

SILOS SPAIN

**SILOS AND
GRAIN STORAGE
PLANTS**

General catalogue

Metal silos



In today's world, where population growth is a solid fact, where food quality standards are continuously becoming higher and where healthy living and eating is becoming more and more widespread, the use of new technologies in accordance with the evolution of the population's needs and food safety needs is necessary.

The conservation of any type of grain in galvanised silos complies with these requirements as this technology makes it possible to control all of the necessary aspects to be considered in order to maintain quality: the level of impurities, grain moisture level, storage temperature, equilibrium moisture content, insect activity, bacteria and fungi...



Our silos with a cylindrical body and 30° sloped roof are designed to store grains, seeds and pelletized products.

Our engineering team designs its silos pursuant to various standards in order to adapt to its customers' needs including European EUROCODE and US ANSI standards.



Technical details for metal silos

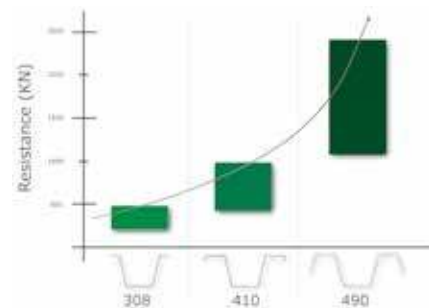


Wall rings

We work with a wide range of wall ring thicknesses. We also have pre-lacquered sheet metal with different finishes. As an option, a layer of baked paint can be applied for large thicknesses.

Stiffeners

The minimum galvanization of our stiffeners is Z-600. This option goes for stiffeners up to 3,5 mm, thicker stiffeners are hot-dip galvanized.



Our silos feature an **inspection door** for maintenance in the second wall ring as well as another one on the roof.



The access stairs to the silo, roof and gateways

are designed to be safe and ergonomic. Designed according to UNE-EN ISO 14122-2 standard and manufactured in highly-resistant galvanised steel, they offer the best solution for silo inspection and maintenance silos.



Roofs

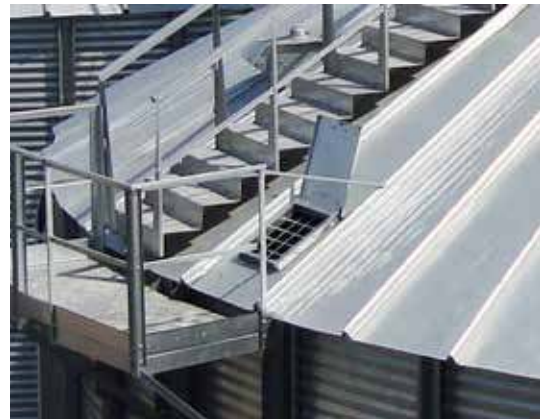
Silos Spain has evolved with the designs of its roofs by developing Z-profile structures with higher bearing capacities so they can now withstand mechanised transport with a performance of up to 1,500 T/h.





Silos Spain **roof vents** guarantee proper silo ventilation and the meticulous design prevents the entrance of water even in the most adverse of conditions. They may also be supplied with an anti-snow kit.

For easier visual control of the silo and the material stored inside, **inspection holes** are included on the roof which, due to the quick-close system and easy access from the stairs, are an important handling tool.



Wind-Ring allows silo to maintain its cylindrical shape without any effect from wind loads which offers rigidity and safety. They may be installed on the roof or on the wall ring depending on the diameter and height of the silo.

Flat bottom silos



Our silos, either flat or hopper bottom, are used for extended storage of large quantities of grain, seeds and granulate products



Our range of concrete base silos cover capacities ranging from 83 m³ to 45,055 m³ and with diameters from 4.58 m to 41.25 m.

Flat bottom silo accessories



Bobcat door opening is ideal for high-capacity silos which are unloaded using light Bobcat machinery so the product residual slope is emptied. It is made with a rigid frame featuring pillars that transmit the loads to the ground and horizontal reinforcements.

Ventilation

For proper grain conditioning and conservation, among other reasons, we recommend ventilation system for every type of silo with any capacity and for all types of grain.

The necessary ventilation system is determined for each system following a technical study of the system and considering the type of grain, the environmental conditions, the silo capacity and dimensions.

Ventilation grill

Framework comprised of perforated grating made of galvanised steel. The minimum standard ventilation surface is 15% and may even reach 100%. We also offer reinforced ventilation grills for drive-thru machinery.



