



***GRAVITY-FED SILO
USE AND MAINTENANCE MANUAL***

WARNINGS

FIORE IMPIANTI S.p.A. accepts no liability as far as the silo safety, reliability and performance are concerned in the event that the warnings and suggestions contained in this manual are not complied with. With regard to the auxiliaries (mixers, aerators, etc.) connected to the silo, the user electrical system must comply with the relevant applicable IEC standards, in particular with the IEC 64-8 regulations. The manufacturer accepts no liability in the event that the silo is not correctly connected to the earth system and coordinated protection devices have not been installed upstream of the same so as to guarantee the automatic interruption of the power supply in compliance with the provisions by the standards mentioned.

Some activities, such as lifting, transport, installation on site, checking stability, extraordinary maintenance, repairs, require the presence of trained and qualified personnel. The operator is forbidden to carry out operations reserved to qualified personnel.

DATA PLATE

The silo has an identification plate which shows the model, factory number, year of construction, manufacturer; these data must necessarily be stated for any communication regarding the silo. The CE mark does not appear on the plate as it is not applicable.

DESCRIPTION AND USEFULNESS OF THE SILO

The gravity-fed silo is a device for the transport, storage and supply of construction equipment and machinery for mortars, plasters, limes, chalks, screeds and the like. It consists of a container formed by a cylindrical body closed at the ends by a convex bottom and a truncated cone. The mixing machine is connected to the end of the truncated cone via a butterfly valve.

The use of an integrated system of vehicles, silos, construction equipment allows considerable time savings and consequent cost reductions. In particular, the use of silos allows the easy transport of large quantities of materials, avoiding the manual handling of the products and their dispersion in the environment.

ACCESSORIES

Hatch: the gravity-fed silo has a manhole closed by three handles, which can be used for loading the silo in the production site or for internal inspections.

Inlet tube: consists of a flanged tube with a diameter of 114 mm. It is used for loading material into the silo.

Vent tube: similar to the previous one, it is characterized by the presence of a capped sleeve placed near the flange.

POSSIBLE ELECTRICAL EQUIPMENT

The silo is set up for the installation of an electric vibrator, to be fixed to the special support located on the lower cone, the vibrator holder is set up with a double series of holes to be able to mount the vibrator itself both in a vertical and horizontal position according to preferences. Depending on the needs, it is recommended to mount the following models (or of equivalent power)

- O.L.I. mod. MVE 200/3 (180 W) - 300/3 (270 W)

- ITALVIBRAS mod. MVS1 3/200-S90 (180 W) - 3/300-S90 (270 W) - 3/500-S90 (500 W)

Models of greater power are not recommended as they can cause damage to the cone and to the load-bearing structures of the silos. Upon request, FIORE Impianti S.p.A. supplies the silo already complete with vibrator chosen from the suggested models and equipped with 4 meters of cable and standard sockets.

GENERAL SAFETY RULES

The operator who must work on the silo must have received adequate training for the activities concerning its loading, transport, handling, installation and use and know all the information relating to safety. **Before carrying out any operation, make sure that there are no people or other obstacles around the work area which could be a source of danger during the activities.** Wear the clothing and personal protective equipment prescribed for the activities carried out. Always ensure the stability and perfect verticality of the silo, especially after rain and storms.

INTENDED USE OF THE SILO

The silo can be used for the storage of premixed mortars, self-levelling plaster screeds, adhesives. Aggregates, binders, limes, plasters, **only for gravity operation**, provided that the powders have **minimum humidity contents** (not higher than 0.05%), otherwise In case of failure to empty within a short time there is the risk of consolidation of the product inside the silo itself.

Freight carriers must be compliant and fit for purpose both as eligible portals and equipped for silos gauge and transportation of premixed powdered mortars.

The silo is designed for transport and installation for a maximum load of 330 quintals equal to its own weight (24 quintals) plus the payload in powders including the load tolerance (306 quintals).

The silo must be installed on site with a minimum load of powder inside of 50 quintals, to guarantee sufficient stability against tipping over under the action of the horizontal thrust generated by the wind and to avoid excessive demixing of the contained product due to the excessive jump that occurs in the first stages of loading. **The installation of the silo without this minimum load must take place with the preparation of the foundation.**

The upper hooks and the front hook can only be used for lifting and horizontal transshipment, in the factory or on the construction site, of the **empty and free-swinging** silo, using gantry cranes, forklifts or bridge cranes. The use of slings with an approved nominal load of at least 25 kN (equal to the weight of the empty silo) and an apex angle of less than or equal to 60° is envisaged.

