CATEGORY: **MANUFACTURING PROCESS**

BACT Size: Minor Source BACT **LYURETHANE FOAM MANUFACTURING PROCESS**

BACT Determination Number:	192	**BACT Determination Date:**	**6/1/2018**

Equipment Information

Permit Number: 25714
Equipment Description: POLYURETHANE FOAM MANUFACTURING PROCESS
Unit Size/Rating/Capacity: VOC <=8,985 lb/yr
Equipment Location: CLERPREM USA CORP
1330 DEL PASO BLVD, STE 300
SACRAMENTO, CA

BACT Determination Information

ROCs	**Standard:**	
	Technology Description:	See comments
	Basis:	Achieved in Practice
NOx	**Standard:**	
	Technology Description:	No Standard
	Basis:	
SOx	**Standard:**	
	Technology Description:	No Standard
	Basis:	
PM10	**Standard:**	0.0015 gr/scf
	Technology Description:	Filtration
	Basis:	Cost Effective
PM2.5	**Standard:**	0.0015 gr/scf
	Technology Description:	Filtration
	Basis:	Cost Effective
CO	**Standard:**	
	Technology Description:	No Standard
	Basis:	
LEAD	**Standard:**	
	Technology Description:	No Standard
	Basis:	

Comments: No Methylene Chloride and no VOCs shall be contained in an Auxiliary Blowing Agent. If VOC's are contained in an Auxiliary Blowing Agent, then
A.VOC collection of 90% by weight of the manufacturing emissions and the storage emissions, and
B.VOC control device with a 95% by weight destruction efficiency
And

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777 12th Street, Third Floor

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.:	192
DATE:	June 1, 2018
ENGINEER:	Brian Krebs

Category/General Equip Description:	Molded Polyurethane Foam Manufacturing
Equipment Specific Description:	Production of polyurethane foam seat cushions and seatback cushions for railcars.
Equipment Size/Rating:	Minor Source BACT <8,985 lbs/yr of VOC
Previous BACT Det. No.:	N/A

This Best Available Control Technology (BACT) determination category was determined under the project for A/C 25714 (Clerprem USA Corp.). Clerprem is a specialty polyurethane seat manufacturer that provides polyurethane products to the automotive and railcar industry. Clerprem utilizes MDI foaming process with no auxiliary blowing agents and utilizes state of the art mechanical self-cleaning mixing head with no solvent cleanup. They will have three seat cushion molding stations as well as two deburing stations with dry filtration vented through a common stack

BACT/T-BACT ANALYSIS

A: ACHIEVED IN PRACTICE (Rule 202, §205.1a)

The following technologies have either been currently employed as BACT/T-BACT for molded polyurethane foam manufacturing or are regulated by applicable District rules by the following agencies and air pollution control districts.

US EPA

BACT

Source: EPA RACT/BACT/LAER Clearinghouse
(See Appendix A - https://cfpub.epa.gov/rblc/index.cfm?action=PermitDetail.ProcessInfo&Process_ID=110031&Facility_ID=27913)

For Molded Polyurethane Foam Manufacturing – Automotive Foam Seat Manufacturer, 56 seats per hour	
Pollutant	**Standard**
VOC	95% overall control with the use of a regenerative thermal oxidizer required if solvent based release agents are used
NOx	NA
SOx	NA
PM10	NA
PM2.5	NA
CO	NA

This BACT determination is for a polyurethane foam automotive seat manufacturer that is quite a bit larger scale than the proposed project which is the basis for this BACT. This source has a VOC potential to emit of 80 TPY from their polyurethane foam manufacturing equipment as opposed to the proposed project that will be well under 2.5 TPY. This source can produce up to 56 seat cushions an hour whereas the proposed project can produce approximately 3.125 seat cushions an hour. The BACT determination specifies that if this source utilizes solvent based release agents instead of water born release agents, then they must utilize a regenerative thermal oxidizer with an overall collection and destruction efficiency of 95%. The post control emissions are limited to 2.308 lb/hr. This is in contrast to the emissions from this project who estimates their solvent born release agent emissions at approximately 0.8 lb/hr and source test emissions of an identical line for a factory in Italy demonstrated an average of 0.9 lb/hr during foam manufacturing. This gives an hourly emission rate of approximately 1.7 lb/hr uncontrolled. Therefore based on the difference in size and emissions, this BACT determination will not be considered achieved in practice for this size source. With that said, it will be considered technologically feasible and will be evaluated under the technologically feasible section.

T-BACT

There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

40 CFR Part 63, Subpart III - National Emission Standards for Hazardous Air Pollutants for Flexible Polyurethane Foam Production

This regulation applies to new and existing facilities that are a major source of hazardous air pollutants. Since this source is not major, these provisions will be evaluated under the technologically feasible section.

40 CFR Part 63, Subpart OOOOOO - National Emission Standards for Hazardous Air Pollutants for Flexible Polyurethane Foam Production and Fabrication Area Sources

This regulation applies to new and existing facilities that are an area source of hazardous air pollutants.

For Molded Polyurethane Foam Manufacturing	
Pollutant	**Standard**
VOC	No material containing methylene chloride can be used as an equipment cleaner, as a mold release agent, or as an adhesive.

NOx	NA
SOx	NA
PM10	NA
PM2.5	NA
CO	NA

CALIFORNIA AIR RESOURCES BOARD

BACT
Source: ARB BACT Clearinghouse

For Molded Polyurethane Foam Manufacturing	
Pollutant	**Standard**
VOC	No standard
NOx	No standard
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	No standard

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS
None.

SMAQMD

BACT
Source: SMAQMD BACT Clearinghouse

For Molded Polyurethane Foam Manufacturing	
Pollutant	**Standard**
VOC	No standard
NOx	No standard
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	No standard

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

Rule 460 Adhesives and Sealants (Amended 11-30-2000)

This rule applies to adhesive or sealants and associated primers and from related surface preparations solvents, cleanup solvents, and strippers.

Standards

VOC Content for Adhesives	
Type of Adhesive	VOC Content (g/l)
Substrate Specific Adhesive - Porous	120

No surface prep, equipment cleanup or stripping is performed.