Silos Spain **sweep augers** adapt to our silo diameters and can be complemented with accessories that enhance emptying by eliminating all existing residue between the sweeping machine and the ground. Complies with the ATEX standard for work inside a silo.

Our **lateral unloading system** means a truck can be loaded directly from the silo without the need of additional machinery. It includes a manual drive discharge gate.



The **inner silo staircase** makes easy access to the silo for maintenance tasks and visual analysis of the product.



The **roof staircase** complies with our clients' most demanding expectations combining accessibility, safety and comfort for comprehensive plant maintenance.

The **spiral staircase** is a perimeter staircase specially designed for easier access to the silo in a comfortable and safe way. Enables easy maintenance.





Flat bottom silos models

Model	Wall ring number	4	5	6	7	8	9	10	11	12	13
Diameter (m)	Height cilinder	4,58	5,71	6,86	8,01	9,15	10,30	11,44	12,58	13,73	14,87
	Height roof										
4,58	1,26	83	101	120	139	158	177	196	215	233	252
5,35	1,60	114	140	166	192	217	243	269	294	320	346
6,11	1,77	151	185	218	252	286	319	353	386	420	453
6,88	2,08	195	237	280	322	365	407	450	492	535	577
7,64	2,20	243	296	348	401	453	506	558	611	663	715
8,40	2,41	298	362	425	489	552	615	679	742	806	869
9,17	2,64	360	436	512	587	663	738	814	889	965	1.040
9,93	2,86	428	517	606	694	780	869	957	1.045	1.133	1.222
10,70	3,11	504	607	710	813	916	1.018	1.121	1.224	1.327	1.430
11,46	3,31	586	704	822	940	1.058	1.176	1.294	1.412	1.530	1.648
12,22	3,53	675	809	943	1.077	1.211	1.345	1.480	1.614	1.748	1.882
12,99	3,69	772	924	1.075	1.227	1.379	1.530	1.682	1.833	1.985	2.137
13,75	3,86	876	1.046	1.216	1.386	1.555	1.725	1.895	2.065	2.235	2.405
14,51	4,13	988	1.177	1.366	1.555	1.744	1.933	2.123	2.312	2.501	2.690
15,28	4,34	1.109	1.319	1.528	1.738	1.948	2.158	2.367	2.577	2.787	2.997
16,04	4,55	1.237	1.468	1.699	1.930	2.161	2.392	2.624	2.855	3.086	3.317
16,81	4,77	1.375	1.628	1.882	2.136	2.390	2.644	2.898	3.152	3.406	3.660
17,57	4,99	1.519	1.797	2.074	2.352	2.629	2.906	3.184	3.461	3.738	4.016
18,33	5,19	1.673	1.975	2.277	2.579	2.881	3.182	3.484	3.786	4.088	4.390
19,10	5,41	1.838	2.165	2.493	2.821	3.149	3.477	3.804	4.132	4.460	4.788
19,86	5,74	2.010	2.364	2.718	3.073	3.427	3.781	4.136	4.490	4.845	5.199
20,63	5,90	2.193	2.576	2.958	3.340	3.723	4.105	4.488	4.870	5.252	5.635
21,39	6,18	2.384	2.795	3.206	3.617	4.028	4.439	4.851	5.262	5.673	6.084
22,92	6,54	2.798	3.270	3.742	4.214	4.686	5.158	5.630	6.102	6.574	7.046
23,68	6,83	3.019	3.523	4.026	4.530	5.035	5.539	6.043	6.547	7.051	7.555
24,45	6,98	3.253	3.790	4.327	4.864	5.402	5.939	6.476	7.013	7.550	8.087
27,50	7,68	4.290	4.969	5.649	6.328	7.008	7.687	8.367	9.046	9.726	10.405
30,55	8,61	5.513	6.353	7.192	8.031	8.870	9.709	10.548	11.387	12.226	13.065
32,08	9,22	6.198	7.124	8.049	8.974	9.899	10.825	11.750	12.675	13.600	14.526
36,66	10,52	8.559	9.768	10.976	12.184	13.392	14.600	15.809	17.017	18.225	19.433
41,25	11,82	11.420	12.949	14.478	16.006	17.535	19.064	20.593	22.122	23.651	25.180

