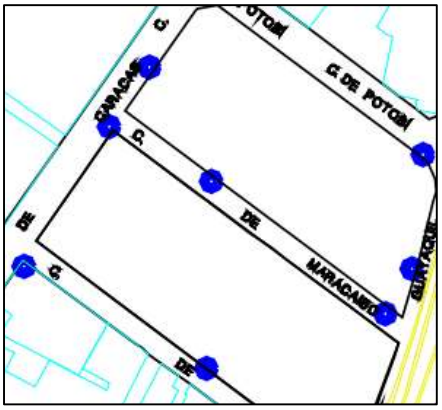
14.02.04 FIRE WATER SUPPLY SYSTEMS

It is not required because the general municipal water network can serve the establishment in the flow, pressure and reserve conditions required by the fire protection system.

14.02.05 EXTERIOR HYDRANT SYSTEMS

Despite having to have a hydrant system (explained on the 14.02.07 point) with a fire surface of more than 1000 square meters, in terms of outdoor hydrants we already have one less than 100 meters, just around the corner from the two streets that touch the industrial building (as seen on the following picture).

Figure 17: Blueprint of exterior hydrant systems in Barcelona.



14.02.06 FIRE EXTINGUISHERS

As an industrial establishment, multi-purpose chemical powder fire extinguishers will be installed of minimum efficiency 21A-113B of 6 kg capacity distributed throughout the sector. 5kg CO2 fire extinguishers will also be installed next to the distribution of electric boards.

The location of the fire extinguishers will allow no more than 15 m to reach one of them of all sources of evacuation, being easily visible and accessible and will be close to the points where it is estimated that the possible fire is more likely to start, close to the evacuation exits and on supports fixed to vertical facings so that the top of the fire extinguisher is, as at most 1.70 meters above the ground.

14.02.07 EQUIPPED FIRE HYDRANT SYSTEMS

Regardless of the requirements of the RSCIEI, the installation of water hydrants will be mandatory when the fire sector exceeds 1000 square meters. Hydrants will be located outside areas of industrial establishments, on public roads and less than 100 meters from the industrial establishment.

A hydrant is a hydraulic device, connected to a supply network, intended to supply water in case of fire in all its phases. These hydrants must be located on the public road or spaces with equivalent accessibility for fire engines, and at such a distance that any point on a ground level façade is less than 100 meters from a hydrant. Hydrants will be located in places accessible to firefighting vehicles, outside the spaces intended for the circulation and parking of vehicles, and their location will be signposted in accordance with the annex to the UNE 23033 standard (or the standard that replaces it). In the case of buried hydrants, the lid will be red on the face. Hydrants must comply with the technical requirements indicated in Royal Decree 1942/1993, of November 5, approving the Regulations for Fire Protection Facilities, or rule to replace it.

14.02.08 DRY COLUMN SYSTEMS

Regarding our type of building and our fire load, there is no need to do anything regarding this point.

14.02.09 AUTOMATIC WATER SPRINKLER SYSTEMS

Regarding our type of building and our fire load, there is no need to do anything regarding this point.

14.02.10 SPRAYED WATER SYSTEMS

Regarding our type of building and our fire load, there is no need to do anything regarding this point.

14.02.11 PHYSICAL FOAM SYSTEMS

Regarding our type of building and our fire load, there is no need to do anything regarding this point.

14.02.12 DUST EXTINGUISHING SYSTEMS

Regarding our type of building and our fire load, there is no need to do anything regarding this point.

14.02.13 EXTINGUISHING SYSTEMS BY GASEOUS EXTINGUISHING AGENTS

Regarding our type of building and our fire load, there is no need to do anything regarding this point.

14.02.14 EMERGENCY LIGHTING SYSTEMS

Emergency lighting will be installed that will automatically come into operation when it occurs a power failure or a voltage drop below 70% of its nominal value, meeting the conditions of service for at least one hour.

There will also be this system next to the panels, premises or cabinets of technical installations.

14.02.15 SIGNAGE

There will be the corresponding signage of the exits of habitual use or of emergency, as well as the one of the means of protection against fires of manual use, when they are not easily located from some point of the protected zone, considering the which is provided in the regulations for the signaling of work centers, on minimum provisions regarding the signaling of safety and health at work.