UNINTENDED USE OF THE SILO

The silo must not be filled with materials other than those envisaged as they can cause damage to the system and constitute a danger to the operator or the environment.

Repairs to the silo in the event of breakage or deformation or wear of any of its components must only be carried out by qualified personnel.

The silo must in no way be put under pressure and must not be used for purposes other than those described.

LOADING THE SILO

The silo can be loaded directly at the premixed mortar and plaster production site via the hatch located on the silo shell. Before proceeding with this operation, check the load capacity of the means of transport, of the lifting device installed and any limitations imposed by the loading system. **Do not exceed the maximum permitted loads.**

If the silo is loaded in the site where it is used, the loading and venting units must be connected to the tipping tank vehicle by means of hoses blocked in position by special pins or tie rods. The material loading hose must be connected to the loading unit, the powder recovery and filtration system to the vent unit. **Pay the utmost attention not to reverse the connections.**

To avoid the risk of pressurizing the casing, always keep the breather pipe and the relative dust suppression units free, as the **container is not designed to withstand the overpressures exerted by the loading systems by blowing compressed air.**

The maximum permissible payload results in an incomplete filling of the silo.

HANDLING, LOADING ON VEHICLE, TRANSPORT AND UNLOADING AT THE SITE

The operator must comply with all the instructions given in the user manual of the silo loading vehicle (in particular, lowering the rear stabilizers before lifting). He must also make sure that there are no people in the work area within a 10 m radius.

The carrier must present the suitable equipment for the silo lifting attachment system, with folding structure and horizontal silo gauge and holding device on board the vehicle. Furthermore, once the overturning has been carried out, the cylindrical shell of the silo must rest along its entire length on the shaped supports so as to allow the maintenance of its cylindrical shape and the retention of the same when curved.

Lift slowly (stop 30 cm from the ground) paying attention to the centring of the pockets by the hooking device.

Carry out the overturning slowly observing the perfect housing of the cylindrical shell inside the shape of the support structure; once overturned (supported by the side members), winch the silo up to the end stop (close to rubber stop blocks).

It is essential that the coupling takes place up to the end of the stroke, but that there is no wedge effect on the pockets, **i.e. there must always be play between the coupling device and the pocket.**

During transport, comply with all traffic regulations. **Avoid abrupt braking or acceleration and in particular pay the utmost attention when cornering since the transport of loose powders with partial filling can cause the vehicle to become unstable due to the centrifugal effect.**

To unload the silo, carry out the above operations in reverse order, in particular pay **attention during the lowering phase that at least two uprights touch the ground at the same time.** The ideal unloading is to tilt the supporting structure so that the silo rests almost simultaneously on both the rectangular tubular support profiles. In case of support in correspondence with a single upright, suspend the lowering before touching the ground and acting on the stabilizers, try to reach the contact and support conditions described above. **Contact and support on a single upright can cause permanent deformation of that upright.**