14	15	16	17	18	19	20	21	22	23	24	25	26
16,02	17,16	18,30	19,45	20,59	21,74	22,88	24,02	25,17	26,31	27,46	28,60	29,74
271	290	309	328	347	365	384	403	422	441	460	478	497
372	397	423	449	474	500	526	552	577	603	629	655	680
487	520	554	587	621	655	688	722	755	789	822	856	889
620	663	705	748	790	833	875	918	960	1.003	1.045	1.088	1.130
768	820	873	925	978	1.030	1.083	1.135	1.187	1.240	1.292	1.345	1.397
932	996	1.059	1.123	1.186	1.249	1.313	1.376	1.440	1.503	1.566	1.630	1.693
1.116	1.192	1.267	1.343	1.418	1.494	1.569	1.645	1.720	1.796	1.872	1.947	2.023
1.310	1.398	1.486	1.575	1.663	1.751	1.839	1.935	2.023	2.112	2.200	2.289	2.377
1.533	1.636	1.738	1.841	1.944	2.047	2.150	2.253	2.356	2.459	2.561	2.664	2.767
1.766	1.884	2.002	2.120	2.238	2.356	2.474	2.592	2.710	2.828	2.946	3.064	3.182
2.016	2.150	2.285	2.419	2.553	2.687	2.821	2.955	3.090	3.224	3.358	3.492	3.626
2.288	2.440	2.591	2.743	2.895	3.046	3.198	3.350	3.501	3.653	3.804	3.956	4.108
2.575	2.745	2.914	3.084	3.254	3.424	3.594	3.764	3.934	4.104	4.273	4.443	4.613
2.879	3.068	3.258	3.447	3.636	3.825	4.014	4.203	4.393	4.582	4.771	4.960	5.149
3.207	3.416	3.626	3.836	4.046	4.255	4.465	4.675	4.885	5.095	5.304	5.514	5.724
3.548	3.779	4.011	4.242	4.473	4.704	4.935	5.166	5.398	5.629	5.860	6.091	6.322
3.913	4.167	4.421	4.675	4.929	5.183	5.437	5.691	5.945	6.199	6.452	6.706	6.960
4.293	4.570	4.848	5.125	5.403	5.680	5.957	6.235	6.512	6.789	7.067	7.344	7.622
4.692	4.994	5.296	5.597	5.899	6.201	6.503	6.805	7.107	7.409	7.711	8.013	8.314
5.116	5.443	5.771	6.099	6.427	6.754	7.082	7.410	7.738	8.066	8.393	8.721	9.049
5.553	5.908	6.262	6.617	6.971	7.325	7.680	8.034	8.388	8.743	9.097	9.452	9.806
6.017	6.400	6.782	7.164	7.547	7.929	8.311	8.694	9.076	9.459	9.841	10.223	10.606
6.495	6.906	7.317	7.728	8.139	8.550	8.961	9.373	9.784	10.195	10.606	11.017	11.428
7.518	7.990	8.462	8.934	9.406	9.878	10.350	10.822	11.294	11.766	12.238	12.710	13.182
8.059	8.563	9.067	9.571	10.075	10.579	11.083	11.584	12.088	12.591	13.095	13.599	14.103
8.624	9.161	9.699	10.236	10.773	11.310	11.847	12.384	12.921	13.458	13.996	14.533	15.070
11.085	11.764	12.444	13.123	13.802	14.482	15.161	15.841	16.520	17.200	17.879	18.559	19.238
13.905	14.744	15.583	16.422	17.261	18.100	18.939	19.778	20.618	21.457	22.296	23.135	23.974
15.451	16.376	17.301	18.227	19.152	20.077	21.002	21.927	22.853	23.778	24.703	25.628	26.554
20.641	21.850	23.058	24.266	25.474	26.682	27.891	29.099	30.307	31.515	32.723	33.932	35.140
26.708	28.237	29.766	31.295	32.824	34.251	35.774	37.410	38.939	40.468	41.997	43.526	45.055

Capacities are estimated and show in m³. Shade models upon request.

Hopper silos



They are designed to store grains, seeds, legumes, pellets and other products that require special storage conditions. The stored product stays off the ground to prevent moisture gaining and lower the possibility of breakage.



This type of silo not only brings economic savings, as no sweeping machine is necessary, but also simplifies the foundation work which considerably reduces the building costs and streamlines assembly work.

Our range of hopper silos covers capacities ranging from 43 m³ to 2,016 m³ with diameters from 3.82 metres to 10.70 metres.

