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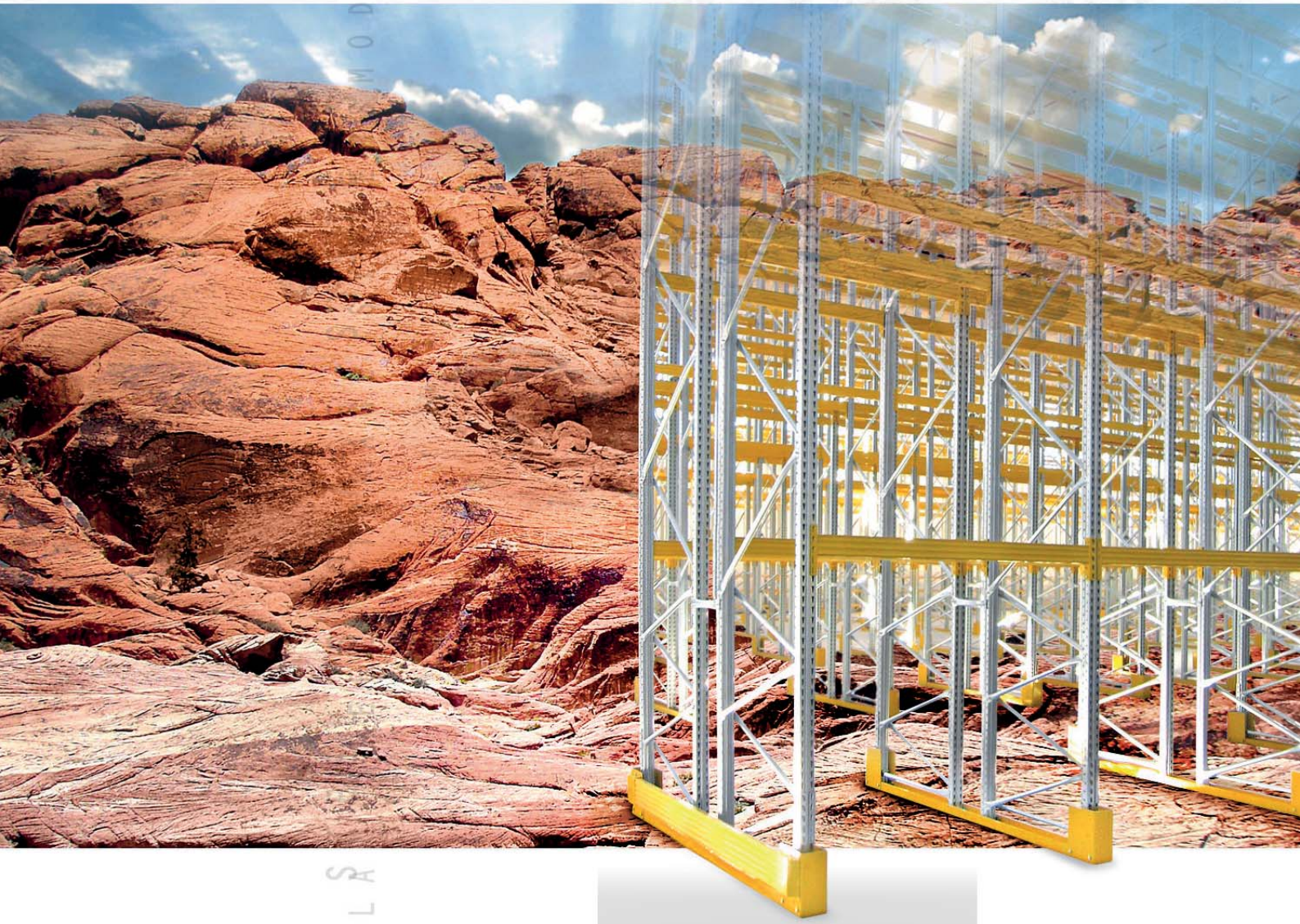
SUPERBO

MODULAR STORAGE SYSTEMS



METALSISTEM®
STRUTTURE ED AUTOMAZIONE
MADE IN ITALY

MODULAR STEEL STORAGE SYSTEMS

FEM section X

Our dedication to making a difference: creating **MORE VALUE** with **LESS IMPACT!**
METALSISTEM is proud to adopt **ECO-EFFICIENCY** concepts in its business model.
ZERO emission and ZERO ecological impact thanks to a **UNIQUE MANUFACTURING PROCESS!**
METALSISTEM has achieved energy self-sufficiency through the use of renewable resources.

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I-38068 Rovereto (TN) - Italy - Viale dell'Industria, 2 - Tel. +39 0464 303030 - Fax +39 0464 303031
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AZIENDE GRUPPO METALSISTEM / METALSISTEM GROUP MEMBERS

SERVIZIO / SERVICES

METALSISTEM CANADA
STORAGE AND DISPLAY SOLUTIONS
121 Granton Drive, Unit #17
Richmond Hill, ON, CANADA, L4B 3N4
Tel. +1 905 8869499
Fax +1 905 8866890
info@metalsistemcanada.com
www.metalsistemcanada.com

METALSISTEM ITALIA Gruppo METALSISTEM
38068 Rovereto (TN) - Italy
Viale del Lavoro, 1
Tel. +39 0464 486124
Fax +39 0464 400430
info@metalsistemitalia.it
www.metalsistemitalia.it

BLOCK sistem
Gruppo METALSISTEM
63076 Monteprandone
Centobuchi (AP) - Italy
Via del Lavoro, 16
Tel. +39 0735 704880
Fax +39 0735 710413
info@blocksistem.it
www.blocksistem.it

METALSISTEM AUSTRALIA
STORAGE AND DISPLAY SOLUTIONS
9B International square,
Tullamarine, VIC, 3043 - AUSTRALIA
Tel. +61 03 9310 5939
Fax +61 03 9310 5938
info@metalsistemaustralia.com
www.metalsistemaustralia.com

METALSISTEM EMILIA ROMAGNA Gruppo METALSISTEM
41012 Carpi (MO) - Italy
Via C. Marx, 113
Tel. +39 059 696 450
Fax +39 059 642 479
info@metalsistememilia.it
www.metalsistememilia.it

GL SISTEM
Gruppo METALSISTEM
90121 Palermo (PA) - Italy
Via Messina Montagne, 8
Tel. +39 091 492 351
Fax +39 091 492 351
glsistem@inwind.it
www.glsistem.com

METALSISTEM N. AMERICA
STORAGE AND DISPLAY SOLUTIONS
3201 Fox St. Philadelphia, PA 19129 USA
Tel. +1-866-412-5558
Fax +1-905-866-6890
info@metalsistemnorthamerica.com
www.metalsistemnorthamerica.com

METALSISTEM LOMBARDIA Gruppo METALSISTEM
20090 Buccinasco (MI) - Italy
Via E. Fermi, 6
Tel. +39 02 45708646
Fax +39 02 45708647
info@metalsistemlombardia.it
www.metalsistemlombardia.it

METALSISTEM LINE Gruppo METALSISTEM
35011 Campodarsego (PD) - Italy
Via Pontarola, 13/B
Tel. +39 049 9201696
Fax +39 049 9201236
info@metalsistemline.it
www.metalsistem.com

LUX METALSISTEM
Rayonnages - Stahlregale
Rue de l'industrie 4-6 - Z.I.
L-8399 Windhof - LUXEMBOURG
Tel. +352 39 72 06
Fax +352 39 92 30
info@luxmetalsistem.eu
www.luxmetalsistem.eu

METALSISTEM MARCHE Gruppo METALSISTEM
60028 Osimo Stazione (AN) - Italy
Via Maestri del Lavoro, 17
Tel. +39 071 710 86 60
Fax +39 071 710 84 85
metalsis@tin.it
www.metalsistemarche.it

