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UNISHELF

LONG SPAN SHELVING



MODULAR



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STRUTTURE ED AUTOMAZIONE
MADE IN ITALY

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ASSOCIAZIONE
ITALIANA
PER L'EDILIZIONE
IN ACCIAIO

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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THE GROUP



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 raw 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, UNICMI - 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, 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

A product's correct technical application and its visual appearance distinguishes both the customer and the manufacturer. METALSISTEM recommends that customers make use of this product professionally and in strict conformity with the applicable Standards and the technical characteristics described in this manual. The design and assembly of projects must be conducted by expert and qualified personnel. METALSISTEM declines any responsibility for improper or inappropriate use of its products or noncompliant uses without prior written approval.



fig. 1.2

a) Tolerances, deformations and clearances

This manual considers hand loaded long span shelving installations. The UNI EN 15620 standard has been referenced as the basis for this application.

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 installation operating tolerances and clearance of the installation from the building and its fixtures must be agreed with the client.

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

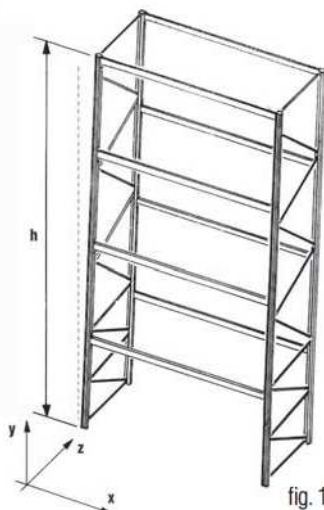


fig. 1.1

to ensure that all frame bracing components are tightly bolted and that all safety apparel has been properly assembled (Refer also to the "Archive Racking Operating and Maintenance Manual", code MUM18).

c) Shelving alignment

The vertical plumb of the long span shelving frames must be checked along both the depth (Z) and length (X) directions. The FEM 10.2.06 standard states that, unless more restrictive tolerances have been specified, the maximum permissible deviation off both directions must not exceed $H/350$, where H represents the height of the uprights expressed in millimeters (Fig. 1.1). Refer to the "Archive Racking Operating and Maintenance Manual", code MUM18, for a more detailed tolerance explanation.

d) Safety signage and load bearing capacity plaques

Refer to National legislation for guide lines regarding the application of safety signage to installations. In Europe, the 92/58/EEC directive and its amendments provide the minimum acceptable level of safety signage regarding occupational health and safety in the work place.

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 as well as the frame series, its load bearing capacity, the shelf load bearing capacity (uniformly distributed load), load unit, height between shelf levels and the number of levels (Fig. 1.2).

It is also advisable to provide:

- clearly marked emergency exits and prohibited dangerous areas.

Refer to the "Archive Racking Operating and Maintenance Manual", code MUM18, for a more detailed description of the safety aspects.

e) Racking safety standards

The use of plastic base plates is prohibited.

Frames with height ≤ 3000 mm may use metal base plates (code SLACC001.95) and be fixed to the floor slab with at least one (1) M8x50 anchor bolt per upright.

Frames with height > 3000 mm must use Super 1-2-3 – UNIRACK Heavy Duty Base Plates (code 67006.95) and must always be fixed to the floor slab with two (2) M8x50 anchor bolts per upright. The maximum allowed frame base to height ratio is 1:6.

Double side frames are defined as a pair of frames placed one behind the other and connected by adequately dimensioned connection accessories placed never more than 2000 mm apart starting from the top of the frames. It is strictly prohibited to tie to walls in seismic areas.

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:

- FEM 10.2.06 "FEM Code of Practice - The design of hand loaded steel static shelving";
- 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 1993-1-1:2014 "Eurocode 3 - Design of steel structures - Part 1-1: General rules and rules for buildings";
- 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";
- UNI EN 1993-1-8:2005 "Eurocode 3 - Design of steel structures - Part 1-8: Design of joints".

Materials reference standards:

- UNI EN 10346:2009 "Continuously hot-dip coated steel flat products - Technical delivery conditions";
- UNI EN 10149-1:2013 "Hot-rolled flat products made of high yield strength steels for cold forming. General delivery conditions";
- UNI EN 10149-2:2013 "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".