In lieu of complying with the above adhesive requirements, a person may comply by using approved air pollution control equipment to apply a regulated product, provided:

a. A control device efficiency of at least 95 percent on a mass basis, as determined pursuant to Sections 404 and 502.5, and
b. An emission collection efficiency of at least 90 percent on a mass basis, as determined pursuant to Section 502.6.

Rule 441 Organic Solvents (Adopted 12-6-78)

This rule limits the emissions of organic solvents into the atmosphere that may result from the use of organic solvents.

Standards

For Organic Materials:
A person shall not discharge into the atmosphere more than 6.8 kilograms (15 pounds) of organic materials in any one day, nor more than 1.4 kilograms (3.1 pounds) in any one hour, from any article, machine, equipment or other contrivance, in which any organic solvent or any material containing organic solvent comes into contact with flame or is baked, heat-cured or heat-polymerized, in the presence of oxygen, unless said discharge has been reduced by at least 85%. Those portions of any series of articles, machines, equipment or other contrivances designed for processing a continuous web, strip or wire which emit organic materials and using operations described in this section shall be collectively subject to compliance with this section.

For Photochemically Reactive Solvents:
A person shall not discharge into the atmosphere more than 18 kilograms (39.7 pounds) of organic materials in any one day, nor more than 3.6 kilograms (7.9 pounds) in any one hour, from any article, machine, equipment or other contrivance used under conditions other than described in Section 301 for employing, or applying, any photochemically reactive solvent, as defined in Section 203, or material containing such photochemically reactive solvent, unless said discharge

has been reduced by at least 85%. Emissions of organic materials into the atmosphere resulting from air or heated drying of products for the first 12 hours after their removal from any article, machine, equipment, or other contrivance described in this section shall be included in determining compliance with this section. Emissions resulting from baking, heat-curing, or heat-polymerizing as described in Section 301 shall be excluded from determination of compliance with this section. Those portions of any series of articles, machines, equipment or other contrivances designed for processing for a continuous web, strip, or wire which emit organic materials and using operations described in this section shall be collectively subject to compliance with this section.

For Non-Photochemically Reactive Solvents:
A person shall not discharge into the atmosphere more than 1350 kilograms (2,970 pounds) of organic materials in any one day, nor more than 200 kilograms (441 pounds) in any one hour, from any article, machine, equipment or other contrivance in which any non-photochemically reactive organic solvent or any material containing such solvent is employed or applied, unless said discharge has been reduced by at least 85%. Emissions of organic materials into the atmosphere resulting from air or heated drying of products for the first 12 hours after their removal from any article, machine, equipment, or other contrivance described in this section shall be included in determining compliance with this section. Emissions resulting from baking, heat-curing, or heat-polymerizing as described in Section 301 shall be excluded from determination of compliance with this section. Those portions of any series of articles, machines, equipment, or other contrivance designed for processing a continuous web, strip or wire which emit organic materials and using operations described in this section shall be collectively subject to compliance with this section.

Material	Hourly Emission Limit [kg/hr] (lbs/hr)	Daily Emission Limit [kg/hr] (lbs/day)
Organic Materials which come into contact with a flame or is baked, heat-cured or heat-polymerized, in the presence of oxygen	[1.4] (3.1)	[6.8] (15)
Photochemically Reactive Solvents	[3.6] (7.9)	[18] (39.7)
Non-Photochemically Reactive Solvents	[200] (441)	[1,350] (2,970)

Rule 466 Solvent Cleaning (Amended 10/28/10)

This rule applies to all persons who use VOC-containing materials in solvent cleaning operations during the production, repair, maintenance or servicing of parts, products, tools, machinery, or equipment, or in general work areas, and to all persons who store and dispose of VOC-containing materials used in solvent cleaning.

Standards

Solvent Cleaning Activity	VOC limits g/l (lb/gal)
Product Cleaning During Manufacturing Process or Surface Preparation for Coating, Adhesive, Sealants or Ink Application	25
Repair and Maintenance Cleaning	25

As an alternative to complying with the Solvent VOC limits, a person may use air pollution control equipment provided it satisfies all of the following:

1. The air pollution control equipment is approved by the Air Pollution Control Officer pursuant to Rule 201, General Permit Requirements,
2. The air pollution control equipment is designed and operated with:
   a. A control device efficiency of at least 95% on a mass basis, as determined pursuant to Sections 402 and 502.3, and
   b. An emission collection efficiency of at least 90% on a mass basis of the emissions generated by the solvent cleaning operations, as determined pursuant to Section 502.4, or
   c. An output of less than 50 parts per million calculated as carbon with no dilution.
3. The air pollution control equipment shall result in VOC emissions per calendar quarter no greater than would have resulted from compliance with Section 301, as calculated by the following equation:

$$\left[1-\left(\frac{CE}{100}\right)\left(\frac{CL}{100}\right)\right]\sum_{i=1}^{n} ACT_i(U_i) \le \sum_{i=1}^{n} LIM_i(U_i)$$

Where:
CE = Control device efficiency, % by mass
CL = Collection efficiency, % by mass
ACTi = Actual VOC content of material “i,” grams per liter
LIMi = Applicable VOC limit for material “i" in Section 301, grams per liter
Ui = Usage of material “i,” liters per calendar quarter.

Since the costs and feasibility of installing control equipment depend on the operation and type of control equipment, this alternative isn’t considered achieved in practice. Alternative emissions control equipment options are addressed in the cost effective analysis.

SCAQMD

BACT

Source: Section I - SCAQMD LAER/BACT Determinations
Section II – Other LAER/BACT Determinations
Section III – Other Technologies

For Molded Polyurethane Foam Manufacturing	
Pollutant	**Standard**
VOC	No standard
NOx	No standard
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	No standard

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

Rule 1171 Solvent Cleaning Operations (Amended 5-1-09)
This rule applies to all persons who use solvent materials in solvent cleaning operations during the production, repair, maintenance, or servicing of parts, products, tools, machinery, equipment, or general work areas; all persons who store and dispose of these materials used in solvent cleaning operations; and all solvent suppliers who supply, sell, or offer for sale solvent cleaning materials for use in solvent cleaning operations.

