

The background features three semi-transparent blue circles of varying sizes. Two thin blue lines intersect at the top left, extending towards the circles. A larger blue circle is positioned in the bottom right corner.

Handling procedure for Scrubbers and Tanks made of thermoplastics.

LES PLASTIQUES
CY-BO®

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Purpose and Application:

This procedure must be followed for handling thermoplastic devices made by the company LES PLASTIQUES CY-BO Inc.

It defines the means (and conditions) of handling which will be implemented for unloading and moving (handling) scrubbers or tanks.

It also defines the storage conditions of these devices.

This procedure does not define the type of crane required for handling which depends on the weight of the scrubber and it's offset from the position of the crane. The principle of handling remains valid for both types of cranes, fixed crane (type tower crane) or mobile crane (automotive type).

Les Plastiques Cy-Bo Inc. declines any responsibility in case of non-compliance with the handling procedure.

Packing Scrubbers and Tanks for transportation.

For their transport and storage, scrubbers and tanks are placed on wooden cradles (2 to 4 depending to the length of the scrubber or tank) or placed on a beam chassis.

The chassis beams allow handling of small scrubbers and small tanks by forklift.



Handling of thermoplastic Scrubbers and Tanks.

Important:

BEFORE UNLOADING, THE WORK AREAS OF CRANES AND LOADS MUST BE MARKED PROHIBITED TO ANY PERSON. IN NO EVENT SHALL ANYONE BE UNDER A FIXED LOAD WHILE MATERIAL HANDLING IS IN PROGRESS. WEARING OF INDIVIDUAL PROTECTION (HELMET, SAFETY SHOES, GLOVES) IS REQUIRED AT ALL TIMES WHILE HANDLING, LIFTING AND POSITIONING THE EQUIPMENT.

Scrubbers may be considered large tanks with flat bottom and conical or flat top. They are provided with one or two lifting bars at the top of the scrubber (in the last 1/3 of the height).

Lifting bars consist of a plastic pipe (the same material as the scrubber or tank) in which there is a steel pipe.

The diameter of the scrubbers and tanks varies from 470 up to 4500mm.

Scrubbers and tanks up to the diameter 1400mm, have a lifting bar (Figure A), the others have two lifting bars (FIGURE B).

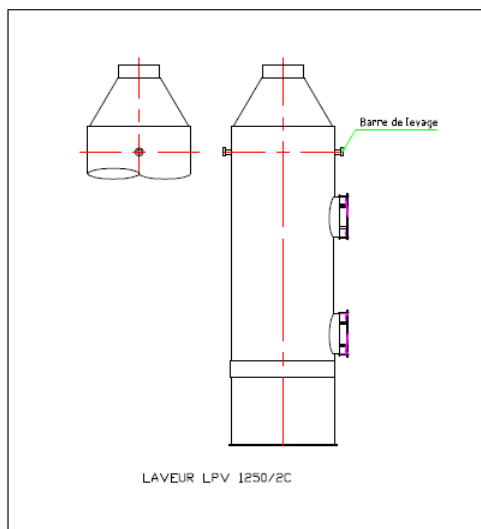


FIGURE A

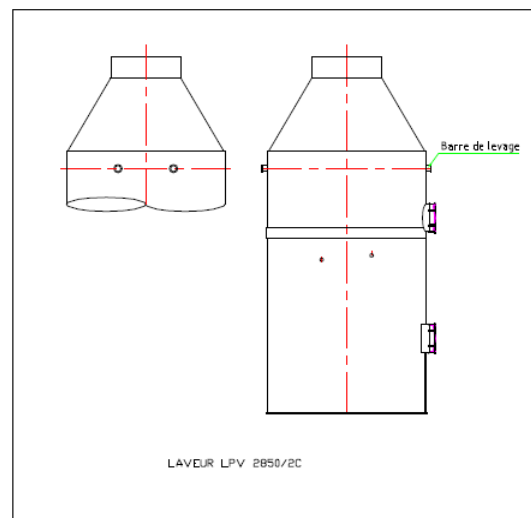


FIGURE B

The orientation of the lifting bars permits only 2 ways of lying the scrubber or tank.

Handling of scrubbers and tanks is divided into 3 phases:

1. The unloading and handling to positioning area.
2. Vertical positioning.
3. Handling to the final area.

1. Unloading and handling to positioning area.

This operation consists of unloading a scrubber or tank off the truck and moving it to a flat area for the vertical positioning.