SIDAC VENETO
Gruppo METALSISTEM
Via Donatori del Sangue, 5/II
31020 Fontane di Villorba (TV) - Italy
Tel. +39 0422 911994
Fax +39 0422 912085
info@sidacveneto.com
www.sidacveneto.com

SIDAC EVOLUTION
Gruppo METALSISTEM
91220 Le Plessis Paté, Paris - FRANCE
11, Rue Leonard de Vinci - Z.I. Du Parc
Tel. +33 1 60851845
Fax +33 1 60849554
info@metalsistem.fr
www.sidac-metalsistem.fr

METALSISTEM PIEMONTE PERTERO Gruppo METALSISTEM
10028 Trofarello (TO) - Italy
Via Torricelli, 39
Tel. +39 011 649 75 69
Fax +39 011 649 84 69
info@metalsistempiemonte.com
www.metalsistempiemonte.com

SOTEA sistem
Gruppo METALSISTEM
50041 Calenzano (FI) - Italy
Via del Pratignone, 70
Tel. +39 055 887 36 33
Fax +39 055 887 46 52
info@soteasistem. com
www.soteasistem.com

SIDAC IBERIA
Gruppo METALSISTEM
08110 Moncada I Reixac,
Barcelona - SPAIN
C/Narcis Monturiol n° 4 nave 14
Tel. +34 935 651 800
Fax +34 935 651 801
sidac-iberia@sidac-iberia.com
www.sidaciberia.com

METALSISTEM ROMA Gruppo METALSISTEM
00040 Pomezia (RM) - Italy
Via dei Castelli Romani, 56/58
Tel. +39 06 91801333
Fax +39 06 91621141
info@metalsistemroma.it
www.metalsistemroma.it

TeknoSistem
Gruppo METALSISTEM
25124 Loc. Folzano (BS) - Italy
Via Tito Baresani 13/15
Tel. +39 030 266508
Fax +39 030 2160301
info@teknosistem.it
www.teknosistem.it

SIDAC ADRIATICO
Gruppo METALSISTEM
Z.I. Squartabue s.n.c.
62019 Recanati (MC) - Italy
Tel. +39 071 7506112
Fax +39 071 7501642
info@sidacadriatico.it
www.sidacadriaticosrl.it

METALSISTEM SARDEGNA Gruppo METALSISTEM
07100 Sassari (SS) - Italy
Z.I. Predda Niedda Nord, str. n. 3
Tel. +39 079 260 559
Fax +39 079 263 3604
info@metalsistemsardegna.com
www.metalsistemsardegna.com

VIERRE SISTEM
Gruppo METALSISTEM
37060 Caselle
di Sommacampagna (VR) - Italy
Via dell'Artigianato, 24
Tel. +39 045 858 12 12
Fax +39 045 858 11 66
info@vierresistem.it
www.vierresistem.it

PRODUZIONE / PRODUCTION

METALSISTEM
SISTEMI E STRUTTURE PER IL MAGAZZINO
38068 Rovereto (TN) Italy
Viale dell'Industria, 2
Tel. +39 0464 30 30 30
Fax +39 0464 30 30 31
info@metalsistem.com
www.metalsistem.com

SIDAC
Gruppo METALSISTEM
25064 Gussago (BS) Italy
Via Mandolossa, 100

ITALIANA ARREDAMENTI
25020 Gambara (BS) Italy
Villaggio Europa, 8

Tel. +39 030 2526 511
Fax +39 030 956110
info@metalsistem.com
www.metalsistem.com

LUONISISTEM
Gruppo METALSISTEM
21013 Gallarate (VA) Italy
Via Monte Leone, 25
Tel. +39 0331 79 36 19
Fax +39 0331 77 04 07
info@luonisistem.it
www.luonisistem.it

OBCHODNÍ SPOLEČNOST KREDIT
Gruppo METALSISTEM
Slavkov 284
687 64 Horní Nemci (UH)
Repubblica Ceca
Tel. +420 572 648615
Fax +420 572 648071
kredit@oskredit.cz
www.kredit.cz

JOINT
MACHINES & TECHNOLOGIES
31045 Motta di Livenza (TV) Italy
Via Friuli, 32 - Z.I. Sud
Tel. +39 0422 863035
Fax +39 0422 861939

SMETAR
Gruppo METALSISTEM
70017 Putignano (BA) Italy
Via Maestri del Lavoro n.c. - Z.I.
Tel. +39 080 405 41 54
Fax +39 080 405 41 43
info@smetar.it
www.smetar.it

THE GROUP

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Founded in 1968, METALSISTEM commenced its activities specialising in the design and production of machinery for the cold profiling of metals.
The experience gathered, numerous highly innovative patents resulting from intense research and development and the considerable market success of the first range of cold form zinc coated profiles quickly channelled METALSISTEM into the production of the latter of its activities.
Today the METALSISTEM Group is an articulated network of companies with its head office and main production facility in Rovereto, Italy.
The Group has consolidated its position as one of the major industries within the Material Handling Sector.
Through products and services aimed at providing complete assistance for all warehousing, product showcasing and sales outlet requirements, the companies of the METALSISTEM Group are able to offer their customers a wide range of products of the highest quality, highly competitively priced, with very rapid delivery times and a first class back up service, as well as tailor made solutions providing efficient and rational use of internal storage areas and material handling environments.
Lightness, strength and modular form, coupled with the ease of integrating and expanding already existing structures are but a few of the successful features of the METALSISTEM storage and shelving systems.
The success of the METALSISTEM Group is the result of a precise managerial choice based on research of new production technologies and continuous development and innovation of its product range. A direction which has produced numerous international patents (testament to the uniqueness of the METALSISTEM product), continuing improvements in safety, quality and versatility.
METALSISTEM's company strategy is to offer products of the highest quality, very competitively priced, with rapid delivery times backed up by a first class service.
The numerous product lines are conceived and designed by METALSISTEM's internal Research and Development Centre, as are the profiling lines and equipment required for their manufacture.
The automated production facilities for the cold profiling of metals have enabled METALSISTEM to achieve one of the highest levels of productivity in the world, today.
Rigorous laboratory tests are conducted on the prime material entering production, and on the final product, thus ensuring the continuing evolution of efficiency and quality standards.
All products have elevated structural characteristics and ensure high quality standards recognised by the most important European certification bodies, such as Germany's TÜV Product Service GmbH, Austria's Ö-NORM, Rome's I.S.P.E.S.L, ACAI/CISI (Associazione Costruttori Acciaio Italiani - Sezione Costruttori Italiani di Scaffalatura Industriale), the latter of which METALSISTEM has membership, and others.
The company's ISO 9001 quality assurance system as well as its environmental management system ISO14001 and the health and safety BS OHSAS 18001, are certified by RINA.
With an annual turnover of exceeding 260 Million Euro, the METALSISTEM Group premises occupy a total area of 230.000 m2, 125.000 of which are dedicated to production.
The METALSISTEM Group affiliated companies and distributors provide a world wide commercial network covering the domestic market and the industrialised nations of the world, able to satisfy the most demanding needs.
We value greatly the high level of trust that is placed in us by our customers and feel that it is proof of the quality and reliability of our products.

SAFETY STANDARDS AND CALCULATION ASSUMPTIONS

The correct use of a product, distinguishes both the Customer and the Manufacturer.
METALSISTEM recommends that Customers make use of their product in strict conformity with the design characteristics given and standards of best practice.
The design and assembly of the racking systems must be carried out by qualified personnel.
METALSISTEM is not responsible for any improper or inappropriate use of its product.