Standards

Solvent Cleaning Activity	VOC limits g/l
Product Cleaning During Manufacturing Process or Surface Preparation for Coating, Adhesive, Sealants or Ink Application	25
Repair and Maintenance Cleaning	25

In lieu of complying with the above solvent requirements, a person may comply by using a VOC emission collection and control system in association with the solvent cleaning operation provided:

(A) The emission control system shall collect at least 90%, by weight, of the emissions generated by the solvent cleaning operation and
  i. Have a destruction efficiency of at least 95%, by weight, or
  ii. Have an output of less than 50 parts per million (ppm) calculated as carbon with no dilution;

(B) The emission control system meets the requirements of the applicable source rule of the District's Regulation XI. The collection system for cleaning in graphic arts and screen printing and cleaning of application equipment used for graphic arts materials and screen printing materials, shall collect at least 70%, by weight, of emissions generated. This control system shall reduce emissions from the emission collection system by at least 95%.

Rule 1168 Adhesive and Sealant Applications (Amended 10-6-17)

This rule applies to adhesive or sealants and associated primers and from related surface preparations solvents, cleanup solvents, and strippers.

Standards

VOC Content for Adhesives	
Type of Substrate Specific Adhesives	VOC Content (g/l)
Plastic Foams or Porous Materials	50

No surface prep, equipment cleanup or stripping is performed.

In lieu of complying with the above adhesive requirements, a person may comply by using approved air pollution control equipment to apply a regulated product, provided:

(A) The control device reduces VOC emissions from an emission collection system by at least 95 percent by weight or the output of the air pollution control device is no more than 50 ppm VOC by volume calculated as carbon with no dilution; and

(B) The owner/operator demonstrates that the emission collection system collects at least 90 percent by weight of the VOC emissions generated by the sources of VOC emissions.

Rule 1175 Control of Emissions from the Manufacture of Polymeric Cellular (Foam) Products (Amended 11-5-10)

This rule applies to polymeric cellular products manufacturing operations including but not limited to expandable polystyrene, extruded polystyrene, polyurethane, isocyanurate and phenolic foam operations.

Standards

For Molded Polyurethane Foam Manufacturing	
Pollutant	**Standard**
VOC	No VOCs shall be used in an auxiliary blowing agent[1] and if so then an approved emission control system to reduce manufacturing and storage emissions is required. The emission collection system and a control device Must meet the following (A) The emission collection system must collect at least 90 percent by weight of the manufacturing and storage emissions; and (B) The emission collection system must reduce emissions from the emission collection system by at least 95 percent, by weight.

[1]Rule 1175 Section (C)(1)(A) states the following: No polyurethane operation subject to this rule shall use any VOCs. The next section states that if you do not comply with this then you must install a collection and control system. Since the raw materials used to make polyurethane as well as release agents, adhesives, cleaning solvents and the like all contain VOCs, it appeared that there must have been some alternative intent. A call to Senior South Coast AQMD Engineer Doug Gordon (909–396-2683), who is in the unit that is responsible for these source types, indicated that the intent of this section is to only apply the “no VOC” requirement to auxiliary blowing agents.

SAN DIEGO COUNTY APCD

BACT

Source: NSR Requirements for BACT

For Molded Polyurethane Foam Manufacturing	
Pollutant	**Standard**
VOC	No standard
NOx	No standard

SOx	No standard
PM10	No standard
PM2.5	No standard
CO	No standard

For Adhesive Material Application Operations (<10 gal/day)	
Pollutant	**Standard**
VOC	Compliance with Rule 67.21 Adhesive Material Application Operations
NOx	No standard
SOx	No standard
PM10	Spray booth if used, shall be equipped with over spray filters.
PM2.5	No standard
CO	No standard

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

Rule 67.21 Adhesive Material Application Operations (Amended 11-14-08)

This rule applies to adhesive or sealants and associated primers and from related surface preparations solvents, cleanup solvents, and strippers.

Standards

VOC Content for Adhesives	
Type of Adhesives	VOC Content (g/l)
Substrate Specific Adhesive	50

No surface prep, equipment cleanup or stripping is performed.

In lieu of complying with the above adhesive requirements, a person may comply by using approved air pollution control equipment to apply a regulated product, provided:
(i) Has been installed in accordance with an Authority to Construct; and
(ii) Includes an emission collection system, which captures organic gaseous emissions, including emissions associated with applicable adhesive material application, equipment cleaning, and surface preparation operations, and transports the captured emissions to an air pollution control device; and
(iii) Has a combined emissions capture and control device efficiency of at least 85 percent by weight.

Rule 66.1 Miscellaneous Surface Coating Operations and Other Processes Emitting Volatile Organic Compounds (Effective 5/11/16)

This rule applies to solvent cleaning or other operations or processes that may result in emissions of VOCs.

Standards

Solvent Cleaning Activity	VOC limits g/l
Surface Preparation and Solvent Cleaning Operations	50
Cleaning of Coating Application Equipment	50

In lieu of complying with the above solvent requirements, a person may comply by using a VOC emission collection and control system in association with the solvent cleaning operation provided:
(i) Has been installed in accordance with an Authority to Construct; and
(ii) Has a combined emissions capture and control device efficiency of at least 85% by weight.

BAAQMD

BACT
Source: NSR Requirements for BACT

For Molded Polyurethane Foam Manufacturing	
Pollutant	**Standard**
VOC	No standard
NOx	No standard
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	No standard

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

Regulation 8, Rule 51 Adhesives (Amended 7-17-02)

This rule applies to adhesive or sealants and associated primers and from related surface preparations solvents, cleanup solvents, and strippers.

Standards

VOC Content for Adhesives	
Type of Adhesive	VOC Content (g/l)
Substrate Specific Adhesive - Porous Materials	120

No surface prep, equipment cleanup or stripping is performed.

In lieu of complying with the above adhesive requirements, a person may comply by using approved air pollution control equipment to apply a regulated product, provided:

a. A overall control efficiency of at least 85 percent and
b. Where incineration is used to control emissions, at least 90 percent of the organic carbon shall be oxidized to carbon dioxide.