The signage must follow the following rules: UNE 23033, UNE 23034, and UNE 23035.

14.03 VENTILATION AND SMOKE REMOVAL

As it has a low intrinsic risk, it is not necessary to have a ventilation and smoke evacuation system.

15. OTHER INSTALLATIONS

15.01. ELECTRICAL INSTALLATION

We introduce the section with the electricity consumption of the industrial building:

Table 12: Planned power consumption.

Production	Units	Power Consumption
Distilled water tank (volume of 3 m^3)	2	-
Raw resin tank (volume of 4 m^3)	1	-
Resin cleaning and mixing tank with water	1	1,08 KW
Dirty water tank (volume of 1 m^3)	1	-
Drying equipment	1	2,45 KW
Other functional product tank (volume of 4 m^3)	2	-
Dry resin and other functional product mixer in the additive	2	1,33 KW
Crusher	1	3,46 KW
Air compressor (0,3 m^3)	1	4,8 KW
Water pump	1	4,5 KW
Forklift	2	14 KW
Refrigerator	1	600W
Microwave	2	1,8 KW
Air conditioning appliances	5	9 KW
Lighting fixtures	-	10 KW
Peripheral devices and miscellaneous	-	5 KW
Water heaters	3	6 KW
TOTAL	**-**	**64,02 KW**

Since the power panel must be more than 50KW, it will be located in a special low risk area, as indicated in "*Artículo 11. Instalaciones del edificio*" of the "*Ordenanza municipal de condiciones de protección contra incendios de l'Ajuntament de Barcelona*" (as seen on the picture below).

Figure 18: Article 11 about power panels.

11.4. Los cuadros eléctricos de potencia igual o superior a 50 kW y las salas con un grupo electrógeno deben emplazarse en locales de riesgo especial bajo.

15.02. WATER INSTALLATION

The indoor water installation of this establishment will be governed by the regulations in force, the source being the municipal network.

At the edge of the plot, on the outer fence, there will be a water cabinet with a meter of the appropriate diameter for consumption and a corresponding passage key.

The only consumption will be in the wetlands of the establishment

Thus, the consumption of the wetlands of the ground floor, mezzanine and first floor will correspond to the following elements and planned unit flows, according to the CTE HS4:

- 4 functional sinks: 0.10 l/s.
- 6 washbasins: 0.10 l/s.
- 6 toilets: 0.10 l/s.
- 1 urinate toilette: 0.10 l/s.
- 2 showers: 0.20 l/s

The total expected annual water consumption of the company by the company is 665,280 m^3 and has been calculated as follows:

Equation 04: Annual water consumption.

$$\left(17 \times 0{,}1\frac{l}{s} + 2 \times 0{,}2\frac{l}{s}\right) \times 3600\frac{s}{day} \times 220\frac{days}{year} \times 0{,}4 = 665{,}280\ m^3$$

The sizing of the network will be carried out in such a way that the pipe is of a low-noise type, with speeds of less than 1 m / s, and in such a way that the pressure is kept within reasonable values.

The pipes and / or accessories will be made of copper or cross-linked polyethylene.

In addition, the following aspects will be considered:

- A check valve will be installed on the tap to prevent water from returning to the public network.
- Water heaters will have the following accessories: shut-off valve, purge valve, check valve and safety valve.

15.03. VENTILATION AND AIR CONDITIONING INSTALLATION

Ventilation consists of renewing and extracting the air from the inside of an enclosure and replacing it with fresh air from the outside in order to prevent its thinning, eliminating steam and odors, in terms of elements of impurities containing the enclosed ambient air inside the premises.

The amount of air to be ventilated depends on the volume of the premises, the activity on the premises, the heat to be dissipated, the granulometry of the solids to be transported and the number of renewals / hour and necessary flows determined in the current legislation, in each case.

The building has the right ventilation conditions to achieve two goals:

- Ensure basic indoor air quality requirements.
- Improve comfort and energy savings.

The available ventilation will be adequate for the activity carried out and the volume built.

To ensure that the ventilation is correct, the occupation and use carried out in each area will be taken into account, with all the natural or mechanical ventilation units available.