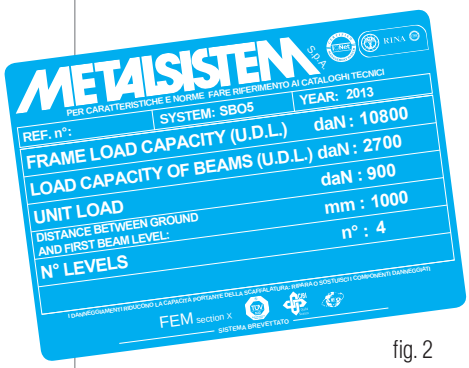


fig. 2

a) Tolerances, deformations and clearances
The Metalsistem documentation considers class 400 (wide and narrow aisle without automation) and class 300 (very narrow aisle without automation) pallet racking installations as defined by the UNI EN 15620 standards. Installations of classes other than these require more stringent structural and deformation characteristics which require the intervention of the Metalsistem Technical Office.

a1) Suitability of the floor
Before commencing a project the suitability, or adequacy of the pavement or floor slab to support the installation loads must be confirmed. The client must supply the necessary technical data for this evaluation. Unless otherwise expressly mentioned, the floor tolerances shall be in accordance with the UNI EN 15620 Standard.

a2) Clearances
The minimum clearance of the installation from the building and its fixtures must be agreed with the client, using the UNI EN 15620 standard as reference.

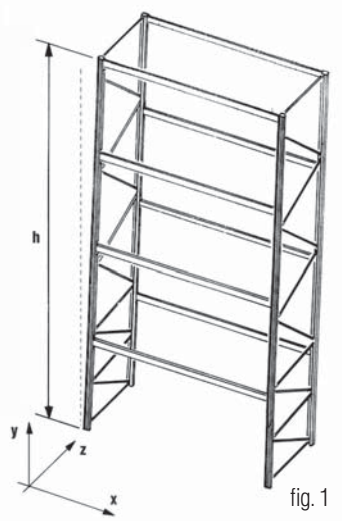


fig. 1

b) Assembly
The rack assembly must be carried out by specialized personnel in conformity with national occupational and safety laws and the information contained in this Technical Manual. Particular attention must be taken to ensure that all frame bracing components are tightly bolted and that all safety apparel has been properly assembled (Refer also to the "Pallet Racking Operating and Maintenance Manual code MUM01").

c) Rack alignment
The vertical plumb of the pallet racking frames must be checked along both the depth (Z) and length (X) directions. The UNI EN 15620 standard states that, unless more restrictive tolerances have been specified, the maximum permissible deviation off both directions must not exceed H/350 for class 400 installations and H/500 for class 300 installations, where H represents the height of the uprights expressed in millimeters. Refer to the "Pallet Racking Operating and Maintenance Manual MUM01" for a more detailed tolerance explanation.

d) Safety signage and load bearing capacity plaques
Refer to National legislation for the application safety signage to the installation. In Europe, the 92/58/EEC directive and its amendments provide the minimum acceptable level of safety and/or health signage at work.
The minimum level of safety signage that must be placed on every installation include:
- Generic warning plaque (consisting in an exclamation mark) (Italian legislative decree 81/08, attachment XXV);
- Load bearing capacity plaque formatted as an information sign. These must be placed in clearly visible locations showing year of assembly, frame series and load bearing capacity, beam pair load or shelf load bearing capacity (uniformly distributed load), load unit, height of the first beam from ground and the number of levels (Fig. 2);

It is also advisable to provide:
- Clearly marked emergency exits, prohibited dangerous areas.

e) Racking safety standards
Frames must always be fixed to the floor slab with two (2) M10x80 anchor bolts per upright.
In applications where the frame height is greater than 5 times the frame depth for single entry rows or 10 times a single frame depth for double entry rows, the racking must be accessorized with portal beams or wall ties. Note that walls ties are possible only after confirmation of the walls structural adequacy which must be confirmed by the property owner. It is strictly prohibited to tie to walls in seismic areas.
Double sided frames are defined as a pair of frames placed one behind the other and connected by pairs of adequately dimensioned spacer bars placed at the connection points of the frame diagonal spacer bars however never more than 1500mm apart.
The use of portal beams may be avoided in single entry runs if the following instructions are applied.
For frame base to height ratios:
Up to 1:5
: Standard frame bracing;
Between 1:5 and 1:6
: Frame with 8 short diagonal spacer bars;
Between 1:6 and 1:7
: Frame with 8 short diagonal spacer bars;
: Maximum bay length of 2700mm with;
: 20% reduction in the admissible frame load bearing capacity for unbraced bays;
: 10% reduction in the admissible frame load bearing capacity for braced bays.

Upright protection must be provided to all frames subjected to the risk of collision by material handling equipment (refer to "Pallet Racking Accessories Manual", code MT07).

f) Reference standards
The structural calculation reference standard are:
- UNI EN 15512:2009 "Steel static storage systems - Adjustable pallet racking systems - Principles for structural design";
- UNI EN 15620:2009 "Steel static storage systems - Adjustable pallet racking - Tolerances, deformations and clearances";
- UNI EN 1993-1-3:2007 "Eurocode 3 - Design of steel structures - Part 1-3: General rules - Supplementary rules for cold-formed members and sheeting".

Materials reference standards:
- UNI EN 10346:2009 "Continuously hot-dip coated steel flat products - Technical delivery conditions";
- UNI EN 10149-1:1997 "Hot-rolled flat products made of high yield strength steels for cold forming. General delivery conditions.";
- UNI EN 10149-2:1997 "Hot-rolled flat products made of high yield strength steels for cold forming. Delivery conditions for thermomechanically rolled steels";
- UNI EN 10204:2005 "Metallic products - Types of inspection documents (3.1 certificate)".

Other reference standards:
- UNI EN 15635:2009 "Steel static storage systems - Application and maintenance of storage equipment";
- ACAI-CISI testo unico del 11/05/2004: "Technical standards for pallet racking";
- ACAI-CISI testo unico del 26/02/2004: "Self certification regulations".

g) Structural component testing
The structural engineering calculations are based on results derived from laboratory testing conducted by the Engineering Faculty of the University of Trento and by the laboratories of the Metalsistem Research Centre.

h) Structural calculations
The structural calculations have been made using the finite element method with the ANSYS, STRAUS7 and IT.RACKS! codes following the UNI EN 15512 standard.

i) Beam pair load bearing capacities
The beam pair load bearing capacities have been calculated using the following assumptions:
- uniformly distributed load;
- calculation results following the UNI EN 15512 standard;
- beam pair collapse safety coefficient minimum of 2;
- maximum deflection of 1/200 of the beam length;
- the mandatory installation of safety pins to beams.

The load bearing capacities of the beams are

based on the use of Euro pallets in a good state of repair.

j) Frame load bearing capacities

The tables contained in the manual are used to find the frame series that match the load demands of a pallet racking installation as a function of the height from ground of the first pair of beams (first loading level), the beam series, the length of the beam pair and of the height of the frame.

These tables are applicable to pallet racking with:

- A distance between levels equal to or less than the height of the first beam from ground;
- An equal load acting on all levels;
- Every upright anchored to ground with at least two (2) anchor bolts.

Given that the frame load bearing capacity is also dependent from other factors (center distance between the levels greater than the first, frame base to height ratio, seismicity of the area, environmental factors such as vibrations, atmospheric conditions, etc), contact the Metalsistem Technical Offices regarding doubts concerning non-standard applications, large or complex installations requiring optimization, or structural controls on specific solutions.

k) Installation environment, use and maintenance of the product

The load bearing capacities and the material finish assume that the product is assembled in dry internal environments. Applications in external or highly aggressive environments forfeits the guarantee of the surface treatment. Contact the Metalsistem Technical Department for structural verification of outdoor applications.

For guidelines regarding use of installation and the programmed inspections of components, required by the UNI EN 15635 standards, refer to the "Pallet Racking Operating and Maintenance Manual MUM01".

l) Bracing

The bracing system, made up of a bracing tower or by cross bracing, its frame connection accessories and horizontal cross bracing components, is a structural element which limit the movement of the racking. This system is designed to absorb the horizontal forces caused by the plumb errors and by the placement of the merchandise as defined by the UNI EN 15635 standards.

m) Raw material

The 3.1 certificate (UNI EN 10204 standards) guarantees the mechanical properties of the high tensile structural steels used by Metalsistem production.