Regulation 8, Rule 4 General Solvent and Surface Coating Operations (Amended 10-16-02)

This rule applies to all persons who use VOC-containing materials in solvent cleaning operations during the production, repair, maintenance or servicing of parts, products, tools, machinery, or equipment, or in general work areas, and to all persons who store and dispose of VOC-containing materials used in solvent cleaning.

Standards

Solvent Cleaning Activity	VOC limits g/l
Surface Preparation	50
Spray Equipment Cleanup	50

As an alternative to complying with the Solvent VOC limits, a person may use air pollution control equipment provided that it has an overall abatement efficiency of 85%.

Regulation 8, Rule 16 Solvent Cleaning Operations (Amended 10-6-02)

This rule is to limit emissions from solvent cleaning operations. This rule specifically regulates vapor solvent cleaners, conveyorized solvent cleaners, and cold cleaner devices. Since this polyurethane foam manufacturing operations is not using these types of devices, this rule is not applicable.

San Joaquin Valley APCD

BACT
Source: BACT Clearinghouse

For Molded Polyurethane Foam Manufacturing	
Pollutant	**Standard**
VOC	No standard
NOx	No standard
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	No standard

BACT #4.9.3

For Adhesive Application Process – Foam Products

Pollutant	Standard
VOC	120 g/l
NOx	No standard
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	No standard

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

Rule 4653 Adhesives and Sealants (Amended 9-16-10)

This rule applies to adhesive or sealants and associated primers and from related surface preparations solvents, cleanup solvents, and strippers.

Standards

VOC Content for Adhesives	
Type of Adhesive	VOC Content (g/l)
Substrate Specific Adhesive – Plastic Foam	50

No surface prep, equipment cleanup or stripping is performed.

In lieu of complying with the above adhesive requirements, a person may comply by using approved air pollution control equipment to apply a regulated product, provided:
a. A overall control efficiency of at least 85 percent and
b. In no case shall compliance through the use of a VOC emission control system result in VOC emissions in excess of the VOC emissions which would result from compliance with the applicable requirements.

Rule 4661 Organic Solvents (Amended 9-20-07)

This rule is to limit the emissions of volatile organic compounds (VOCs) from the use of organic solvents.

Standards

Operation	VOC Emission Limit (lbs/month)
All applicable VOC-containing materials, equipment, and processes subject to this rule	833

As an alternative to complying with the VOC emission limit, a person may use a VOC emission control system that meets the following requirements.
A. The VOC emission control system shall be approved by the APCO.

B. The VOC emission control system shall have a capture efficiency of at least 90 percent by weight (90 wt%) and a control efficiency of at least 95 wt%.

Rule 4663 Organic Solvent Cleaning Operations (Amended 9-20-07)

This rule is to limit emissions from solvent cleaning operations.

Standards

Solvent Cleaning Activity	VOC limits g/l
Product Cleaning During Manufacturing Process or Surface Preparation for Coating, Adhesive, Sealants or Ink Application	25
Repair and Maintenance Cleaning	25

In lieu of complying with the above solvent requirements, a person may comply by using a VOC emission collection and control system in association with the solvent cleaning operation provided:

A. The VOC emission control system's collection device(s) has a capture efficiency of at least 90 percent, by weight, of the emissions generated by the solvent cleaning operation and one of the following requirements:
   i. The VOC emission control system's control device(s) has a control efficiency of at least 95 percent, by weight, or
   ii. The VOC emission control system has an output of less than 50 parts per million by weight (ppm) calculated as carbon with no dilution; or,
   iii. If the solvent cleaning activity is associated with operations subject to Rule 4661 (Organic Solvents), the VOC emission control system shall meet the VOC emission control system overall capture and control efficiency requirements as specified in Rule 4661 (Organic Solvents).

B. In no case shall compliance through the use of a VOC emission control system result in VOC emissions in excess of the VOC emissions which would result from compliance with the applicable requirements.

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
Pollutant	**Standard**
VOC	<u>For Polyurethane Foam Manufacturing which includes mold release agents:</u> 1. No material containing methylene chloride can be used as an equipment cleaner, as a mold release agent, or as an adhesive. [EPA] 2. No VOCs shall be used in any Auxiliary Blowing Agent or A. VOC collection of 90% by weight of the manufacturing emissions

	and the storage emissions, and B. VOC control device with a 95% by weight destruction efficiency [SCAQMD] 3. 441 lb/hr and 2,970 lb/day of Non-photochemically reactive solvents [SMAQMD] <u>For Adhesive Operations:</u> 1. 50 g/l – Substrate Specific, Plastic Foams or Porous (SCAQMD, SDCAPCD, SJVAPCD) 2. 120 g/l – Substrate Specific, Porous (SMAQMD, BAAQMD) <u>Solvent Cleaning Operations</u> 1. 25 g/l - Product Cleaning During Manufacturing Process or Surface Preparation for Coating, Adhesive, Sealants or Ink Application, and Repair and Maintenance Cleaning (SMAQMD, SCAQMD, SJVAPCD) 2. 50 g/l – Surface Preparation, Solvent Cleaning Operations, and Cleaning of Coating Application Equipment (SDCAPCD, BAAQMD))
NOx	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
SOx	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
PM10	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
PM2.5	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
CO	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
T-BACT (VOC)	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]

BEST CONTROL TECHNOLOGIES - ACHIEVED IN PRACTICE	
Pollutant	**Standard**

VOC	<u>For Polyurethane Foam Manufacturing which includes mold release agents:</u> 1. No Methylene Chloride (EPA) and no VOCs shall be contained in an Auxiliary Blowing Agent. If VOC's are contained in an Auxiliary Blowing Agent, then (SCAQMD) A. VOC collection of 90% by weight of the manufacturing emissions and the storage emissions, and B. VOC control device with a 95% by weight destruction efficiency <u>For Adhesive Operations:</u> 1. 50 g/l – Substrate Specific, Plastic Foams or Porous (SCAQMD, SDCAPCD, SJVAPCD) <u>Solvent Cleaning Operations</u> 1. 25 g/l - Product Cleaning During Manufacturing Process or Surface Preparation for Coating, Adhesive, Sealants or Ink Application, and Repair and Maintenance Cleaning (SMAQMD, SCAQMD, SJVAPCD)
NOx	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
SOx	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
PM10	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
PM2.5	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
CO	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]
T-BACT (VOC)	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA]

B: TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (Rule 202, §205.1.b.)