All areas have to comply with the office area, ventilation shall comply with the "*Reglament d'instal·lacions tèrmiques en els edificis (RITE)*", in accordance with point I.T. 1.1.4.2.2.

The calculation of the required ventilation depending on what zone they are and what category are classified, is shown in the table below.

Table 13: Needed ventilation in establishment zones.

ZONE	CATEGORY	OCUPATION (persons)	FLOW PER PERSON (l/s)	FLOW (l/s)
Loading and unloading areas	IDA 4	2	5	10
Warehouse and auxiliary areas	IDA 4	2	5	10
Production and auxiliary areas	IDA 3	4	8	32
Office areas	IDA 2	8	12,5	100

ZONE	FLOW (m^3/h)	SURFACE (m^2)	VOLUME (m^3)	VENT.
Loading and unloading areas	36	41,88	226,152	0,159
Warehouse and auxiliary areas	36	830,77	2954,842	0,012
Production and auxiliary areas	115,2	247,54	1336,716	0,086
Office areas	360	212,48	1291,181	0,279

This required flow will be largely guaranteed by natural ventilation through the set of casement windows that have direct access to the outside.

16. ENVIRONMENTAL HEALTH AND CORRECTIVE MEASURES.

16.01. NEEDS FOR APPLIANCE AND LAND AND SUBSOIL USE

The activity to be carried out will not need to take advantage of any land and subsoil resources, except for its own occupation.

16.02. EMISSIONS IN TO THE ATMOSPHERE

This activity will not produce any emissions in to the atmosphere.

16.03. THERMAL RADIATION

This activity will not produce any environmental thermal alterations as it lacks emitting sources.

16.04. IONIZING RADIATION

This activity will not have devices capable of producing ionizing radiation.

16.05. SEWAGE

As for waste, we do not create it with the electrolyte manufacturing process. We only need to talk about the dirty water we create during the process that every certain amount of time should come to collect.

Apart from the water, other waste that we can find in the ship would be that which comes from the administrative part.

16.06. WASTE MANAGEMENT

Due to the characteristics of the activity, two basic types of waste will be produced:

- *Ordinary municipal waste*: it will be deposited in airtight containers, in such a way that the waste is separated according to its nature to enable the best environmental treatment process. Specifically, there will be a separate paper container and a banal waste assimilated to urban waste. The contents of these containers will be delivered to a company authorized for their treatment or will be deposited in municipal recycling containers depending on their volume, except for the assimilable to urban waste that will be deposited in bags or sacks that once closed will be deposited daily in the containers of the Municipal Garbage Collection Services.
- *Non-ordinary waste*: which will be stored in special containers and periodically removed by a company authorized for its management.
-

The development of this activity will involve the generation of waste that can be generated from the use of toilets, the administrative use of offices and manufacturing.

This waste will be classified with the following codes of the Waste Catalog of Catalonia:

Table 14: Waste classification.

CER	CLA	DESCRIPTION	ORIGIN	QUANT/YEAR
150110	P	Empty packages that have been filled with dangerous products	Productive	1.000
150103	NP	Wooden pallets	Productive	1.000
150102	NP	Plastic packages	Productive	5.000
070213	NP	Raw material from declining production	Productive	4.000
100327	P	Wastewater treatment containing oils	Productive	4.000
190905	NP	Saturated or used ion exchange resins	Productive	4.000
110116	P	Saturated or used ion exchange resins	Productive	20.000

where:

CER: residual code - CLA: classification - NE: not special - IN: inert - ES: special

Consequently, the aforementioned waste will be managed in accordance with the classification that belongs to them and, when necessary, sending it to the carrier and manager duly authorized by the Waste Board, taking care to formalize both the acceptance form and the Tracking.

However, the relevant Waste Declaration will be made annually.

Likewise, the following measures will be carried out to minimize the generation of waste in the activity:

1) In general, they will be the following:

- Systematic control of the energy consumption of each process or equipment.
- Implementation of waste loading and unloading procedures.
- Implementation of procedures for cleaning equipment and facilities.
- Implementation of an action procedure in the event of a product spill.
- Implementation of a specific maintenance procedure for each team.
- Purchasing policy with environmental criteria.
- Preventive maintenance program.