Technical details for hopper silos

The support structure, which is made up of hot-dip galvanised structural profile columns braced together with laminate profiles, guarantees immense silo resistance against external forces.



For easier assembly, the silo is supplied with chemical anchoring elements which may be installed once the silo is completely assembled to prevent problems with the construction work.



Cones / slopes

Cones with slopes of 45° and 60° may be supplied for proper silo unloading and to guarantee cleaning afterwards. Our cones are meticulously designed to prevent any material may accumulate and, thus, contaminate the product during later loading.

The silo outlet dimensions vary between Ø270 mm and Ø1200 mm, and may be completed with a wide range of accessories to adjust the outlet dimensions to your needs.

The clearance between the silo unloading and the ground may be 1 or 1.5 m, depending on the requirements for each system. This height may be customised upon request.

Hopper silo accessories



Hopper silo ventilation

The inner ventilation conduits on the silo are made up of highly-resistance perforated metal cylinders. The number and position on the silo cone guarantee even air distribution in the stored grain mass. The design of these conduits creates minimal grain friction during unloading which reduces stress on the silo cone and the accumulation of grain during unloading.



Overhead ventilation cone / Flow Mass

In order to meet our clients' needs, our technical team has developed a FLOW MASS unloading system which consists of a central cone that is inverted with respect to the silo cone. This prevents the formation of preferential unloading channels where the walls and lateral opening are designed to compensate for mass flows as well as it provides a balanced distribution of the incoming air.

The **vibrating bottom** helps to unload the products stored in hopper silos with poor flow characteristic like flour, granulated poppy, small shells, carbonate, soya beam meal, etc. Recommended for silos with a 60° cone that is reinforced to support the vibration. System is available in different diameters and we adapt it to different silo outlet dimensions.

Hopper silo models

Hopper silos at 45°

Models	Wall ring number		4	5	6	7	8	9	10	11	12	13	14	15	16
Diameter (m)	Cylinder Height		4,58	5,72	6,86	8,01	9,15	10,30	11,44	12,58	13,73	14,87	16,02	17,16	18,30
	Roof Height	Column Height 1 m													
4,58	1,26	3,00	95	114	133	151	170	189	208	226	245	264	283	302	320
5,35	1,60	3,60	134	160	185	211	237	262	288	314	339	365	390	416	442
6,11	1,77	3,90	181	214	248	281	314	348	381	415	448	482	515	548	582
6,88	2,08	4,30	237	279	322	364	406	449	491	534	576	618	661	703	745
7,64	2,20	4,60	301	353	406	458	510	562	615	667	719	771	824	876	928
8,40	2,41	5,00	375	438	501	565	628	691	754	817	881	944	1.007	1.070	1.133
9,17	2,64	5,50	460	536	611	686	762	837	912	987	1.063	1.138	1.213	1.289	1.364
10,70	3,11	6,30	663	765	868	971	1.073	1.176	1.278	1.380	1.483	1.585	1.688	1.790	1.893

Hopper silos at 60°

Models	Wall ring number		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Diámetro (m)	Cylinder Height		2,29	3,43	4,58	5,72	6,86	8,01	9,15	10,30	11,44	12,58	13,73	14,87	16,02	17,16	18,30
	Roof Height	Column Height 1 m															
3,50	1,01	3,60	32	42	52	64	-	-	-	-	-	-	-	-	-	-	-
3,82	1,03	4,00	-	-	69	82	95	108	121	135	148	-	-	-	-	-	-
4,58	1,26	4,30	-	-	104	123	142	161	180	199	217	236	255	274	293	312	330
5,35	1,60	5,00	-	-	149	175	200	226	252	278	303	329	355	380	406	432	458
6,11	1,77	5,60	-	-	203	237	270	304	337	371	404	438	471	505	538	572	605
6,88	2,08	6,30	-	-	268	311	353	396	439	481	524	566	609	651	694	736	779
7,64	2,20	7,00	-	-	344	397	449	502	554	607	659	712	764	816	869	921	974
8,40	2,41	7,60	-	-	433	496	559	623	686	750	813	876	940	1.003	1.067	1.130	1.193
9,17	2,64	8,30	-	-	535	611	686	762	837	913	988	1.064	1.140	1.215	1.291	1.366	1.442
10,70	3,11	9,70	-	-	782	885	987	1.090	1.193	1.296	1.399	1.502	1.605	1.707	1.810	1.913	2.016

Capacities are estimated and show in m³.