Technologically Feasible Alternatives:

Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer.

The table below shows the technologically feasible alternatives identified as capable of reducing emissions beyond the levels determined to be "Achieved in Practice" as per Rule 202, §205.1.a.

Pollutant	Technologically Feasible Alternative
VOC	1. Carbon Adsorber 2. Thermal Oxidizer
NOx	No other technologically feasible option identified
SOx	No other technologically feasible option identified
PM10	Filter requirements for deburring operation
PM2.5	Filter requirements for deburring operation
CO	No other technologically feasible option identified

Cost Effective Determination:

After identifying the technologically feasible control options, a cost analysis is performed to take into consideration economic impacts for all technologically feasible controls identified.

Maximum Cost per Ton of Air Pollutants Controlled

1. A control technology is considered to be cost-effective if the cost of controlling one ton of that air pollutant is less than the limits specified below:

Pollutant	Maximum Cost ($/ton)
VOC	17,500
NO_X	24,500
PM10	11,400
SO_X	18,300
CO	TBD if BACT triggered

Cost Effectiveness Analysis Summary

VOC

Several BACT cost effectiveness evaluations have been performed for VOC control in the coating industries. In all cases, carbon adsorption was found to be the most cost effective, so this cost effectiveness evaluation will only focus on this type of control device. The cost

analysis was processed in accordance with the EPA OAQPS Air Pollution Control Cost Manual (sixth Edition). The sales tax rate was based on the District's standard rate of 8.5% as approved on 10/17/16. The electricity (11.24 cents/kWh) rate was based on an industrial application as approved by the District on 10/17/16. The life of the equipment was based on the EPA cost manual recommendation. The interest rate was based on the previous 6-month average interest rate on United States Treasury Securities (based on the life of the equipment) and addition of two percentage points and rounding up to the next higher integer rate. The labor (Occupation Code 51-9122: Painters, Transportation Equipment) and maintenance (Occupation Code 49-9099: Installation, maintenance, and repair workers, all other) rates were based on data from the Bureau of Labor Statistics. The cost of the control was based on a vendor quote for their specific use.

Carbon Adsorber:

As shown in Attachment B, the cost effectiveness for the add-on carbon adsorber system to control VOC was calculated to be **$17,507.95/ton** (see attached Molded Polyurethane Foam Manufacturing Cost Effectiveness Analysis). The following basic parameters were used in the analysis.

Equipment Life = 10 years

Total Capital Investment = $54,746.56

Direct Annual Cost = $10,288.82 per year

Indirect Annual Cost = $5,277.10 per year

Total Annual Cost = $74,726.74 per year

Total Collection/Control Efficiency = 95%

VOC Removed = 4.27 tons per year

Cost of VOC Removal = $17,507.95 per ton reduced

A detailed calculation of the cost effectiveness for VOC removal with a carbon absorber is shown in Attachment B. Uncontrolled VOC emissions of 8,985 lb/year or greater is the cost-effective threshold for control equipment using carbon absorption control technology

The only other feasible VOC alternatives to be evaluated under the technologically feasible and cost effective section were those requirements that would be imposed by 40 CFR 63 Subpart III if the project were a major source of HAPs. This subpart has the following provisions:

1. Diisocyanate storage vessels shall be equipped with one of the following:
   a. A vapor return line from the storage vessel to the tank truck or rail car to minimize emissions during diisocyanate delivery, or
   b. Carbon adsorbition system to minimize emissions during diisocyanate delivery.
2. Transfer pumps in diisocyanate service shall be one of the following:

   a. The pump shall be a sealless pump, or
   b. The pump shall be a submerged pump system meeting the requirements of this section
3. No HAP based material (containing >= to 5% HAP by weight) as an auxiliary blowing agent.
4. No HAP based material (containing >= to 5% HAP by weight) as an equipment cleaner.
5. No HAP based material (containing >= to 5% HAP by weight) as an equipment cleaner.

Analysis

1. The project receives their diisocyanate material by drum, so the vapor recovery during receiving provision will not be evlauated.
2. The project's diisocyanate transfer pumps are sealless, therefore it is assumed to be cost effective.
3. The project does not utilize any auxiliary blowing agent, so this provision will not be evaluated.
4. The project utilizes mechanical self-cleaning mixing head with no solvent cleanup, so this provision will not be evaluated.
5. The project utilizes mechanical self-cleaning mixing head with no solvent cleanup, so this provision will not be evaluated.

PM10/PM2.5

BACT for particulate control is generally particulate filtration. Previous BACT determinations have determined BACT to be dry filters with an emission rate of 0.0015 grains/ft3. Since the project is proposing dry filters in the exhaust of the deburring stations it is assumed to be cost effective.

CONCLUSION

An uncontrolled VOC emission level of 8,985 lb per year or greater must be reached in order for the carbon adsorption control option to be cost effective. Since the project will be permitted below these levels, an add-on carbon adsorber will not be required as technologically feasible BACT. As for the operational parameters pursuant to NESHAP Subpart III, only the diisocyanate transfer pump requirement will be considered as an additional technologically feasible BACT requirement.

For particulate matter, dry filtration that meets 0.0015 grains per ft3 will be required as technologically feasible BACT.