2) Particularly and according to the type of waste will be:

- Paper: and cardboard in the future it is planned to acquire a compactor press and then deliver the waste to the authorized manager. Thus, a greater amount of paper will accumulate, delaying its collection by the authorized manager.

16.07. SOUND POLLUTION.

16.07.01. ACOUSTIC ANALYSIS OF THE CAPACITY OF THE TERRITORY

The activity will take place in a warehouse in the Bon Pastor industrial estate, which will be used to manufacture electrolytes used for polishing machines and the corresponding warehouse and offices.

There are no areas of natural interest or others in the immediate area.

In our case, we are in an area of low noise sensitivity, which includes the sectors of the territory that support a high perception of sound level, according to the Map of Acoustic Capacity of the municipality:

Figure 19: Noise sensibility area.

Figure 20: Typology of noise sensibility areas.

The process that will be carried out in this activity will not produce, by its own nature, perceptible noises in the outside of the establishment, guaranteeing the elements of closing the corresponding isolation and the fulfillment of the "*annex 3 del Decret 176/2009, de 10 de November"* of the Regulation of protection against the acoustic pollution on the sound emission applicable to the external environment produced by the activities, included the derived of the relations of neighborhood.

This annex establishes the limit values of emission of the activity from the situation of this one in the corresponding zone of acoustic sensitivity and uses of the ground.

In our case, we are in an area of low noise sensitivity, according to the map of noise capacity of the municipality, with a predominance of land for industrial use (C2) and the named limit values are as seen on figure 4: (Emission limit values in construction area.)

- Ld (7 h-21 h) = 70 dB (A).
- Le (21 h-23 h) = 70 dB (A).
- Ln (23 h-7 h) = 60 dB (A).

These limit values must be complied with in order to preserve and / or improve the acoustic quality of the territory.

The type of activity, its conditions and the schedule in which it will take place will allow compliance with current noise pollution regulations.

16.07.02. ACOUSTIC ANALYSIS OF THE ACTIVITY ENVIRONMENT

The industrial building where the present activity is intended to be carried out is isolated.

The uses attached to it are as follows:

- North: Maracaibo Street.
- South: company dedicated to Manufacture of receivers, recording and reproducing sound and image, recording discs and magnetic tapes.
- East: Caracas Street.
- West: Car Repair Shop.

No noise-sensitive use has been detected in the vicinity of the establishment.

16.07.03. SOUND OR VIBRATORY FOCUS AND APPLICATION OF PREVENTIVE AND CORRECTIVE MEASURES

The main sound or vibrating focus in the establishment will be the machinery used for the industrial activity.

Although the activity to be carried out will not produce any type of noise pollution, preventive and corrective measures will be adopted to be able to carry it out without inconvenience or danger and in accordance with current regulations:

- The closing elements and partitions with the outside will guarantee sufficient insulation below the values allowed according to the regulations.
- All electromotive devices shall be properly insulated from any lateral contact surface to ensure zero vibration transmission and shall be installed on anti-vibration supports.
- Around any electric motor or machines with moving organs there will be a free space that allows a comfortable and easy maneuver and facilitates surveillance and maintenance.
- The machines will be installed separate from walls, insulated from pillars and ceilings.
- Connections of centrifugal fans, compressors, pumps and, in general, of fluid transport equipment in the distribution ducts and pipes will always be executed by means of elastic couplings.
- The duct support elements and the fluid distribution pipes will be mounted, particularly in the first sections, with elastic elements to prevent the transmission of vibrations through the structure of the building.
- To cross walls, the ducts and pipes will do so without embedding and with elastic assembly of proven effectiveness.
- The installation of pipes or pipes specific to the activity will not be installed on the false ceilings of sound insulation or between the elements of a double wall.
- No acoustic cameras will be used to drive or return air conditioning.

16.07.04. CALCULATION OF OUTDOOR IMMISSION LEVELS

In accordance with the Acoustic Capacity Map of the municipality for the protection of the environment against the emission of noise and considering the operating hours of the activity (daytime), activities with the following conditions are allowed. outdoor emission limit values: 70 dB (A).

Considering and taking as reference the values indicated by the Association of Industrial Engineers of Catalonia, in the document "Emissió acústica en activitats industrials ", in the plastic section, we will define an internal emission sound level of L1 = 95 dBA.