The mechanical properties of the structural steel may vary from between S315 to S355 for pickled steels and between S350 and S400 for galvanized steels (UNI EN 10346 and UNI EN 10149) depending on the components structural application.

The surface treatment of the structural steels may either be hot dip galvanized using the SENDZIMIR process or powder coated pickled steel.

n) Fire protection

Refer to the "Pallet Racking Operating and Maintenance Manual MUM01" document for information regarding standard applications, reaction and resistance to fire. It is the duty of the racking installation designer to check if the client requires the installation to have allowances for the integration of fire protection measures.

o) Controls

The raw material entering production sustains on going testing by Metalsistem internal quality control. The tests confirm the mechanical properties (elongation, yield, rupture), dimensional characteristics (gauge and width) surface finish (absence of defects, uniformity, resistance of coating). Metalsistem has its own internal testing facilities able to conduct SIT (Servizio di Taratura in Italia) certified tensile tests (approx. 1000 per year) and dimensional tests. Saline mist, scratch resistance and other tests are conducted by external facilities.

Testing of finished products is conducted by both the internal Metalsistem Quality Control Office and externally by the product certifying agency TÜV. The system certifying agency RINA guarantees consistent product quality.

p) Certifications

Metalsistem production has been certified by the following international standards:

- Centro di Trasformazione - Italian metal fabricator certificate No. 7537/10;
- Environmental Management System ISO 14001;
- Quality Management Standard - ISO 9001;
- TÜV;
- ACAI CISI - quality and safety
- AEO FULL - authorized economic operator;
- UNI EN ISO 3834 - qualified welding processes.

q) Customized applications

Contact the Metalsistem Technical Office for solutions and / or calculations of non-standard applications.

Metalsistem reserves the right to modify the technical characteristics of its products at any time it sees fit.

Technical data, dimensions and characteristics given in this document are indicative only.

r) Safety apparel

The installation designer, in consultation with the client, must review the type, locations, and needs of the safety apparel to be fitted to the installation (e.g.: upright and frame protection, floor guide rails, safety netting, walkway protection and covers, seismic design) in accordance with the risk and use of the areas under examination.

THE COMPANY TODAY

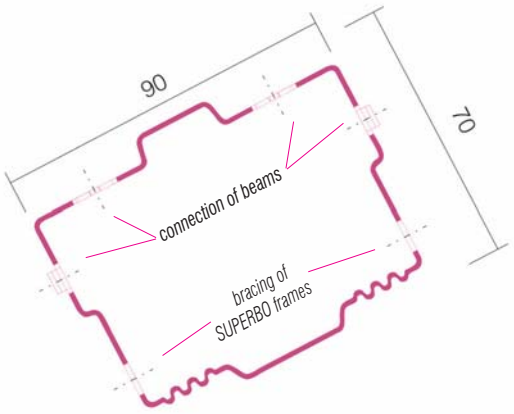
METALSISTEM products are now in use in many installations throughout the world, and after more than 45 years production, we value greatly the high level of trust that is placed in us by our customers and feel that it is proof of the quality of our products.

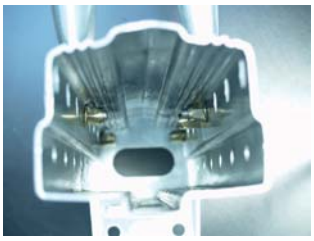
The racking components are produced on fully automated production lines. The folding and cold processing techniques developed by METALSISTEM are designed to obtain light and extremely strong components.

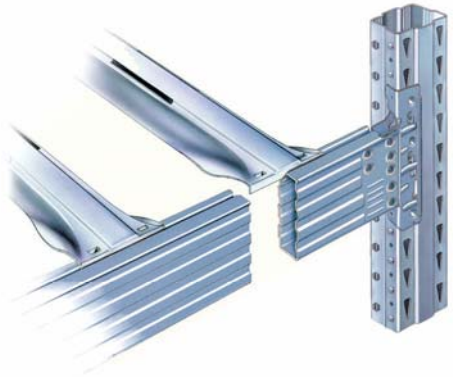
Lightness, strength and modular form, coupled with the ease of integrating and expanding already existing structures are but a few of the successful features of the METALSISTEM Industrial Storage Systems. Ideal storage solutions for a whole host of products supplied worldwide are created here thanks to a total commitment to research and development.

The METALSISTEM Technical Department is at the complete disposal of its customers, to study their individual needs and to propose the most effective solutions.

See more
on the web

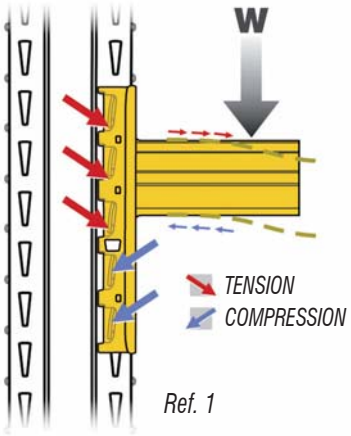




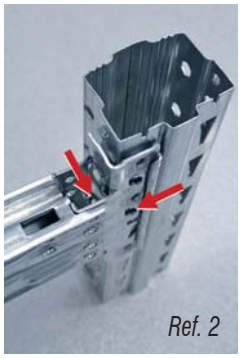


The unique beam-upright connection has a series of distinctive features, including:

- Each beam connector has 5 anchor points; 3 of them operating in tension and 2 in compression (Ref.1).
- The connection between beam and upright is made via tapered slots in the upright section, providing an improved connection with increased load.
- The specific design features of the end connector prevent rotation of the connector in the upright section and improve the load bearing capacity of the beams.
- Optimised performance through double faced upright connection.



Ref. 1



Ref. 2

Galvanised beams with riveted, double sided beam connectors

See more on the web

THE PRODUCT

SUPERBO 4-5-6-7 series are interchangeable with the SUPERBUILD and UNIBUILD heavy duty pallet racking series and have been designed to satisfy all requirements of medium to heavy duty pallet storage.

SUPERBO 4-5-6-7 series are available in four different frame load options, up to 14 tons.

The SUPERBO 4-5-6-7 series are well known for their utmost performance in terms of resistance against torsional deflection, thanks to the closed box section of the uprights.

Thanks to the rigidity of the frame, SUPERBO 4-5-6-7 provides significant resistance against rupture and deformation and good performance in case of accidental impact.

The frames are made from prime quality, certified, high tensile, hot dipped galvanised steels (SENDZIMIR procedure), thus ensuring a high level of durability. All structural components are made from high tensile steels, certified according to EN 10204 3.1. The frames are assembled using threaded rivets and screws, allowing for an easy and quick assembly and providing utmost rigidity of the connection between uprights and frame bracing components.

The beams are profiled sections with quadruple gauges at points of maximum stress for high loading capability. A channel running along the top face of the beam provides a lip within which a variety of components may be inserted, such as shelf panels, secondary beams, drum cradles and a.o. (see next pages). Beams with riveted, double sided beam connectors distinguish themselves by an optimised upright/beam connection, featuring utmost mechanical precision regarding beam length and position of the connector (Ref. 2).