C: SELECTION OF BACT

BACT (#192) MOLDED POLYURETHANE FOAM MANUFACTURING, <8,985 LB/YR VOC	
Pollutant	**Standard**
VOC	For Polyurethane Foam Manufacturing which includes mold release agents: 1. No Methylene Chloride and no VOCs shall be contained in an Auxiliary Blowing Agent. If VOC's are contained in an Auxiliary Blowing Agent, then A. VOC collection of 90% by weight of the manufacturing emissions and the storage emissions, and B. VOC control device with a 95% by weight destruction efficiency And 2. Diisocyanate transfer pumps must be sealless. For Adhesive Operations: 1. 50 g/l – Substrate Specific, Plastic Foams or Porous Solvent Cleaning Operations 1. 25 g/l - Product Cleaning During Manufacturing Process or Surface Preparation for Coating, Adhesive, Sealants or Ink Application, and Repair and Maintenance Cleaning
NOx	N/A
SOx	N/A
PM10	Filtration that achieves 0.0015 grains/ft3
PM2.5	Filtration that achieves 0.0015 grains/ft3
CO	N/A

REVIEWED BY: _____ **DATE:** _____

APPROVED BY: _____ **DATE:** _____

COST EFFECTIVENESS ANALYSIS FOR CARBON ADSORPTION

SMAQMD Calculation

This cost effectiveness analysis was performed using EPA's OAQPS Control Cost Manual
EPA publication no. 452/B-02-001

FACILITY NAME: CLEARPREM USA
LOCATION: 1330 Del Paso Rd
PERMIT NO.: 25714
EQUIPMENT DESCRIPTION: Molded Polyurethane Foam Manfacturing

VOC Parameters

VOC of concern	n-Heptane
Cost of pure VOC ($/ton)	
Molecular weight of VOC (Refer to Control Cost Manual, pg 3-63)	100.21
Emission rate (lbs/hr - inlet)	4.32
Inlet concentration (ppm)	24
k factor (Refer to Control Cost Manual, pg 4-11)	0.551
m factor (Refer to Control Cost Manual, pg 4-11)	0.11
Partial pressure (psi)	0.000356928

Gas Parameters

Total gas flow rate (acfm - inlet)	11,777
Total gas pressure (psi - inlet)	14.7

Equipment Parameters

Removal efficiency (%)	95.0%
Adsorption time (hours)	8
Desorption time (hours)	8
Number of adsorbing beds	1
Number of Desorbing beds	1
Equipment life (years)	10

Operating Parameters

Hours per day	8
Days per week	5
Weeks per year	52

Carbon Requirements

Controlled VOC Emissions with max operation (tons/year)	((4.32 lbs VOC/hr)*(0.95)*(8 hours/day)*(5 days/week)*(52 weeks/year))/(2000 lbs/ton)	4.27
VOC Emissions BACT add on limit (lbs/year)		8985.6
Controlled VOC Emissions BACT add on limit (tons/year)	(8,985.60 lbs/year*0.95)/2000	4.27
Carbon working capacity (lb VOC/lb carbon)		0.25
Amount of carbon needed (lbs)	(8,536.32 voc)/(0.25 lb VOC/lb carbon)	34,145
Carbon cost	($1.5/lb carbon)*(34,145.28 lbs carbon)	$51,218
Carbon life (years)		5

Direct Costs:

Purchased Equipment Cost			
Adsorber and auxiliary equipment			$41,820.00
Instrumentation	1% of equipment cost ($41,820)*0.1		$4,182.00
Sales taxes	(41,820)*0.085 (CA sales tax)		$3,554.70
Freight	5% of equipment cost ($41,820)*0.05		$2,091.00
Purchased Equipment Cost	($41,820+$4,182+$3554.70+$2,091)		$51,647.70
Direct installation costs	No additional installation costs have been added		
Foundations & supports		$	-
Handling & erection		$	-
Electrical		$	-
Piping		$	-
Insulation		$	-
Painting		$	-
Direct installation costs			

Indirect Costs:

Indirect Costs (installation)			
Engineering		$	-
Construction and field expenses		$	-
Contractor fees		$	-
Start-up	2% of equipment cost ($51,647.70)*0.02	$	1,032.95
Performance test	1% of equipment cost ($51,647.70)*0.01	$	516.48
Contingencies	3% of equipment cost ($51,647.70)*0.03	$	1,549.43
Total Indirect Costs	($1,032.95+$516.48+$1,549.43)	$	3,098.86

Total Capital Investment		($51,647.70+$0.00+$3,098.86)		$54,746.56
Interest Rate				0.04
Equipment Life (years)				10
Capital Recovery Factor (CRF)				0.1233
Capital recovery cost		($54,746.56*0.1233)		$6,749.76
Capital Recovery Inflation adjustment		$6,749.76*(1+0.0275)^2		$7,142.90
Direct Annual Costs				
Labor wage ($/hr)				19.79
operator hour (hrs/shift)				0.5
shifts per day (shift/day)				1
days of work per year (days/year)				260
Operator labor				
	Bureau of Labor Statistics. Occupation Code: 51-9122 (Painters, Transportation			
Operator	Equipment)	($19.79)*(0.5 hours/shift)*(1 shift/day)*(260 days/year)		$2,572.70
Supervisor				$0.00
Material		equal to operator costs		$2,572.70
Replacement labor				$0.00
Utilities				
Electrical Cost				
kW				22
hp				
hours/year				2080
		(Based on District's Avg. Electricity Rate for an Industrial		
kWh price		Operation as approved on 10/17/16)		0.1124
Electrical		(22 kw)*(2,080 hours/year)*($0.1124/kwh)		$5,143.42
Total Direct Annual Costs (without carbon costs)				$10,288.82
Indirect Annual Costs				
Overhead		60% of maintenance labor and materials		$3,087.24
Administrative Charges		2% of Total Capital Investment	$	1,094.93
Property Tax		1% of Total Capital Investment	$	547.47
Insurance		1% of Total Capital Investment	$	547.47
Total Indirect Annual Costs (without Capital Recovery)				$5,277.10
Ton VOC controlled				4.27
Carbon needed				34,145
Cost of Carbon per year		(18,495 lb carbon)*($1.50/lb carbon)		$51,217.92
Total Annual Costs		($2,148.85+$6,889.49+$3,679.68+$27,743.04)		$74,726.74
Cost of VOC Removal		($74,726.74)/(4.27 tons Voc)		$17,507.95

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Spett.le Ditta

Clerprem S.p.A.
Via Bianche, 10
36010 Carrè (VI)

Casalserugo (PD), 17 Aprile 2018

"Alla c.a. Sig. Fabio Bedendi"

Ns. rif.: DA/ad

Preventivo n. 077/060.A/2018

Oggetto: ***Fornitura di N. 1sistema di filtrazione degli SOV e del TDI (toluen diisocianato) per una portata di 12000 Nm³/h***

A seguito della Vs. gradita richiesta, con la presente siamo a sottoporVi la ns. migliore offerta per la fornitura di quanto in oggetto e di seguito descritto.