Therefore, the necessary insulation for noise will be:

ta 05: Necessary noise isolation.

$$Db = L1 - L2$$

and in our case:

$$Db = 95 - 70 = 25\,dBA$$

where:

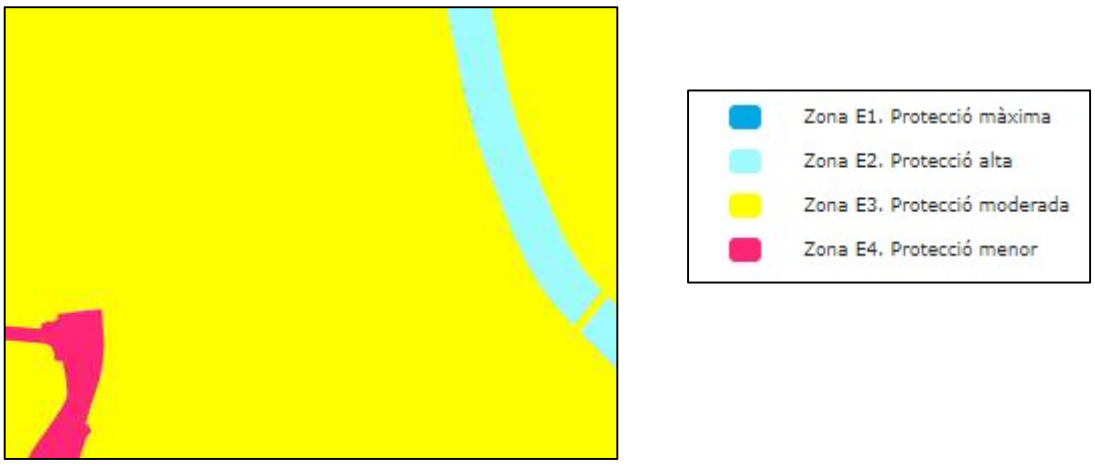
- L1 is the emission sound level.
- L2 is the sound level at the reception.
- Db is the necessary sound insulation.

In no case will we have to exceed the value of these 25 dB in any direction.

16.08. LIGHT POLLUTION.

In accordance with the zoning proposed by the Office for the Prevention of Light Pollution of the Department of the Environment and Housing of the Generalitat de Catalunya, the establishment where the activity will take place is zone E3, as it is urban land, as seen on the picture below (see the red circle as the location of the industrial building).

Figure 21: Zone of light pollution protection.



In our case, as we do not have outdoor lighting, we will not have to apply any changes in order to comply with articles 190/2015, of 25 August, implementing Law 6/2001, of 31 May.

17. INTERIOR AMBIENCE OF THE BUILDING.

17.01. SOUND AND EMISSIONS.

In this activity there will be no auditory disturbances on the part of the workers because of the level of the noise produced, since in no situation the maximum calculated internal value will exceed 80 dBA as established in Real Decret 1316/89.

There will also be no emissions of gases and vapors inside the enclosure other than those mentioned above, and which will be conducted to the outside by means of chimneys resistant to the action of acids.

17.02. CLEANING.

Given the characteristics of the materials, the health needs in the different premises will be important.

Thus, the periodic cleaning of the floor, walls and structural elements will be overseen by the personnel assigned to the activity who will be in charge of the maintenance by means of the suitable products for the cleaning and the disinfection.

The following aspects must also be considered:

- The interior floor of the building, waterproof and resistant, will be cleaned periodically.
- Both the walls and ceilings of the different areas will be kept in perfect condition and clean.
- All sanitary facilities will be cleaned regularly and at least daily.
- Remaining oil or sliding materials will not be allowed on the surface of any pavement.
- Cleaning cloths, as well as those already used, will be deposited in suitable containers and for their specific use.
- There will be a closed metal cabinet to place the cleaning utensils.
- The outdoor courtyard, with asphalt agglomerate pavement, will be kept clean of bulky elements that could become annoying or dangerous for the free movement of vehicles and activity personnel.

17.03. SECURITY AND SURVEILLANCE MEASURES.

To ensure safety, the staff who will be working will also be in charge of their surveillance.