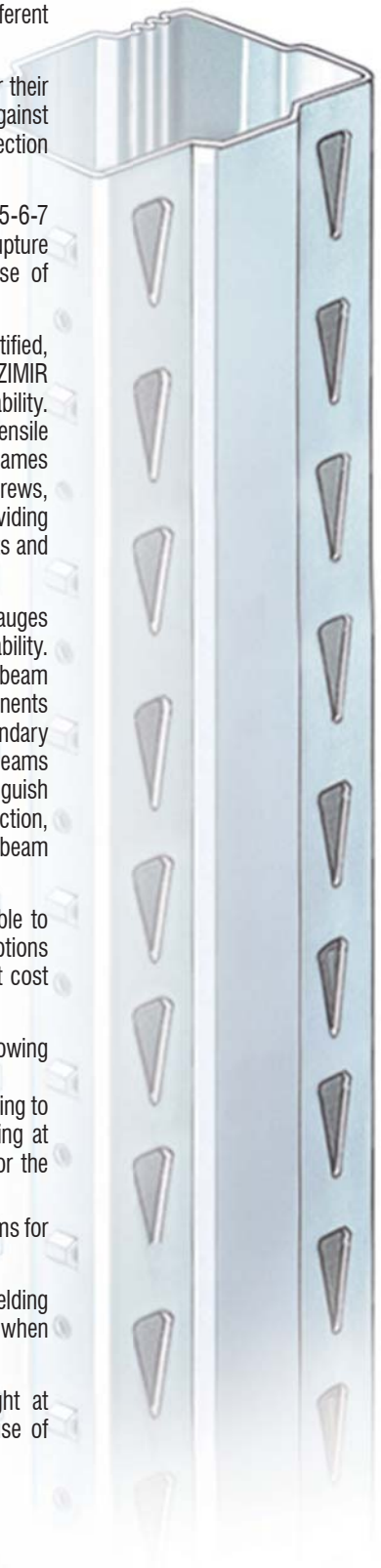
A wide range of load capacity options is available to provide the best possible beam load bearing options for each application, thus ensuring the very best cost efficiency.

As far as the beam surface is concerned, the following options are available:

- entirely zinc coated beams, zinc coating according to the SENDZIMIR procedure, featuring zinc coating at the inside and outside of the bream profiles for the best cost&quality ratio;
- zinc coated and additionally powder coated beams for utmost protection.

Zinc coated beams, thanks to the absence of welding seams, are less subject to oxidation and fragility when used in cooling rooms.

All SUPERBO beams can be adjusted in height at intervals of 50 mm, thus facilitating the best use of available space.

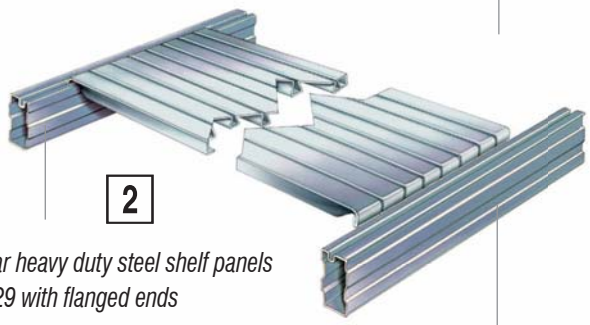


MAIN STRUCTURAL COMPONENTS

The design of the various components is the result of rigorous technical testing and the highly specialised knowledge developed over years of experience in the field of metal processing.

This experience has enabled METALSISTEM to offer innovative products of the highest quality, highly competitively priced, and to provide a highly technical solution to the most important storage problems, such as rapid assembly, stability, low cost and load bearing capacity.

1 *Heavy duty metal base plate and plastic top cap*



2

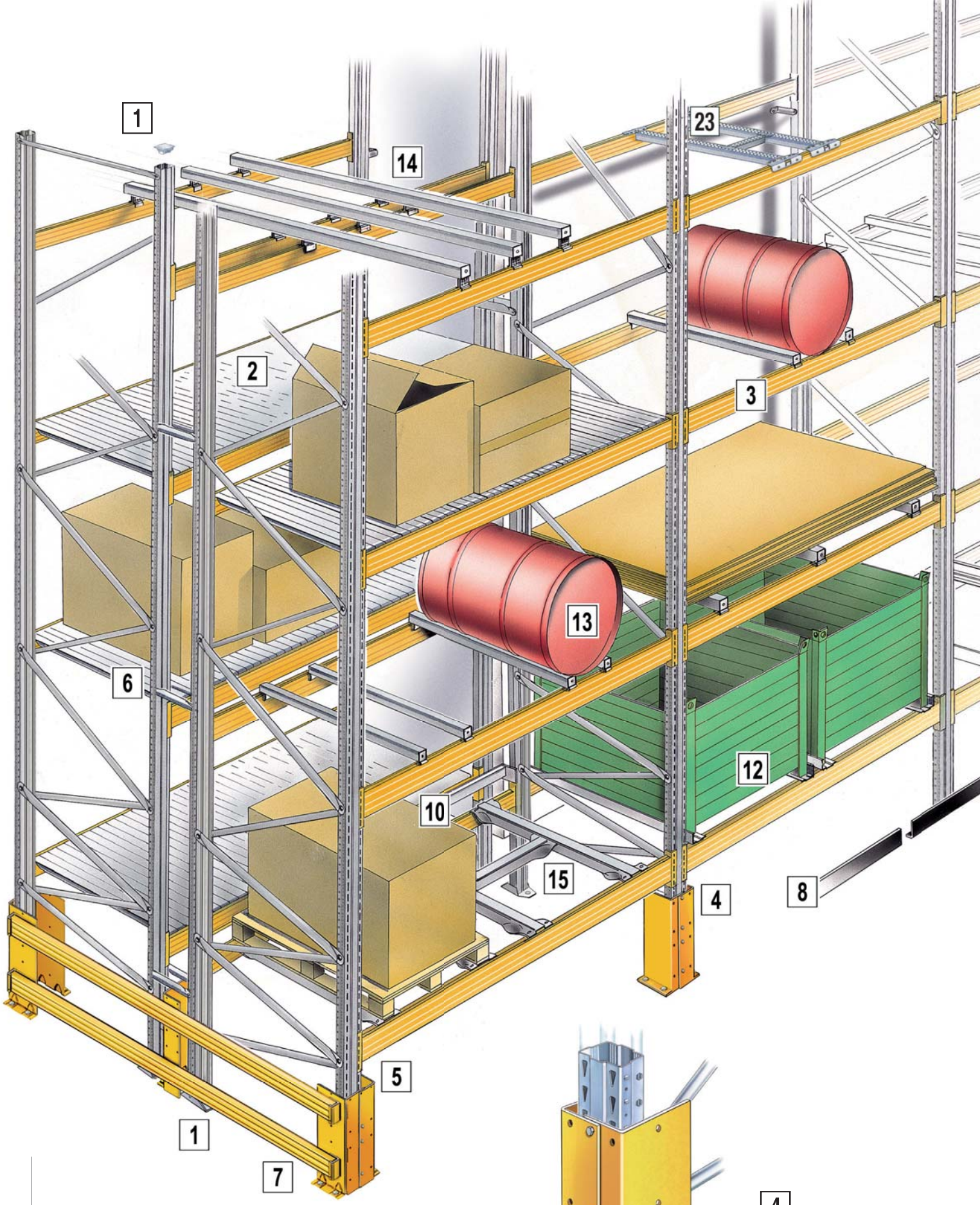
Modular heavy duty steel shelf panels H25/H29 with flanged ends

Beams used for pallet racking or for heavy duty steel shelf panels to be inset

3

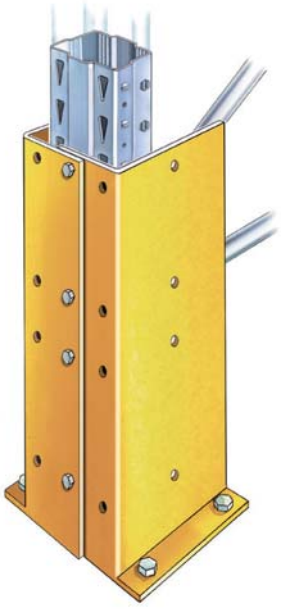
The use of safety pins is mandatory!