Descrizione del sistema

La fornitura comprende:
- N. 1 prefiltro a tasche a protezione del filtro a carboni attivi
- N. 1 filtro a carboni attivi per 12000 Nm³/h
- Ventilatore centrifugo

Dati di progetto	
Portata nominale	12000 Nm³/h
Temperatura	Ambiente
Concentrazione in ingresso massima di COV (n-eptano)	25 mg/Nm³ pari a 20 mg_{COT}/Nm^3
Concentrazione in ingresso TDI	0,006 mg/Nm³
Particelle solide	Assenti
Efficienza di abbattimento di progetto sul TDI	>94%
Efficienza di abbattimento n-eptano	>95%

Data una concentrazione di COV in ingresso ai carboni di 25 mg/Nm³, il tasso di caricamento teorico dei carboni attivi è pari al 10-11% in peso: 100 kg di carbone attivo si caricheranno alla saturazione con 10-11 kg di n-eptano. Con un quantitativo di carbone attivo pari a circa 4000 kg, considerando una concentrazione di ingresso di 25mg/Nm³ si ottiene che il filtro è in grado di adsorbire 400-440 kg di n-eptano (VOC). Con un flusso di massa di 300 g/h, il tempo necessario fino a saturazione è di più di 1460h. Questo considerando la concentrazione massima durante tutte le ore di funzionamento.

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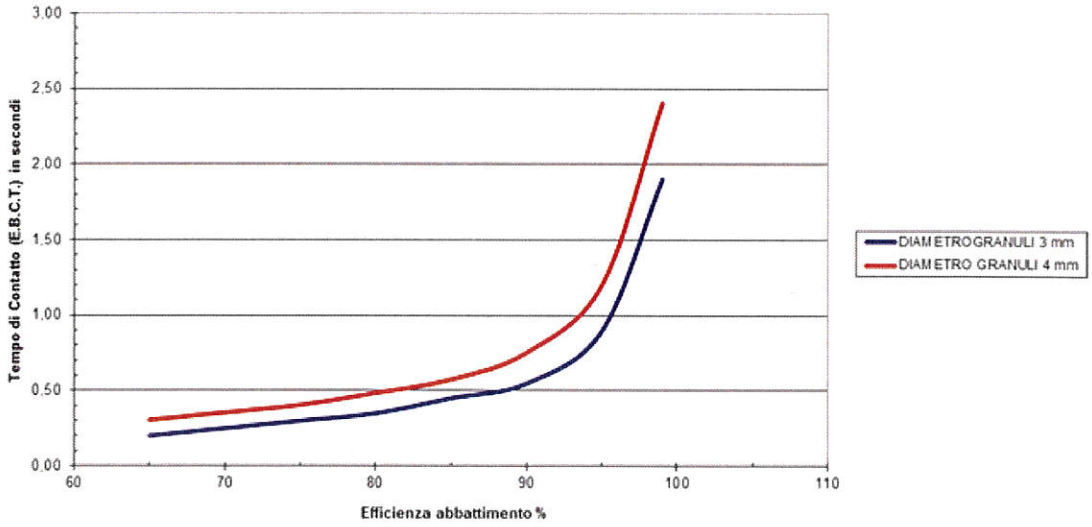
EFFICIENZA DI ABBATTIMENTO S.O.V.

CARBONI ATTIVI PER TRATTAMENTO ARIA

Velocità filtrazione lineare 0,25 m/secondo



Il filtro proposto è stato dimensionato per un tempo di contatto di 1,7 secondi circa ottenendo, per granuli da 3mm, un'efficienza teorica di circa il 98%.
Per la protezione del filtro a carboni dalle sostanze cerose proprie della Vs. produzione, viene proposto uno stadio di prefiltrazione statico con un filtro a tasche protette da triplo stadio rigenerabile con celle metalliche.
La perdita di carico del sistema è di circa 160 mmH_2O; in base alle Vs. indicazioni si stima una perdita di carico dell'impianto di 300mmH2O:

- Perdita di carico filtri: 160 mmH_2O
- Perdita di carico camino (Ø550 – H10m – completamente rettilineo e dotato di cappello parapioggia): 23 mmH_2O
- Perdita di carico tubazioni (Ø500 – L12m – con due curve a 90°): 62 mmH_2O
- Perdita di carico cappe di aspirazione (N. 3 cappe – contemporaneità 2/3): 35 mmH_2O
- Perdita di carico serrande e tubazioni di raccordo tra i filtri: 20 mmH_2O

Le tubazioni e le cappe sono escluse dalla presente quotazione, così come il quadro elettrico di comando.

Materiali e lavori di nostra fornitura

1)	**N. 1 Apparecchiatura filtrante IFCA 440**
Portata nominale	12000 Nm^3/h
Temperatura	Ambiente
Dimensioni	2290 x 2390 x H4800 mm con parapetto
Materiale	Lamiera zincata verniciata esternamente
Carbone attivo	In cilindretti da 3mm – densità 670 kg/m^3
Peso totale carbone	4250 kg – utile all'adsorbimento: 4000 kg ca.
Tempo di contatto	1,68 s
Velocità di attraversamento	0,24 m/s
Spessore del letto	0,4 m
Perdita di carico	100 mmH_2O
Caratteristiche costruttive	– Struttura portante in profilati di acciaio al carbonio zincato a caldo con pannellatura in lamiera zincata – N. 4 sezioni di filtrazione in parallelo, contenenti carbone attivo in cilindretti, realizzate in lamiera microforata e profili zincati – N. 4 valvole a farfalla manuali per lo scarico del carbone – N. 4 portelli di carico superiori – Scala alla marinara in acciaio al carbonio verniciato H 4,8 m – Parapetto superiore di sicurezza in acciaio al carbonio verniciato
Note	– Il filtro sarà fornito parzialmente assemblato e vuoto, il carbone attivo sarà fornito in sacchi. Il filtro dovrà essere assemblato e riempito di carbone in opera.