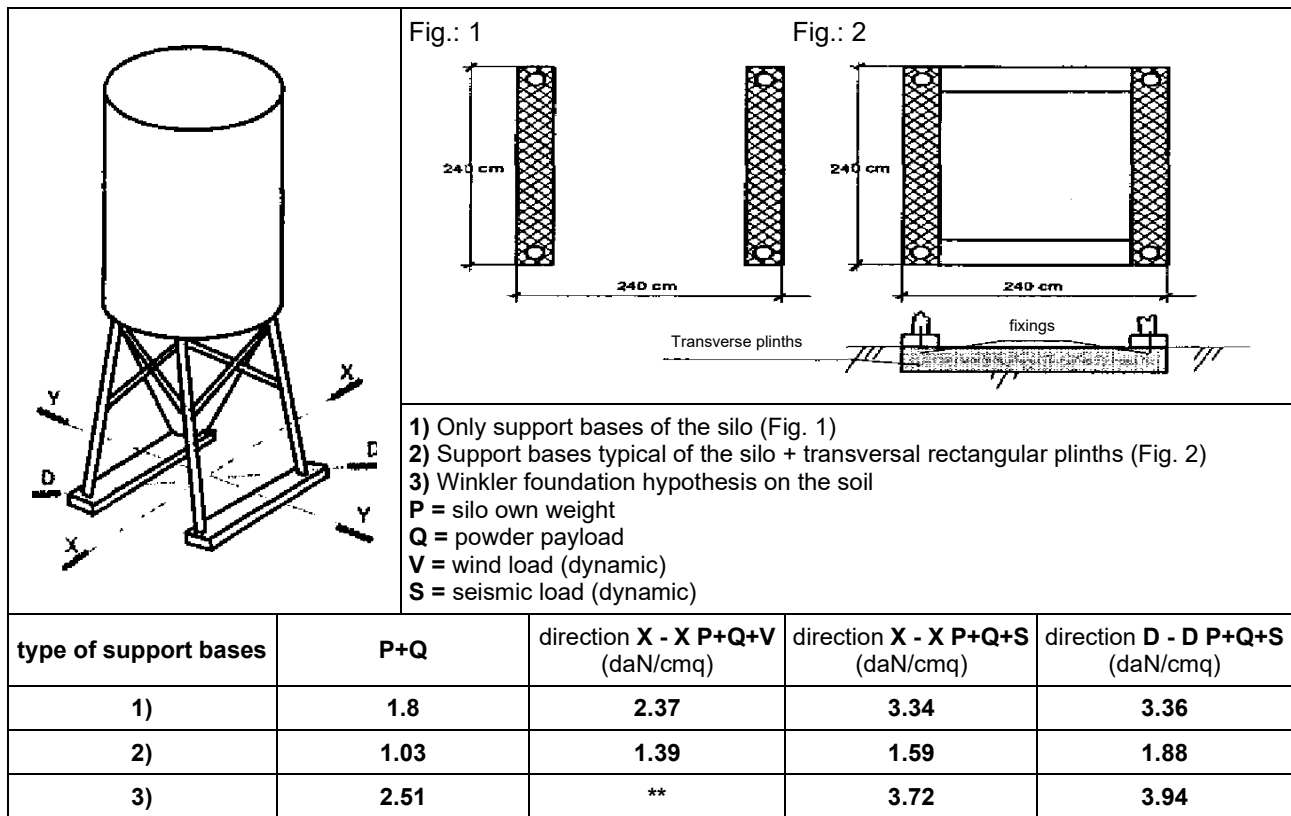
It is forbidden to insert spacers (wooden boards, metal profiles, natural stones, etc.) in order to achieve vertical stability of the silo. Even if at the moment there may be no subsidence of the ground, it could happen later and in different environmental conditions (rain, water infiltration, wind action), with the consequent possibility of the silo overturning.

Always check that the tubular profiles of the silo feet are always supported for their entire extension in order to obtain as much as possible a homogeneous pressure on the support ground, as expected.

CONDITIONS OF INSTALLATION ON THE SITE AND PREPARATION OF THE PITCH

The artefact has two support bases in rectangular steel profile each with a support footprint of 240x30 cm. For positioning the silo, pay particular attention in choosing the site and in preparing the pitch suitable for installation, with specific reference to the bearing capacity of the ground and its levelling.

The pressure levels induced by the superstructure via the silo support bases on the ground in the most onerous conditions can reach values of a certain consistency, as can be seen from the table below. The table must be consulted by the Site Works Manager.



An examination of the table shows that with a fully loaded silo and in the presence of wind, the induced pressures can reach values between 2 and 3 daN/cm², values that require soils with good support and geodetic characteristics. These pressures are significantly reduced in the hypothesis that, in addition to the silo's own bases, they are integrated and fixed to two transversal prismatic support plinths to be built on site, arranged as in fig. 2, measuring 240×30×30 cm in reinforced concrete, embedded flush with the ground or by means of a lean concrete casting.

In relation to the above and to the pressure table on the ground, it will be the responsibility of the site manager, based on the characteristics of the ground, to evaluate the opportunity to integrate the silo's own support bases.

If the installation of the silo takes place without the minimum load of stabilization against the action of the wind of 50 quintals, the proper bases must be fixed with the concrete plinths necessarily prepared and of such dimensions that their weight is at least equal to 50 quintals or through fixed anchors in the ground of equal strength. These footings should preferably be made of reinforced concrete with resistance class Rck > 250; the minimum reinforcement must include four bars of diameter $a = 16$ mm, quality FeB44K, with improved adherence arranged, longitudinally at the corners of the prism, with brackets of diameter $e = 8$ mm of similar quality, arranged at a distance of 15 cm. Alternatively, rectangular profiles of the same size as those of the silo bases, or specially treated and impregnated timber beams with a 30×30 cm section can be used.