Beam safety pin



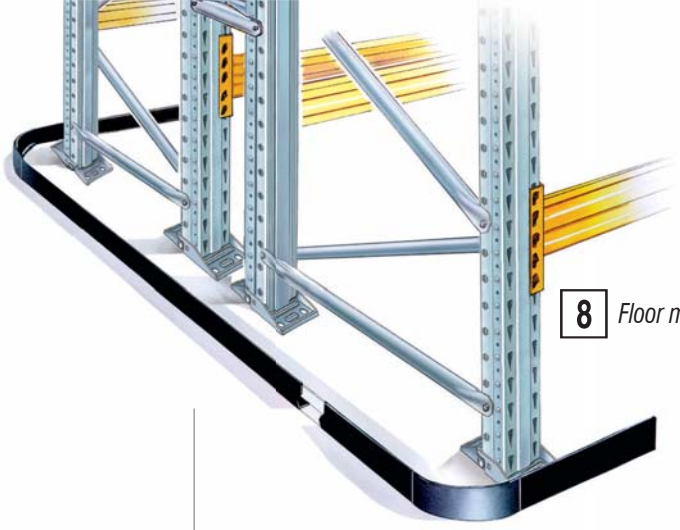
POWDER COATING FINISH OF THE BEAMS
Standard colour: yellow, RAL 1004.

- Hot wash degreasing and iron phosphate pre treatment;
- Application of thermosetting powder paint;
- Curing at temperature of approx. 240° C in a force ventilated air circulation oven.

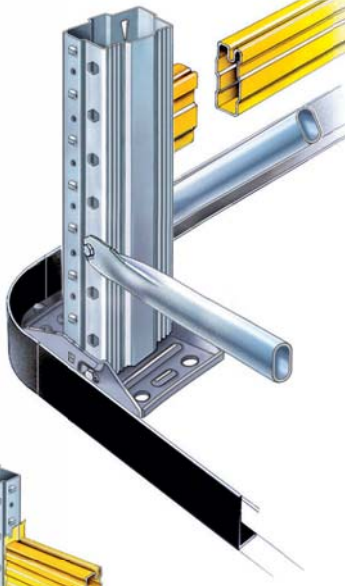


4

Upright protector

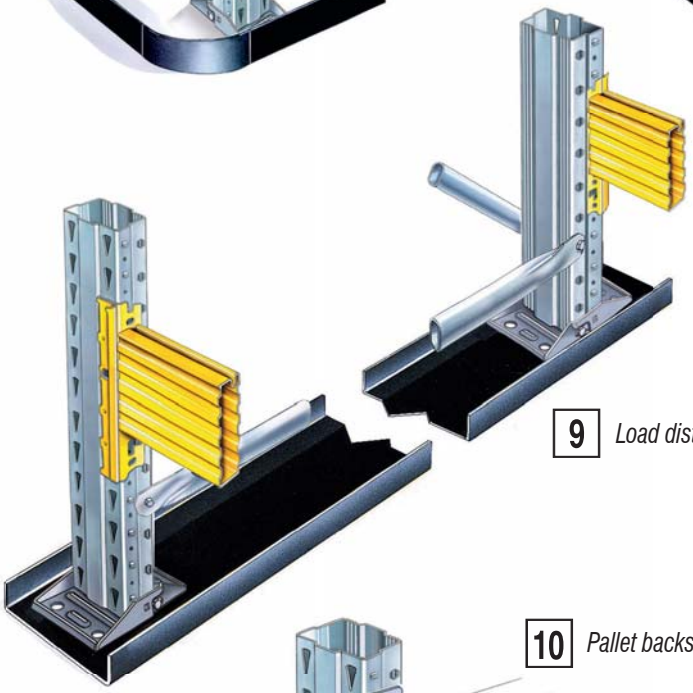


8 *Floor mounted guide rail*

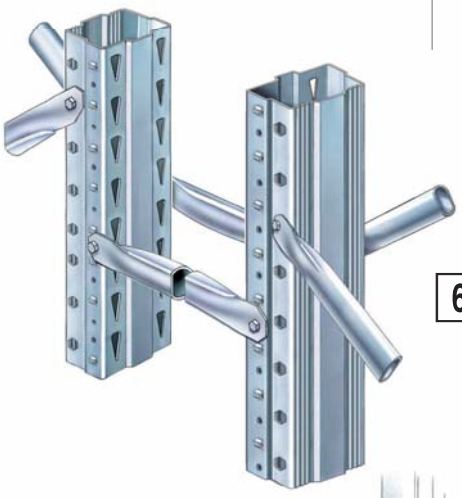


ACCESSORIES

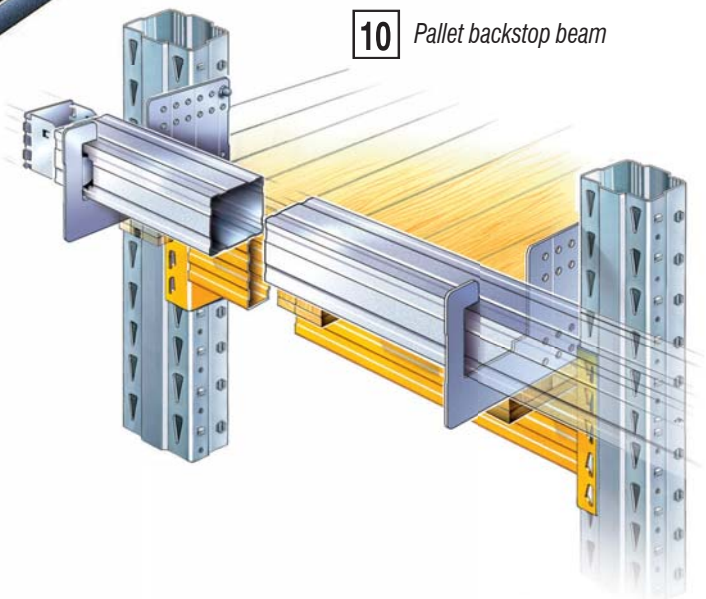
Regarding technical data, characteristics and dimensions, customers should refer to the Technical Reference Book of the SUPERBO series (Doc. MT12) as well as to the Technical Manual of Accessories (Doc. MT07).