2)	**N. 1 Filtro a tasche filtranti IFT 60**
Portata	12000 Nm^3/h
Dimensioni corpo	1450 x 1280 x H1900 mm ca.
Profondità tramogge IN/OUT	760 mm
Peso totale	600 kg a pieno carico
Materiale pannelli	LZ sp. 20/10 verniciata esternamente
Materiale carpenterie	Acciaio verniciato
Descrizione	Filtro a tasche filtranti non rigenerabili
Sezione di pre-abbattimento	– Triplo stadio agglomerante realizzato con filtri a paglietta metallica zincata
Sezione di abbattimento	– N. 6 tasche filtranti a struttura progressiva in polipropilene, immarcescibile, classe di filtrazione F7
Atex	No

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Caratteristiche costruttive	– basamento completo di gambe di supporto – struttura esterna realizzata con pannelli in lamiera zincata da 20/10 – porta frontale per l'accesso alle manutenzioni dotata di cariglione e cerniere – sezione prefiltrante agglomerante con celle filtranti metalliche in classe G2 contenente n. 18 filtri piani dim. 592x592x48 mm – sezione filtrante con tasche in fibra sintetica organica e microfibre a struttura progressiva con classe di filtrazione F7 contenente n. 6 tasche dim. 595x595x625 mm – vasca di raccolta eventuali condense dotata di valvola manuale di evacuazione da 1"1/2 – tramoggia di ingresso in lamiera zincata verniciata esternamente
Note	*Le tasche filtranti, che compongono l'ultimo stadio a elevato grado di filtrazione, non sono rigenerabili e possono trattenere una certa quantità di polvere prima di dover essere sostituite. È possibile che il cambio delle tasche debba avvenire frequentemente, si consiglia quindi di testare preliminarmente l'efficienza del sistema senza le tasche (poiché potrebbero risultare non indispensabili al raggiungimento del risultato richiesto).*

3)	**N. 1 Ventilatore centrifugo**
Descrizione	Elettroventilatore centrifugo a semplice aspirazione di costruzione industriale, ad alto rendimento
Portata nominale	12000 Nm^3/h
Prevalenza totale	320 mmH_2O
Motore	22 kW – 60 Hz – 3F – 4 poli – 480V – Nema Premium – verniciatura e RAL del costruttore
Potenza assorbita	22 kW
Sistemazione	04 (trasmissione diretta)
Materiale	Lamiera verniciata – RAL e ciclo di verniciatura del fornitore
Rumorosità	85 dB(A) a bocche canalizzate senza insonorizzazione
Caratteristiche costruttive	– chiocciola in robusta lamiera di acciaio verniciato adeguatamente rinforzata con profilati metallici, dotata da portina di ispezione – girante staticamente e dinamicamente equilibrata, dotata di pale rovesce, costruite in acciaio elettrosaldato dotata dei necessari rinforzi – accoppiamento diretto motore-girante
	*Esclusioni:* – *Quadro elettrico, linee e allacciamenti elettrici* – *Tubazioni, camino, serrande e staffe* – *Sistemi antincendio* – *Imballaggi (casse in legno, sacchi barriera, containers) e trasporti* – *Montaggio e messa in servizio c/to il cliente finale*

Prezzo complessivo f.co ns sede ***€*** ***34.000,00***

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FORNITURE ADDIZIONALI

4)	**N. 1 Cofano insonorizzante**
Descrizione	Cofano insonorizzante per il ventilatore sopra descritto
Dimensioni	2050 x 1400 x H1700 mm ca.
Caratteristiche costruttive	– basamento cassone in profilo a U zincato a caldo – struttura in profilati di alluminio estrusi portapannello con giunti tridimensionali di unione – pannelli di tamponamento sandwich spessore 45 mm realizzati con lamiera esterna preverniciata con polveri epossipoliestiriche bianco/grigio spessore 5/10, strato di poliuretano e lamiera interna preverniciata con polveri epossipoliestiriche bianco/grigio spessore 5/10 – porte di ispezione e manutenzione complete di maniglie e cerniere – N°2 bocchette presa aria motore in alluminio anodizzato complete di silenziatore – giunti antivibranti interni al cassone – vibrostop interni al cassone – sigillatura di tutti i componenti con guarnizione mousse autoadesiva – bullonatura zincata per l'unione dei pannelli e della struttura

Prezzo f.co ns sede ***€*** ***2.700,00***

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Condizioni generali di fornitura:

A Ns. CARICO :

- *Fornitura di tutti i materiali descritti nella presente offerta*

A Vs. CARICO :

- ***CERTIFICAZIONI DELL'IMPIANTO SECONDO NORMATIVE LOCALI***
- ***ONERI PER SUPERVISORE LOCALE PER EVENTUALI ABILITAZIONI/CERTIFICAZIONI***
- *Imballi*
- *Trasporto*
- *Montaggio, collaudi, supervisione, commissioning*
- *Quadri elettrici*
- *Piping e camino*
- *Insonorizzazione*
- *Linee ed allacciamenti elettrici a monte e valle della ns. fornitura*
- *Oneri fiscali - Iva*
- *Analisi dei fumi*
- *Quant'altro non espressamente indicato a ns. carico nella presente offerta*

CONSEGNA:

- *Ex works*

GARANZIA:

- *24 mesi parti meccaniche*
- *24 mesi parti elettriche*

PAGAMENTI:

- *Da convenire*

Le parti si impegnano a riconoscere che qualsiasi disegno ovvero informazione e/o documento di natura tecnica scambiato con CLERPREM SRL e ICAM SRL prima o dopo la conclusione del contratto, rimane in esclusiva proprietà delle rispettive parti e non potrà essere copiato, riprodotto, trasmesso o comunicato a terzi senza il rispettivo consenso delle parti stesse, in quanto di natura strettamente confidenziale. La violazione di tale obbligo darà diritto alle parti di risolvere il contratto e richiedere il risarcimento del danno subito.

Restiamo a Vs. completa disposizione per ulteriori chiarimenti in merito e in attesa di Vs. gradito riscontro, porgiamo distinti saluti.

p.ICAM
Ing.A.Doardo

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