The installation of the silo must also comply with the current regulations regarding the following (as indicated by the Site Safety Manager and/or the Works Supervisor);

- distance from power supply lines;
- connection to the earthing system;
- distance from the excavations relative to the foundations of the building structure or from any slaved systems.

TERMS OF USE

Before using the silo, check the correct connection of the earthing system and its effectiveness, the integrity of the electrical panel, control panel, electric cables. Check that all gaskets are closed and sealed and that the silo has not been damaged during installation.

Start the power supply of the mixing unit from the electrical panel; use the mortars and adjust the quantity of water in the mixture if necessary. At the end of use, as well as when filling up the silo, disconnect the power supply and wash the parts in contact with the mortar according to the use and maintenance manual of the mixing unit.

In the event of a powder leak, disconnect the power supply, wear respiratory protection PPE (mask) and check the reason for the release. Before loosening the bolts of the hose connection flanges, make sure that there is no dispersion into the environment or empty the silo.

MAINTENANCE

For any doubts about the anomalies found, contact the Manufacturer.

Local heating or welding must not be carried out, in particular on the support trestle of the silo, before it is completely emptied (the characteristics of mechanical resistance decrease with possible yielding and tipping over of the structure).

If it is necessary to carry out internal repairs, cleaning or other, empty the silo and place it in a horizontal position, preferably with the manhole facing the side. Prepare suitable equipment to facilitate access (ladders, scaffolding, etc.) and use a harness with a safety rope, acting in the presence of a second external surveillance operator. Ensure adequate ventilation inside the tank, especially in the case of grinding wheels, welding machines, etc., after removing the butterfly valve on the cone for the installation of an aspirator.

the washing of the silo can be done with high pressure hydropumps or with normal means, always with the silo **electrically disconnected**, carefully avoiding the infiltration of water inside it.

The storage of the silo must be indoors if possible and taking care to grease all the flanges and relative bolts with grease.

After each installation of the silo, check at the indicated period:

- the tightening of all the bolts, tightening the flanges (every week and after each powder load);
- the hoses and the equipment for using the limes that are connected to the silo (every week);
- the wear of threads and gaskets (every week);

- the absence of deformations on the load-bearing elements of the trellis (every week);
- the absence of drafts on the cylindrical body or on the cone of the silo (every two weeks);
- the welding seams of the shell, load-bearing trestle, pockets and lifting eyebolts, in particular check underneath for any cracks of the coating paint (every month).

REQUEST FOR SERVICE OR SPARE PARTS

For any type of information relating to use and maintenance, as well as to request original spare parts, the manufacturer **FIORE Impianti S.p.A.** is available to the customer. For each request, specify the identification data of the machine shown on the plate, in particular:

- Buyer data
- Model of the silo
- Factory No.
- Date of construction

COMPONENTS AND SPARE PARTS

No.	Code	Description	UM	Quantity
01	4000068	Screw TETF M12×45 UNI5739 ZN	No.	8
02	4000113	Screw TETF M18×45 UNI5739 ZN	No.	8
03	4083047	Eye bolt M20×80 ASTM A193 B7 ZN	No.	3
04	4100033	Nut M12 UNI5588 CL. 8 ZN	No.	8
05	4100072	Nut M18 UNI5587 8-8 ZN	No.	8
06	4110001	Self-locking nut M12	No.	4
07	4150003	Washer M12 UNI1336 ZN	No.	8
08	4150006	Washer M18 UNI6592 ZN	No.	8
09	4210004	Cotter pin D5×40 INOX UNI336-77 DIN 94	No.	8
10	4252003	Gasket De200 Di115	No.	2
11	4252005	Special nitrile 2×8 rubber gasket	MT	1.5
12	4252008	Gasket De330 Di250	No.	1
13	4505001	Cast iron 1" male cap	No.	1
14	4532060	Butterfly valve with swivel flange	No.	1
15	8020249	Pin for short tie rod D18 L76	No.	3
16	BD20250	Silo hatch hinge pin D18 L103	No.	1
17	8330001	Gravity-fed silo manhole closure group	No.	1
18	8480000	Silo hatch closing handle	No.	3

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