17.04. PERSONNEL PROTECTION.

Work clothes will meet the following requirements:

- It will be appropriate to the risks arising from the use of corrosive products.
- It will be made of light and flexible fabric.
- It will allow easy cleaning and disinfection.
- It will be suitable for the temperature and humidity conditions of the workplace.
- It will fit well in the body of the worker, without compromising on comfort and ease of movement
- The sleeves will be long, fitting perfectly with elastic fabric finishes.
- Additional and protruding elements will be removed as far as possible in order to prevent the danger of jams and accumulations of dirt.
- Shoes should be closed and provided with adequate protection against crushing by falling heavy objects on the feet.

Where corrosive splashes, hot liquids, or particle splashes may occur, operators shall be provided with goggles, gloves, and face shields.

If the noise level in the workplace or work area exceptionally exceeds the established safety margin, and in any case when it exceeds 80 dB, the use of individual hearing protection elements or devices will be mandatory.

18. OTHER MEASURES TO BE APPLIED.

As measures to consider, we must highlight the following elements to carry out:

- Maintain the electrical installation in good condition.
- Signage storage areas.
- Surveillance and control in stacking.
- Keep the whole establishment in a good state of cleanliness.
- Always have in force the contract for the maintenance of the means of protection against fires with an authorized maintenance company, within the time limits required by the Annex of this report, always complying with the Protection Facilities Regulation Against Fires.

However, the following instructions will be given periodically to the activity staff with a small training on all fire installations:

- Physical situation of the means of protection and extinction.
- Need for free access to them, as there are no objects that make it difficult to use.
- Need to keep them in good condition and report to management in case you find any damaged item or without the corresponding revision.
- Operation and use of fire extinguishers.
- Situation of emergency exits, evacuation routes and alternatives.
- Methodology to follow in the event of a fire:

✓ The worker who observes the existence of a fire must notify the other colleagues, for to evacuate local personnel through predetermined escape routes and gates.

✓ Once the source of the fire is known, it must be reported to the fire station explaining the characteristics of the same and the direction clearly. The phone number of firefighters will have to be attached to the local telephone.

✓ During the start of the fire, the designated employees will go to the nearest fire extinguisher, and they will attempt its extinction using it.

✓ If it is not possible to extinguish the fire, the designated workers will help the firefighters providing clear, accurate and rigorous information on the characteristics of the fire, the possible hazards and the operation of the premises.

19. BUDGET SUMMARY

At this point the project budget document will be summarized. It consists of detailed financial information in order to provide a budget that tells us the total cost of the execution of the project including the small cost of construction variations needed to be done and the cost of the material equipped in it.

The budget is broken down into three different groups:

- Cost of construction variations.
- Cost of the equipped utensils
- Indirect costs.

The cost of construction variations has to do with all the changes we have to make in the structure of the establishment.

As for the costs of equipped utensils, it is all those utensils that we must equip in the establishment in order to comply with fire regulations (such as fire extinguishers, signs ...).

And finally, we have the indirect costs that are all the ones difficult to justify, as in our case, as we have decided to apply a safety margin in the budget of 20%. This margin will be within indirect costs.

The costs of the project are specified in the following table:

Table 15: Calculation of total cost.

DESCRIPTION	COST (€)
Cost from construction variation	1877,50
Cost of needed utensils	4065,68
Indirect costs	1188,64
TOTAL	**7131,82**

As we can see the total cost of the project will be around 7131**,82€**.

20. CONCLUSIONS

First, it should be noted that the goal of this project has been met: the technical adequacy of an already existing industrial building for the development of a chemical industry.

This final project has helped me to consolidate a large part of the knowledge acquired throughout my studies. In this case throughout the "Expressió Gràfica I", "Expressió Gràfica II", "Medis continus i Resistència de Materials", "Teoria d'Estructures i Construccions Industrials", "Ciència i Tecnologia del Medi Ambient" and "Projectes" classes, that have been of a vital importance for the realization of the project.

It must be said that personally, what has cost me the most has been in the elaboration of the plans in AUTOCAD, since during the engineering studies the work with this program has not been encouraged.

As future projects, my recommendation to improve and expand the project would be to add more weight to other facilities, as in this project we have focused a lot on fire installations and little on the others.

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