For scrubbers and tanks up to the diameter 1400mm, 2 handling equipment's can be used:

- The fork lift.
- The crane.

For scrubbers and tanks with diameter above 1400mm, only a crane can unload the equipment.

For unloading small scrubbers and small tanks with a forklift:

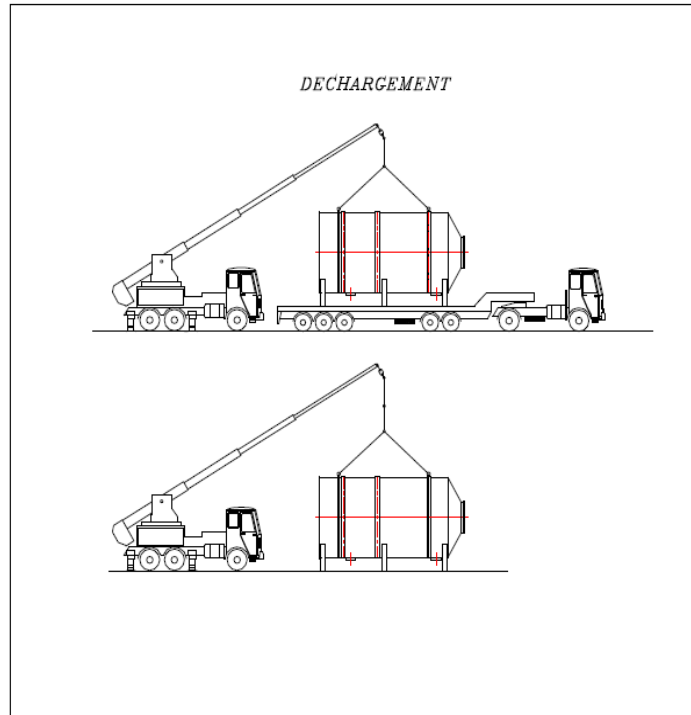
- Attach the forklift with forks extensions.
- Position the forks under the wooden frame – the forks should not be in direct contact with the tank (**IMPORTANT:** check that the forks cannot touch the outlets when pushed under the frame).
- Lift the load and remove it from the truck.

For unloading by crane, here is the handling equipment to use:

- 1 crane
- Lifting straps (6 tonnes per strap), synthetic slings (6 tonnes a sling).

(See Figure C on page 5)

FIGURE C :



The straps (or slings) will be installed by choking; their length will depend on the diameter of the scrubber or the tank. They will be at least a length equal to:

$$\text{Ø scrubber(m)} \times \pi (3.1416\dots) + 1 \text{ meter} = \text{straps length(m)}$$

So, for a scrubber or a tank diameter of 2 meters, the strap will be at least 7.3 meters.

The straps will be positioned on each end of the device making sure to leave at least 500mm from the end of the scrubber or the tank.

Once the straps are in place, connect them to a double chain between each strap and the crane hook. This can limit the angle between the two slings at the hook and thus reduce the risk of sliding straps.

Then proceed to the unloading of the device (Figure C).

2. Getting in the vertical position.

Scrubbers and tanks provided with a single lifting bar:

Necessary equipment:

- a crane.
- 2 synthetic slings of 4 tonnes, lengths 4 meters.
- double chains of handling.

The scrubber or tank will be put in vertical position by taking support on the edge of the bottom of the tank.

NB: this mode of lifting is not valid if an outlet (connexion) is located at the bottom of the tank, close to the edge (in this case, refer to the following paragraph).

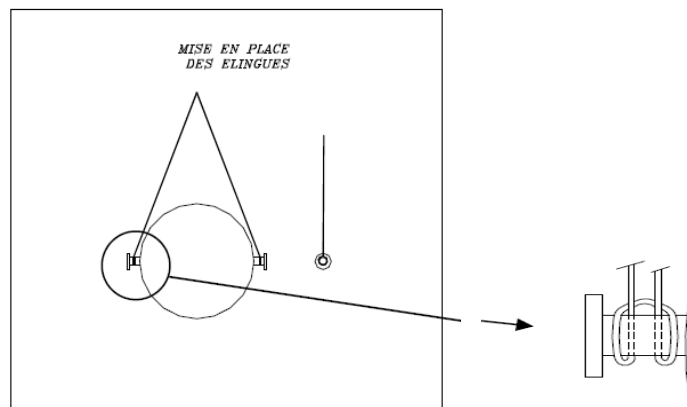


FIGURE D:

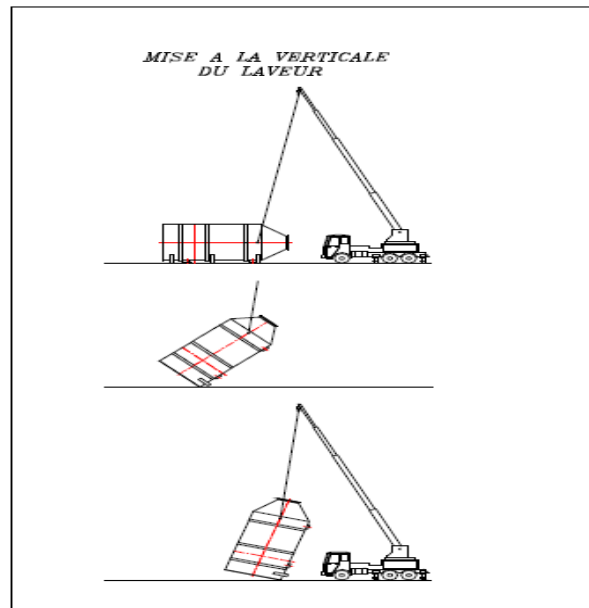
Begin by installing the slings; slings will be placed on each lifting bar choking (FIGURE D) as to have a hold on the bar during lifting.

Then connect the slings to the double chain hanging on the hook of the crane.

Proceed to lift at slow speed (FIGURE E); the scrubber or tank will be based first on the wooden cradle and then progressively lifting on the bottom of the scrubber or tank. It is very important to have a maximum movement of the crane to always pull vertically on the scrubber or tank. The critical point is when the diagonal of the scrubber or tank passes through to vertical; at this point, the scrubber or the tank will swing in vertical position. It is important that at this point, **the crane cable is vertical** to minimize tipping and have no sudden force on the scrubber or tank. When the scrubber or tank is completely vertical; lower the crane hook to support the scrubber or tank on its bottom.

Figure E shows the various steps of the operation.

FIGURE E:



Scrubbers and tanks equipped with two lifting bars.

- Necessary equipment:
- 2 cranes.
 - 1 boat strap (see paragraph 1, for length).
 - 4 synthetic slings 4 tonnes, lengths 4 meters
 - 4 core handling chains.

The scrubber or tank, being heavier than before, cannot be put on the edge of its base when rising. In this case, use 2 cranes: a crane head (the most powerful) lifting the load; a tail crane keeping the balance of the load and avoid placing it on the base edge of the scrubber or tank.

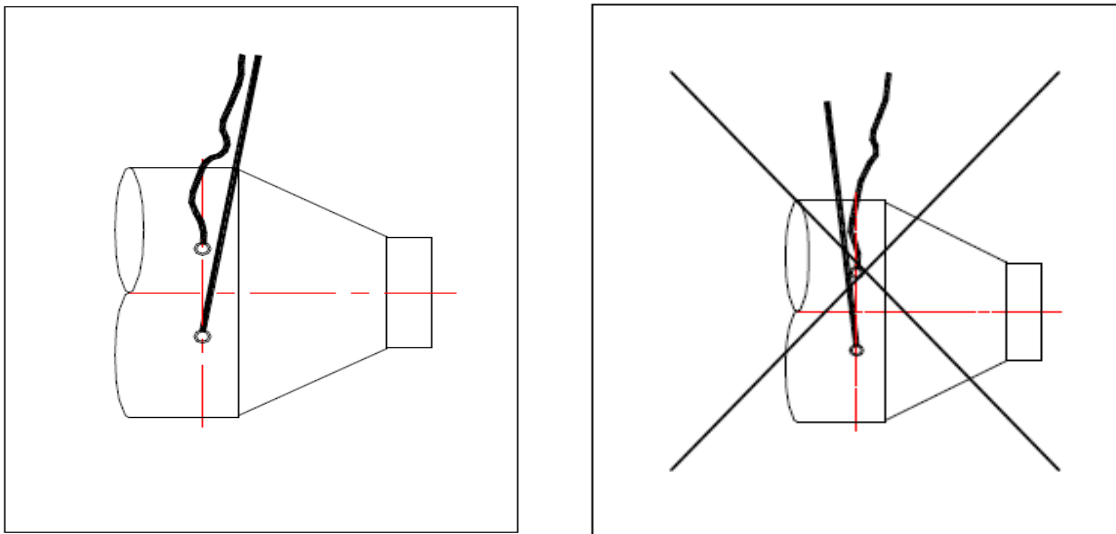
Begin by installing slings (FIGURE D) on the 4 lifting locations and approximately 500 mm from the bottom, set up the boat strap choking.