Other reference standards:

- UNI EN 15635:2009 "Steel static storage systems - Application and maintenance of storage equipment";
- UNI EN 1090-1:2012 "Execution of steel and aluminium structures - Part 1: Requirements for conformity assessment of structural components";
- UNI EN 1090-2:2011 "Execution of steel and aluminium structures - Part 2: Technical requirements for steel structures";
- 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, Italy, 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, STRAU7 and IT.RACKS! programs 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:

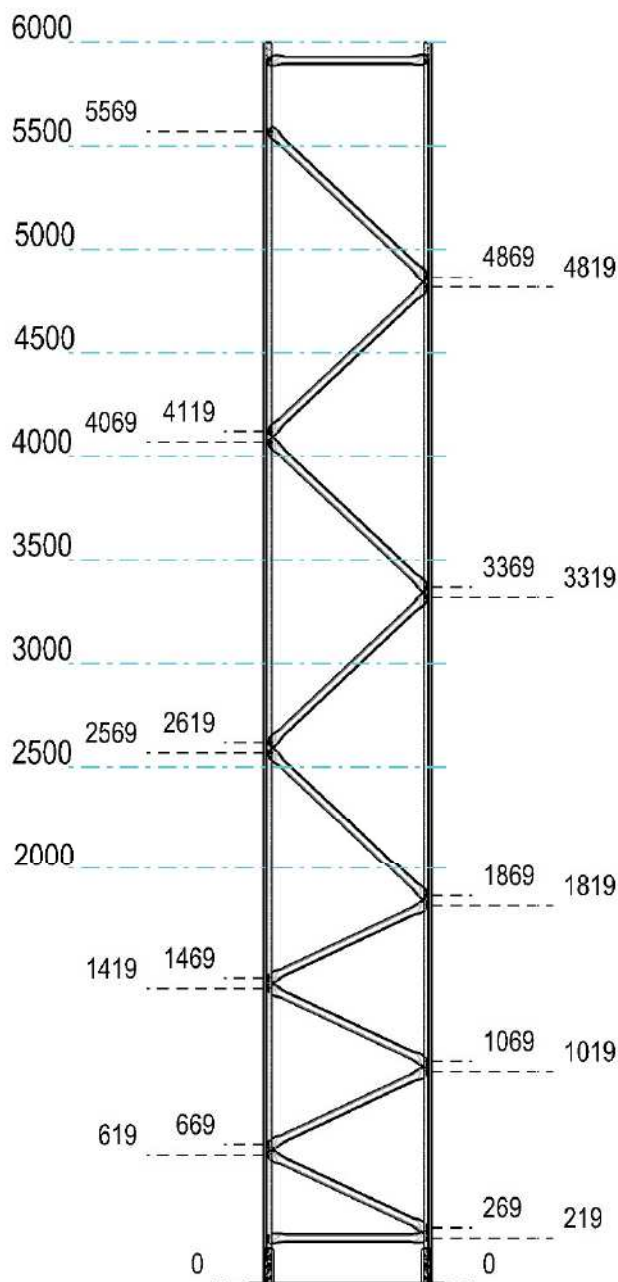
- uniformly distributed load;
- calculations in accordance with the FEM 10.2.06 standard, with material factors, $\gamma_{M0} = \gamma_{M1} = 1,1$, $\gamma_{M2} = 1,25$;
- beam pair collapse safety coefficient minimum of 2;
- maximum deflection of $1/200$ of the beam length;
- the mandatory installation of safety pins to beams;
- specific conditions listed under the load bearing capacity tables.

j) Frame load bearing capacities

The tables contained in Section 5 of this manual are used to find the frame series that match the load demands of a hand loaded shelving application as a function of the height from ground of the first pair of beams (first loading level), the beam type, the length of the beam and the number of levels.

- These tables are applicable to shelving applications 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;

UNISHELF FRAME ASSEMBLY DIAGRAM



- calculations in accordance with the FEM 10.2.06 standard, with material factors $\gamma_{M0} = \gamma_{M1} = 1,05$, $\gamma_{M2} = 1,25$;
 - every upright with $H \leq 3000$ mm using a metal base plate and anchored to ground with at least one (1) anchor bolt;
 - every upright with $H > 3000$ mm using a Super 1-2-3 – UNIRACK Heavy Duty Base Plate and anchored to the ground with two (2) anchor bolts;
 - compliance with the specific conditions listed under the load bearing capacity tables. Given that the load bearing capacity of the frame is also dependent from other factors (height of beam from ground equal to or more than the centre distance between the bay beams, 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 for specific solutions.
- The frame load bearing capacities have been determined considering horizontal forces induced by imperfections as defined by the FEM 10.2.06 standard. Horizontal forces due to wind, vibrations, impact, seismic activity or other have not been considered. If these conditions apply, contact the METALSISTEM Technical Department.