Total silo high is the result of adding roof height + eave height + support structure height (support structure height = height from the ground to the first wall ring).

Silo outlet is between 1m – 1,5m height. Other highs upon request.

Truck/train load silos



Structure-based truck/train load silos are designed for the storage and later dispatch of bulk products such as granulates, flour, etc.



For agricultural facilities, feed mills or flour mills, the silos available range from 2.55 m in diameter to 4.65 m with capacities ranging from 12 m³ to 116 m³.



For industrial facilities with silos for truck or rail dispatch, we recommend silos with a diameter of at least 4.58 m and capacities ranging from 80 m³ to 400 m³, upon request.

Technical details for truck load silos



We design and manufacture bulk silos with **support structures** for truck or train drive-thru. This structure is made up of rigid bare double-T laminate profiles built in S275JR hot-dip galvanised steel. The standard silo to ground outlet height is 4500 mm with the possibility of adapting to the customer's needs.



Options

Available in different matrices from an independent silo to matrices in different arrangements to meet the needs of your facility and with the option of adding a maintenance platform and access to the

silo unloading outlet. As an option, we offer the possibility of a lateral and top closure as well as adding a load cell weighing system on the structure.

Truck-train load silos models

Models	Wall ring number		1	2	3	4	5	6	7	8	9
	Cylinder Height		2,55	3,79	4,99	6,21	7,45	8,65	9,89	11,11	12,34
Diameter (m)	Structure Height										
	Truck	Train									
2,55	8,21	8,51	11	17	22	27	-	-	-	-	-
3,82	9,57	9,87	-	39	52	65	78	91	104	117	130
4,58	10,75	11,05	-	59	78	97	116	135	154	173	192

Capacities are estimated and shown in m³.



Metal silo accessories



Internal sledge is an inner conduit situated on roof and wall of the silo to make the product slide down homogeneously to prevent breakage during loading (of the silo).



Level sensors

We offer instruments that are able to measure the product level at fixed points or continuously. We manufacture supports for the different options as well as for a completely integrated system.



Control Temperature Systems

Silos Spain offers a grain temperature and moisture measuring, monitoring and control system for the inside of the silo. This system includes the supports for the different probes adapted to the structure of our roofs.



Fumigation systems

Our engineering department has developed a ventilation chimney closure system that enhances the conditions of the silo for fumigation purposes.



The **perimeter handrail** is a structure that enhances safety when doing maintenance work on the silo roof.

Insulation

To improve the conservation of the product inside the silo, we offer a silo insulation system that is recommended for products with a chemical composition that can easily change (such as processed rice or white corn or in countries with warm climates).

When the inside of the silo reaches an extreme temperature and the temperature in the silo drops quickly at night, it is suddenly cooled which creates inner condensation which can deteriorate the product or steel quality.



Double sheet insulation: For roofs, wall rings or the cone. The outer sheet can be pre-lacquered, preferably in white.



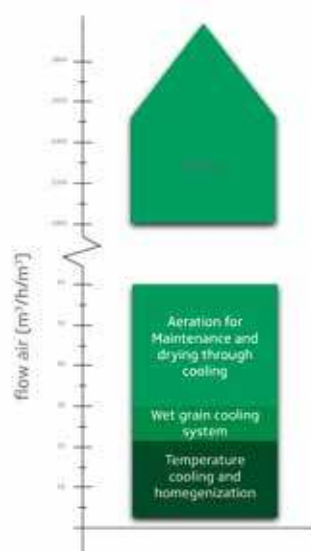
Double sheet plus insulation material: Insulation material is added between sheets. The most common materials are polyurethane foam and fibreglass wool.

Ventilation

For good grain conditioning and conservation, among other aspects, we equip all silos of all capacities and for a variety of products with a ventilation system. The necessary ventilation system is determined for each system following a technical study of the system and considering the type of grain, the environmental conditions, the silo capacity and dimensions.



Fans offer additional ventilation for tropical atmospheres or products that are likely to be affected by condensation. We have axial fans equipped with plastic or aluminium propellers with specific supports included for each type of fan.



Centrifugal fans

The necessary fan, which may be average to high-pressure, is determined following a technical study of the system based on the required air and pressure flow and considering the type of grain, environmental conditions as well as the silo volume and dimensions. The use of grain cooling and dehumidification systems is particularly recommended for facilities in countries with a tropical climate given the high relative humidity and average annual temperatures as well as for facilities aimed at long-term storage.