The 4 slings will be taken by the 4 strands chain and put on the hook to the head crane.

The boat strap will be attached to the tail crane.

As shown in FIGURE F, slings attached to the lower lifting bars will be strained, while those above are not strained.

FIGURE F:



The load will be lifted first by the lower lifting bar and the boat strap lifting the bottom of the scrubber or tank.

Perform handling. In slow speed, 2 cranes begin to lift the load (see FIGURE G).

When the load is sufficiently raised (about 1 meter above the ground), remove the wooden cradle (supports) as not to interfere with the following handling steps.

Once done, the head crane continues to rise, while the tail crane controls the distance from the bottom of the scrubber or tank, to the ground; The scrubber or tank should not be in contact with the ground.

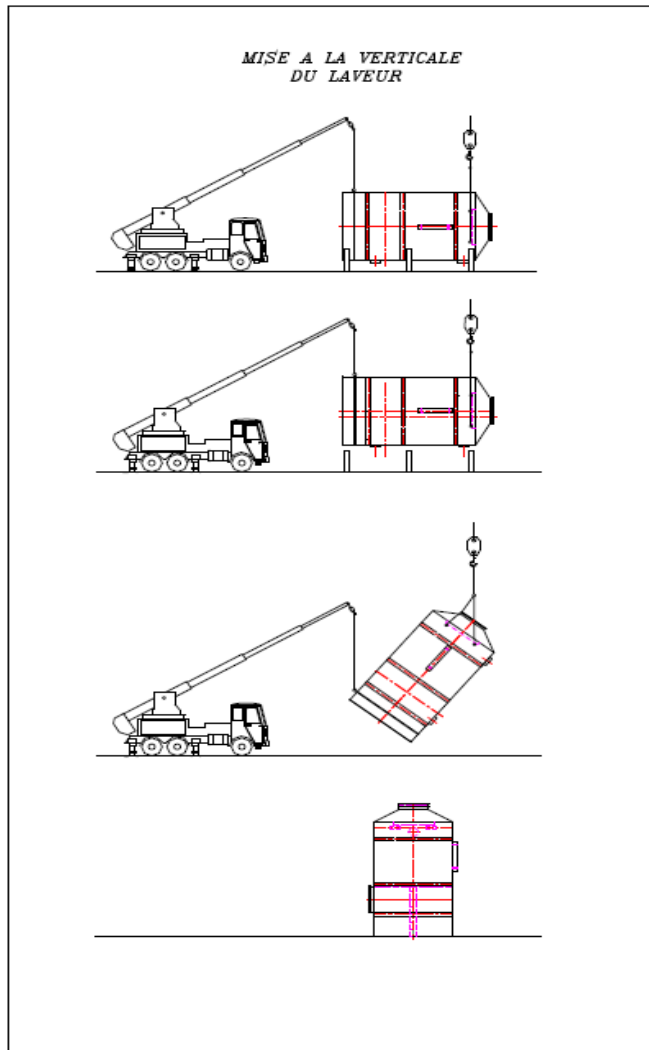
This step lasts until the scrubber or tank is vertical. Throughout the handling, care should be taken to maintain maximum verticality in cranes cables.

Once the scrubber or tank is vertical, operation is complete, and the load is controlled by the head crane only.



While handling the upper slings should be monitored at all times to prevent crossing. You also must check that the slings do not come off.

FIGURE G :



3. The handling to the final area.

The scrubber or tank remains attached to the crane by lifting bar(s) (depending on the type of scrubber or tank). In this vertical position, the scrubber or the tank can be manipulated by the crane into its final position.



DANGER

If during handling and particularly when setting into vertical position, a ``click or snap`` was heard, handling should be stopped immediately.

Indeed, thermoplastics (including PPH and PVC) can be brittle. A ``click or snap`` is the translation of breaking a weld or an incipient fissure in a plate.