The FEM 10.2.06 Standard applies material factors which may vary between the European member states with values ranging from 1.0 to 1.1. The METALSISTEM frame load bearing capacity tables have taken a γ_{M0} value of 1.05. Clients of member states which apply other γ_{M0} values shall contact the METALSISTEM Technical Office.

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 forfeit the guarantee of the surface treatment. Contact the METALSISTEM Technical Department for structural verification of outdoor applications.

For guidelines regarding use of the installation and programmed component inspection, required by the UNI EN 15635 standards, refer to the "Archive Racking Operating and Maintenance Manual", code MUM18.

l) 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.

m) Fire protection

Refer to the "Archive Racking Operating and Maintenance Manual", code MUM18, 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.

n) Controls

The raw material entering production sustains ongoing testing by METALSISTEM internal Quality Control Department. 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), dimensional tests and performance tests (stub column, nodal stiffness, shear and deflection) on finished product. Saline mist, scratch resistance and other tests are conducted by external facilities.

Testing of finished products are 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.

o) 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;
- Health and Safety System certification OHSAS 18001;
- ACAI CISI – Quality and safety;
- AEO FULL – Authorized Economic Operator;
- UNI EN ISO 3834 – Qualified welding processes;
- EN 1090-1 – Certificate of conformity of the factory production control.

p) 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.

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.