Customized structures and uses



Catwalks

To support loading mechanisation and easier silo floor maintenance and operability, there are different types of catwalks available depending on the span, distance to the ground and load supported.

The design is modular with bolted joints. They are designed for people to pass through or as a support for mechanisation up to 2,000 T/h. The dimensions range from 80 mm to 3500 mm wide with an anti-slip floor and protective elements pursuant to standard UNE-EN ISO 14122.

The available catwalks options are: Open, tunnel closed, with lattice or laminate structure.



Cap support supports the catwalk and is placed above the top cover of the silo roof. There are different types based on the machinery performance and type of catwalk.



The **lateral support** is bolted to the silo stiffeners. Used for light machinery in silos of up to 24 m in diameter. Additionally, an oblique support can be added to the lateral support depending on the silo and catwalk model.



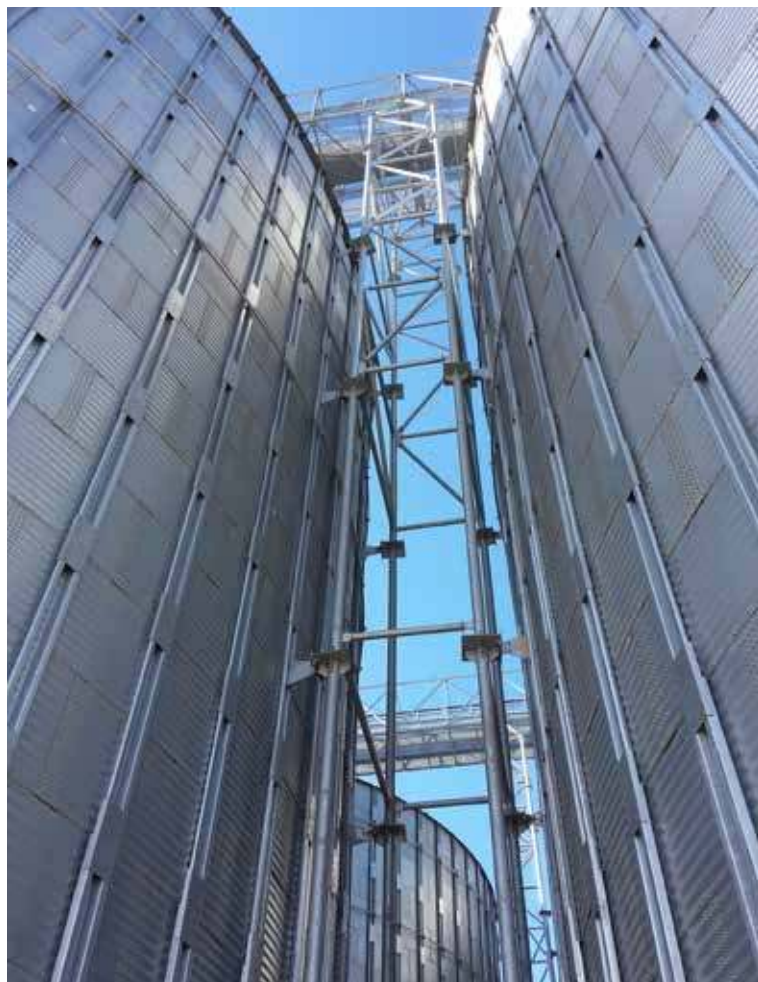
Rest platform on silo hatch is an optional element and fosters the connection supervision work between the machinery and the silo.

The support towers are specially designed to bear the loads from the catwalk by transferring them to the foundation directly. We offer different tower types depending on their position and design:

Intermediate towers between silos as catwalk support: 2x1 metre ground surface.

Towers in an exposed position: 2x2 metre ground surface.

Supporting towers: double T beam and steel sheet catwalks.



Elevator towers are modular bolted and welded structures made with double-T laminated profiles in galvanised steel. They offer stability, easy access to the catwalks and make for safer elevator maintenance. With a floor that can be walked on, electro-welded grating and maintenance platforms including securing tensioners.



Uses:

Facilities where the grain reception is centralised in a group of elevators.

For processing towers with reception, weighing and cleaning.

Port facility transfer towers.



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Our Manufacturing Plant

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