9 *Load distribution plate*

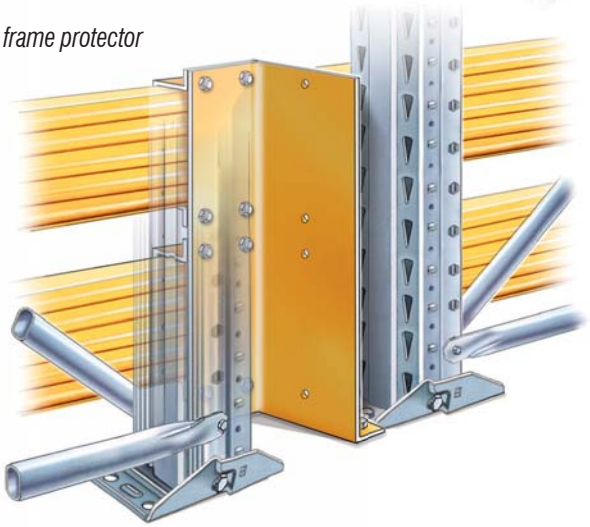


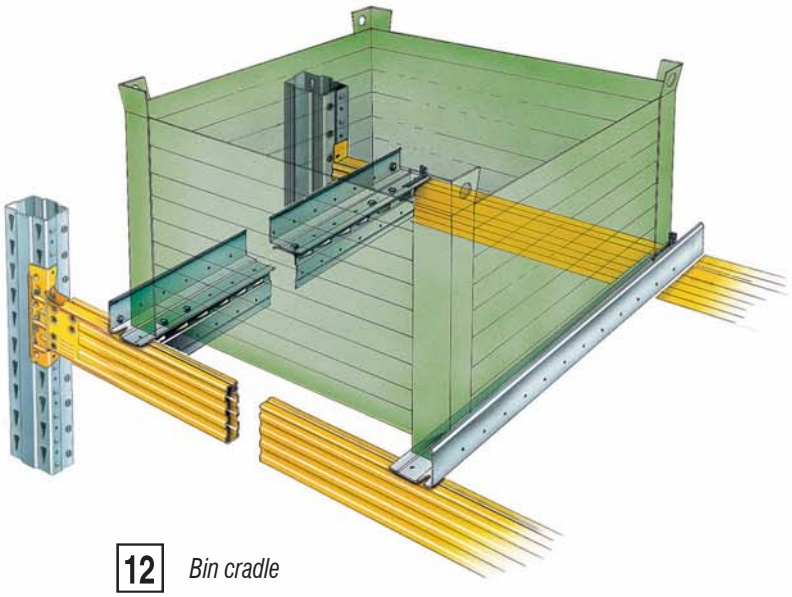
6 *Row spacers*



10 *Pallet backstop beam*

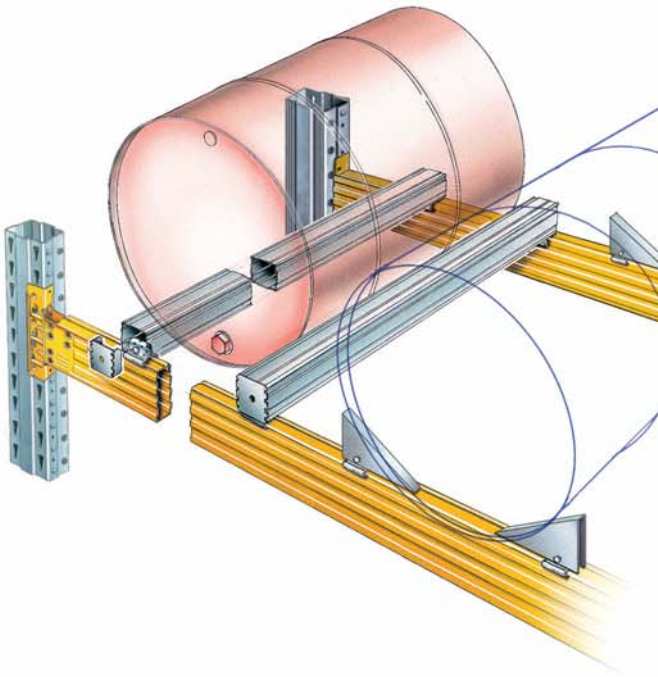
11 *Double frame protector*

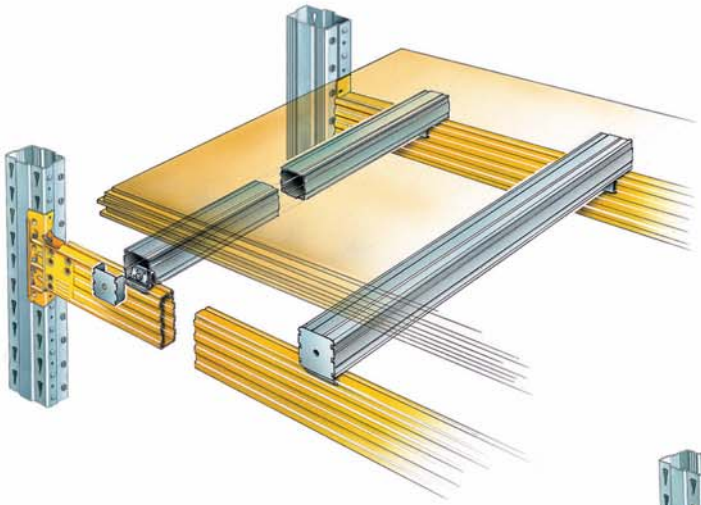




12 *Bin cradle*

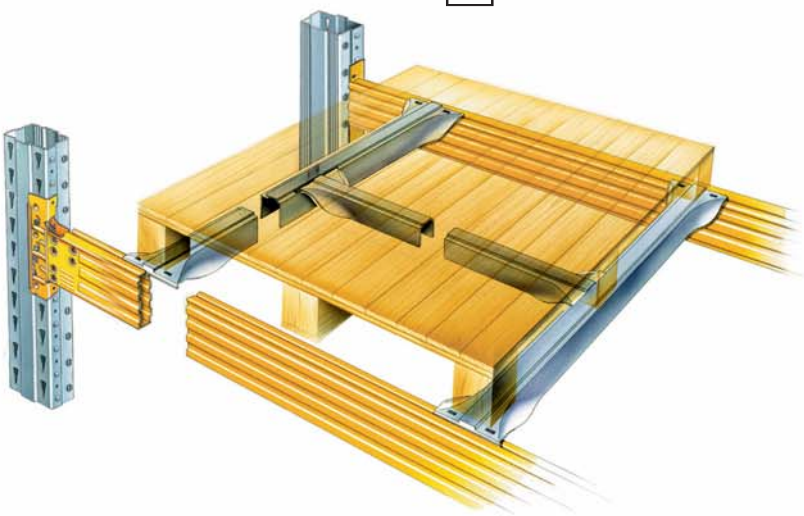
13 *Drum cradle*
Drum wedges

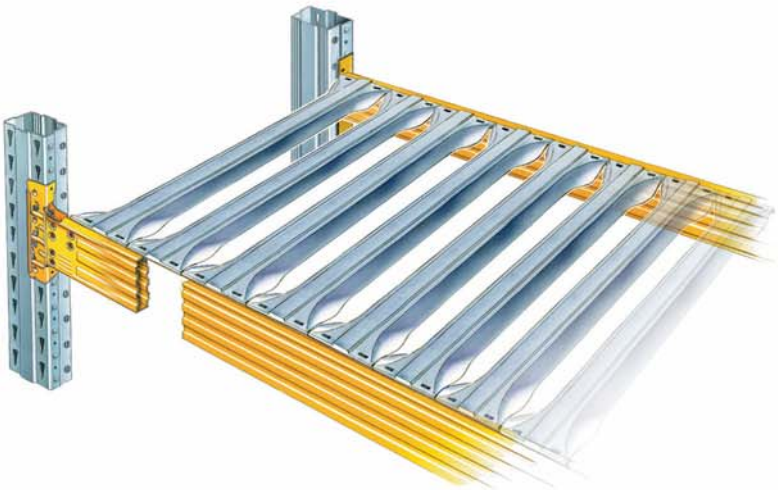




14 *Raised pallet support bar*

15 *Combined pallet support bars*

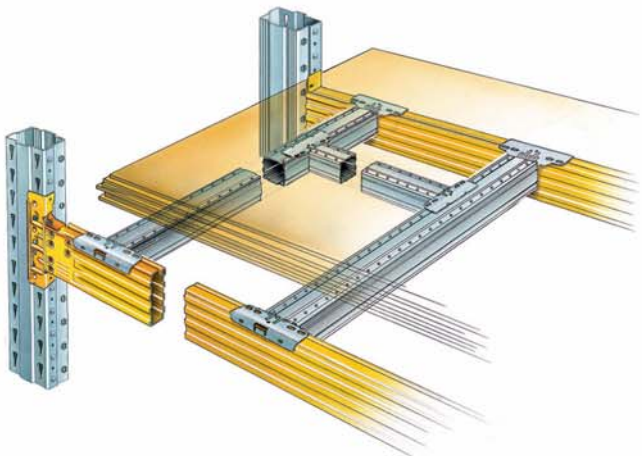




16 *Lightened secondary beams*

For use in installations equipped with sprinkler systems (shelf surface with < 50% coverage)