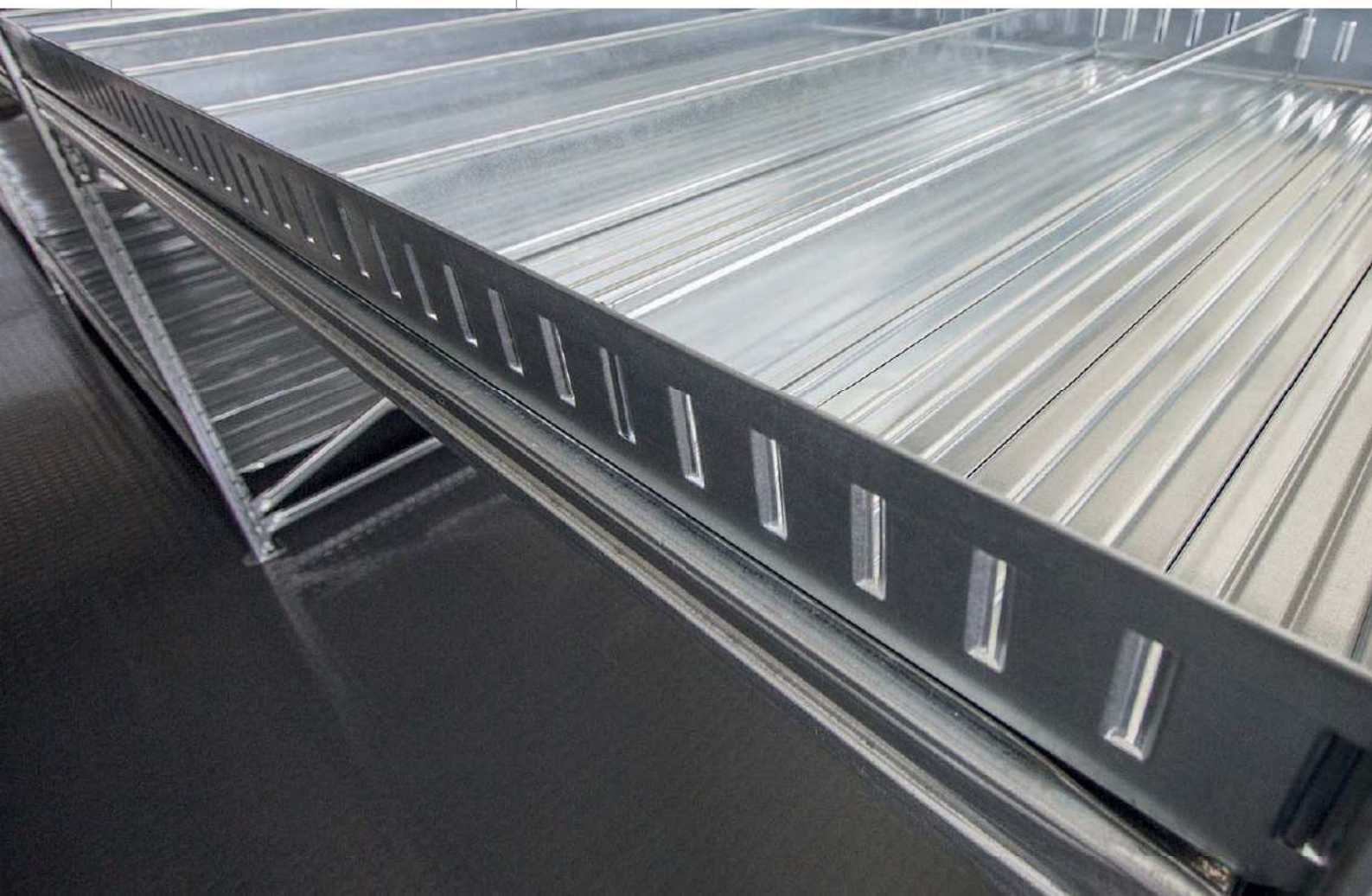
THE COMPANY TODAY

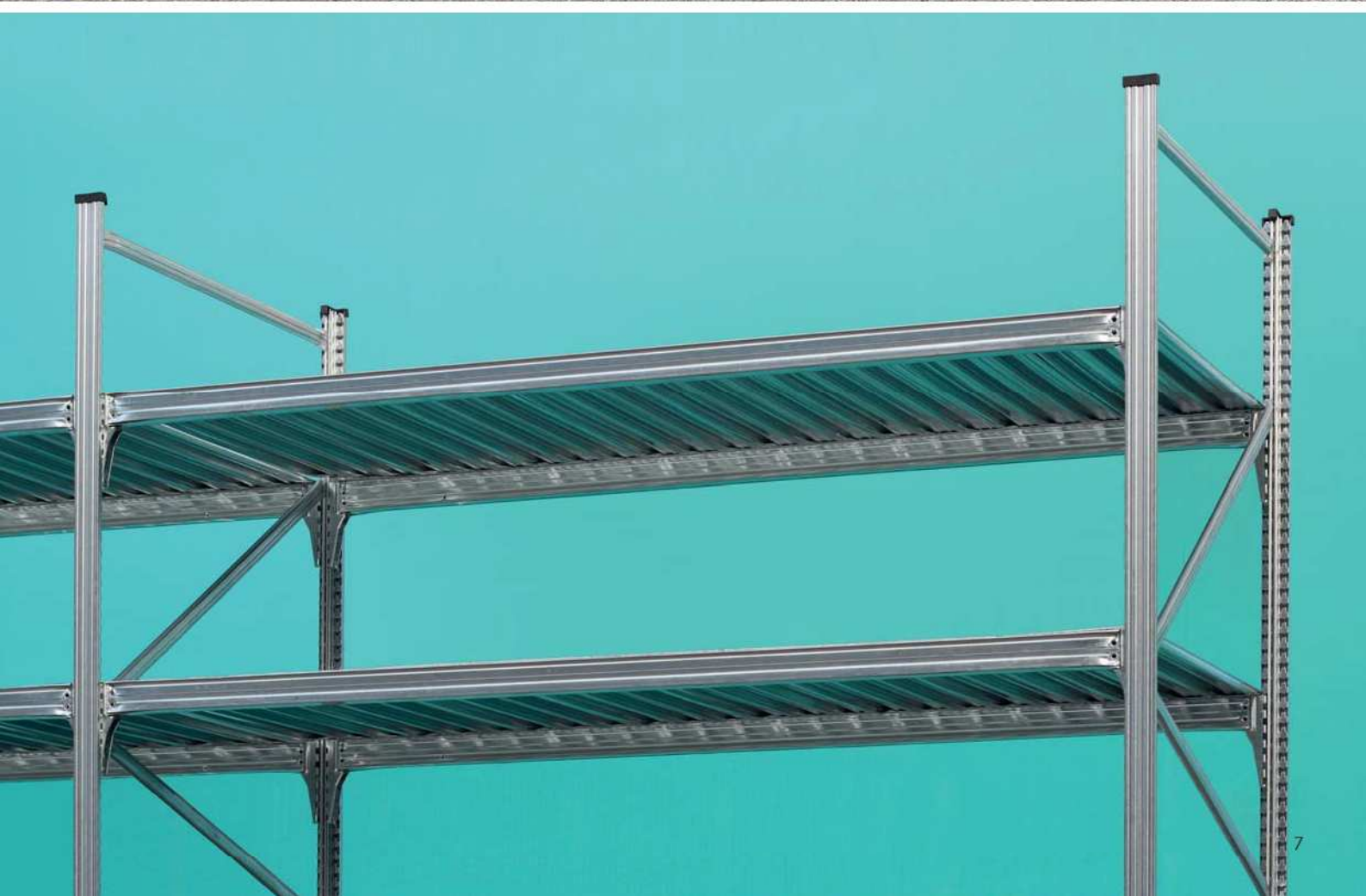
METALSISTEM products are now in use in many installations throughout the world, and after more than 45 years production, we value greatly the high level of trust that is placed in us by our customers and feel that it is proof of the quality of our products.