If a ``click or snap`` occurs, be sure to check the welds at the lifting points. If there is a crack or a break on welding of a lifting point, the lifting will be stopped, and the load safely positioned by relieving the lifting points and stabilizing the load.

Our company should be contacted to check the condition of the lifting points and establish an end-lifting procedure.

Handling tanks.

Storage tanks are similar to gas scrubbers; because the concept of storage and thus sealing against liquids, the handling points are different from gas scrubbers.

Tanks under 1 ton of empty weight will not be equipped with stowage points. In this case, the holding point is created by ratchet straps. We will only use ratchet straps of 10 tons of resistance.

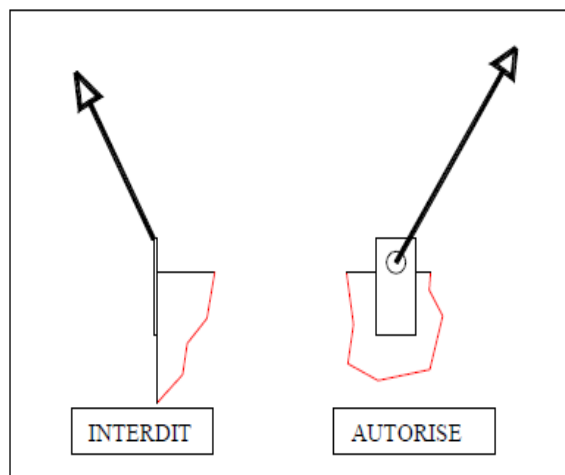
For other tanks (over 1 ton) lifting lugs are welded to the tank (usually 2); one can also find 2 lifting bars (scrubbers) for tanks with an overflow located lower than the lifting bars.

The handling is done using a single crane for any tank less than 5 meters high and 2 cranes with any other tank. However, if outlet piping is inconvenient to the positioning of the tank, use two cranes.

The handling procedure is identical for scrubbers (outlined in previous sections).

Additional precautions are :

- The ratchet straps will always be duplicated by choking slings.
- Efforts on the lifting lugs will always be longitudinal and not perpendicular to the lug; FIGURE below.



Forbidden

Allowed

Some precautions before craning

- Check that you dispose of all necessary equipment and it is suitable for lifting.
- The lifting accessories must be certified and standardized.
- Knowing the exact weight of the load being lifted.
- Verify the weather forecast of the day handling (wind, temperature).
- Check the worksite (enough space to perform the handling, storage, presence of power lines, overhead cables, type of terrain, ...).
- Mark out the cranes work zone.
- Have appropriate protective equipment (helmets, steel toe boots, ...)
- Provide the height access means necessary to work at height (scaffolding, platforms, ...); Indeed, we sometimes do not pay attention to the height of the devices as they come lying; Once standing, their height often exceed 7 meters and can sometimes reach 15 meters; in these cases, the use of articulated boom is mandatory to detach the slings, once the lifting completed.

Atmospheric limitation for handling thermoplastics.

Thermoplastics have mechanical characteristics which vary with the temperature and time (aging).

HDPE :

Temperature in which the handling is allowed: 0 to +30° C

PPH :

Temperature in which the handling is allowed: +5°C to 30°C

PVC :

Temperature in which the handling is allowed: +5°C to 30°C

- The wind speed is in all cases less than 50 km/hour.

Scrubbers and tanks positioning example.



Storage of tanks and scrubbers.

The table below gives the times and storage constraints of thermoplastic tanks and scrubbers according to the materials and position.

Any storage equipment must be on level and unfurnished ground. The wooden cradle must be in contact with the ground at all points.

The biggest concern is with temperature and UV; Some thermoplastics, like PPH, are not U.V. resistant.

Moreover, after prolonged storage in the cold, we cannot undertake all handling operations without taking some precautions.

	PPH	HDPE
Horizontal storage on wooden cradle	2 months	2 months
Vertical Storage	1 year	1 year
Outdoor Storage	no	yes
Indoor Storage	yes	yes
Storage temperature	-5°C to +40°C	-10°C to +40°C
Minimum temperature to move the load in horizontal position and on its wooden cradle	0°C	-5°C
Temperature to proceed with vertical positioning after a long storage (minimum temperature setting) *	+5°C (2 days)	0°C (2 days)

* Meaning that if a machine made of PPH is kept for 2 months at 0°C, it must be put somewhere at 5°C for 2 days, before proceeding to vertical positioning.