23 *Pallet support bar 70X70*



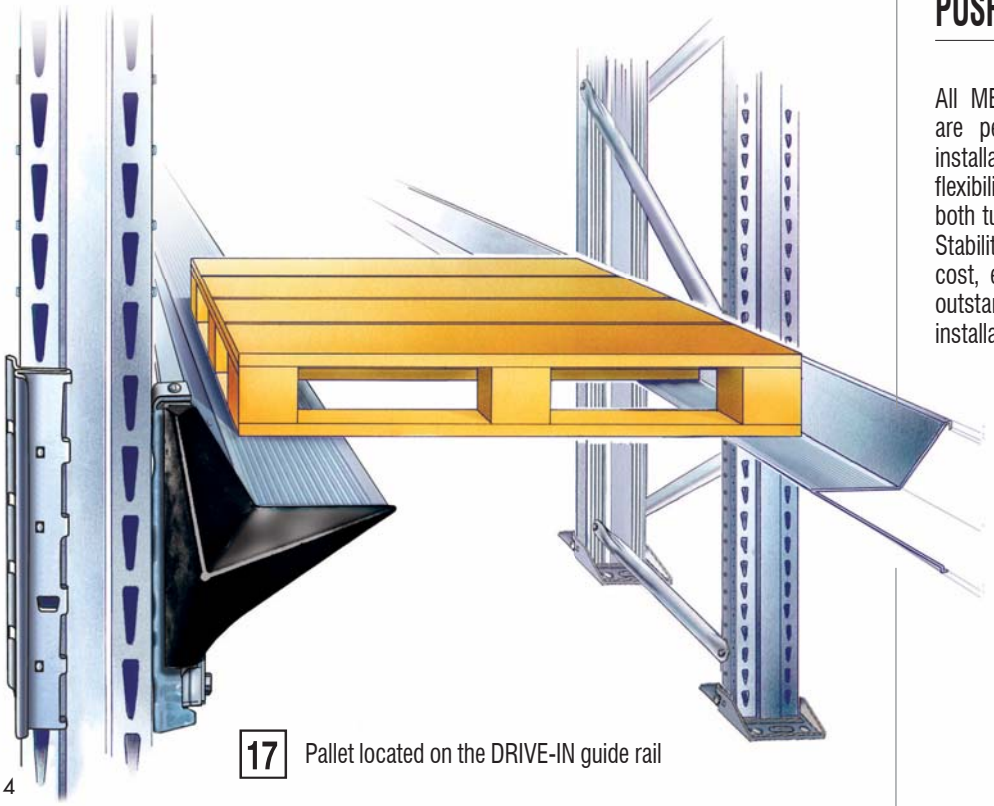
18 Entrance crescent for DRIVE-IN guide rail

DRIVE-IN

The DRIVE-IN racking system allows the maximum use of space and volume due to the elimination of access aisles.

The storage volume is therefore more than doubled compared with standard pallet racking.

Two kinds of installation are possible: DRIVE-IN or DRIVE-THROUGH.



17 Pallet located on the DRIVE-IN guide rail

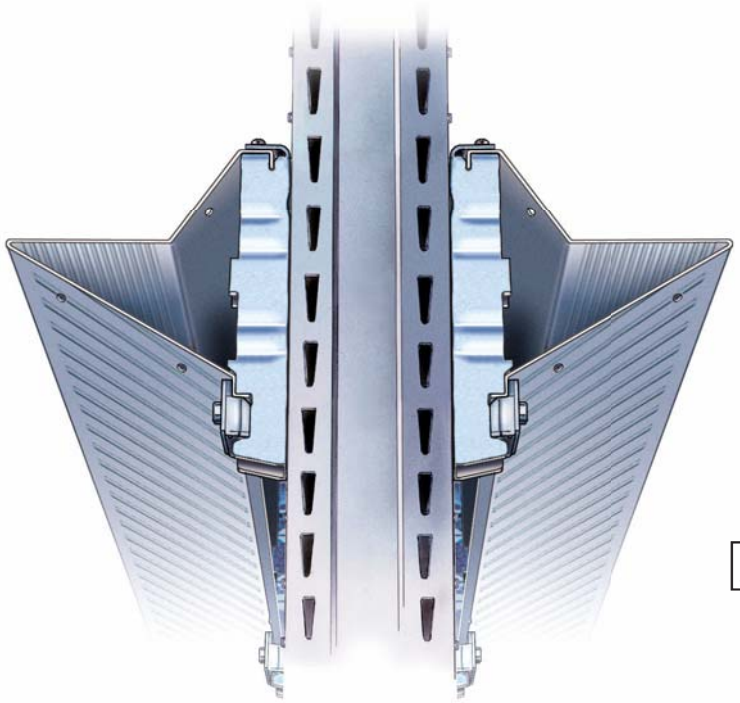
PUSH BACK

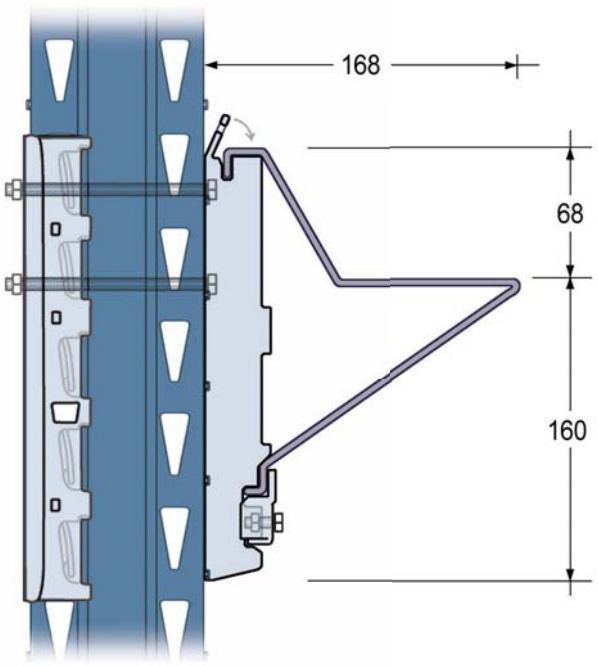
All METALSISTEM pallet racking series are perfectly suitable for PUSH-BACK installations, providing increased usage flexibility and pallet accessibility across both tunnels and storage levels in height. Stability, storage density, low maintenance cost, ease of use, are but a few of the outstanding features of PUSH-BACK installations.

20 DRIVE-IN guide rail located on a single bracket

19 DRIVE-IN guide rail located on a double bracket

21 Entrance crescent for DRIVE-IN guide rail





22 Double sided DRIVE-IN guide rails located on single brackets

METALSISTEM® IGQ FEM section X RINA SOA RINA

Our dedication to making a difference: creating **MORE VALUE** with **LESS IMPACT!**
METALSISTEM is proud to adopt **ECO-EFFICIENCY** concepts in its business model.
ZERO emission and ZERO ecological impact thanks to a **UNIQUE MANUFACTURING PROCESS!**
METALSISTEM has achieved energy self-sufficiency through the use of renewable resources.

more information here

SUPERBO

STEEL STORAGE SYSTEMS MODULAR STORAGE SYSTEMS

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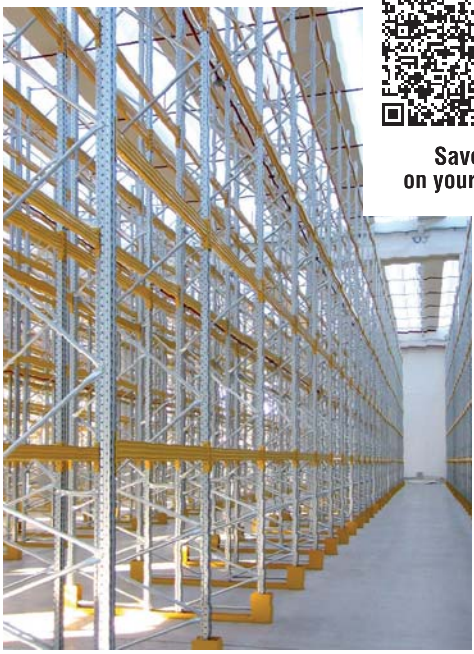

METALSISTEM®
STRUTTURE ED AUTOMAZIONE
MADE IN ITALY

METALSISTEM S.p.A.
38068 Rovereto (Tn) - Viale dell'Industria, 2 - Italy
Tel. +39 0464 303030 - Fax +39 0464 303031
info@metalsistem.com - www.metalsistem.com

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