The shelving and 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.





THE PRODUCT

The METALSISTEM's UNISHELF series have been designed to satisfy all requirements of long span storage. Featuring beam profiles of 70 mm in height, the UNISHELF system can reach clear bay spans of up to 3000 mm and bay depths of up to 1200 mm providing remarkable load bearing capacities per bay. This solution is ideal for manual picking applications where deep shelves and wide bays are needed, for

example for large boxes, crates, cartons and other bulky items.

UNISHELF provides versatile and affordable storage solutions and can be equipped with a wide range of accessories such as dividers, plastic bins, perforated shelf panels to comply with fire regulations, hung garment's accessories, etc., according to the specific needs and requirements of each installation.

Frame depths range from 400 to 1200 mm and bay lengths from 1200 to 3000 mm. Frames are available in heights of up to 6000 mm, with load capacities ranging from 800 daN per shelf level and up to 4800 daN per frame, bringing the versatility of this product series to the highest standards.

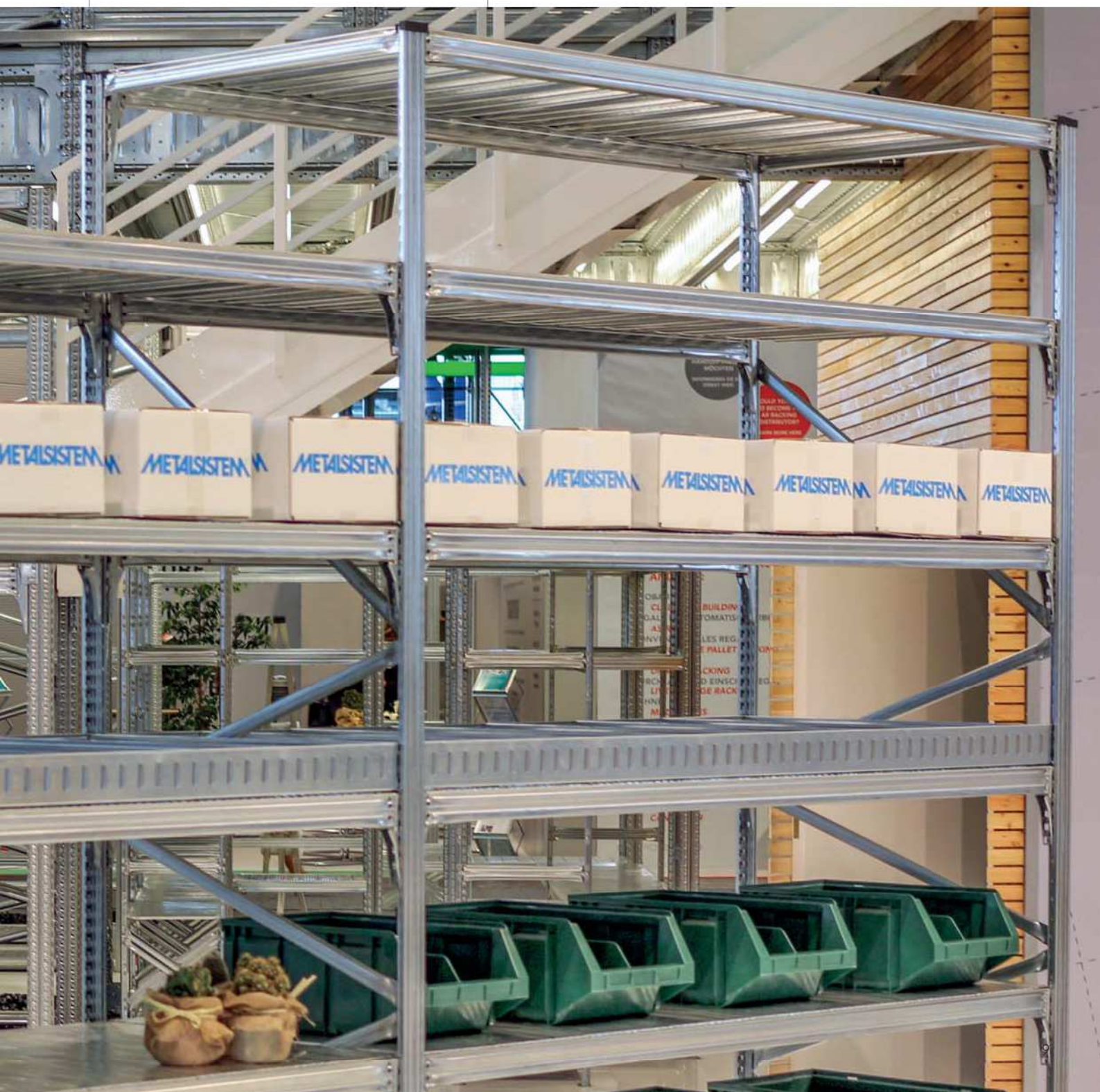


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UNISHELF series naturally inherits all of the best characteristics of the METALSISTEM product range, such as:

- adjustable pitch of 33 mm in height;
- fully galvanised components;
- made from high tensile steel, certified according to EN 10204 3.1.
- easy and fast assembly, adding to this product's safety and convenience.



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.

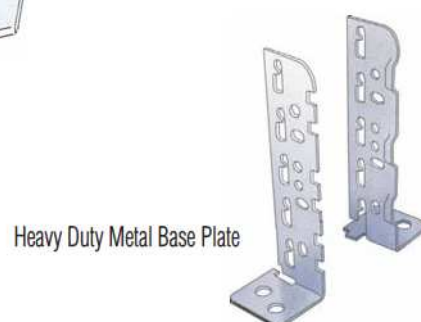
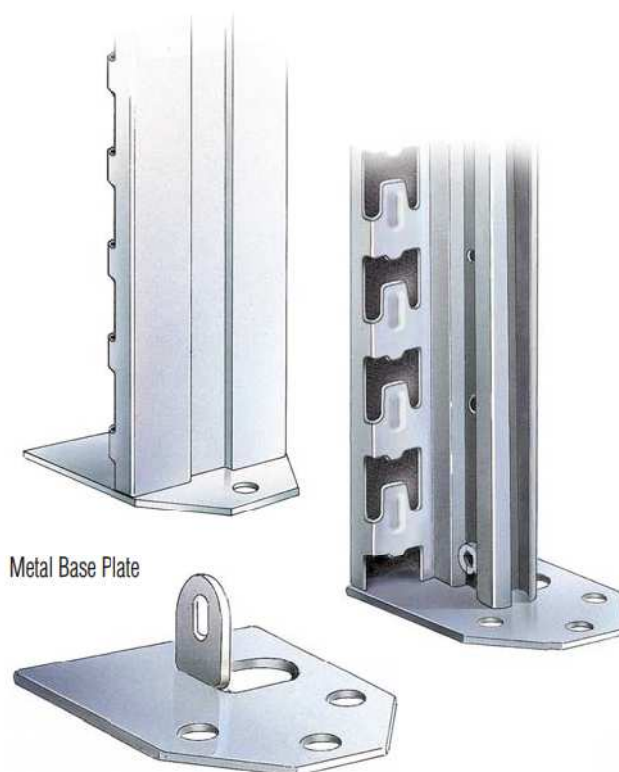
UNISHelf frames with height ≤ 3000 mm may be assembled using the metal base plate (Article SLACC001.95) and fixed to the floor slab with at least one M8x50 anchor bolt per upright.

UNISHelf frames with height > 3000 mm must use the heavy duty base plate (Article 67006.95) and must always be fixed to the floor slab with two Mx50 anchor bolts per upright.

At the top of the frame, uprights are finished off with plastic caps (Article SLACC063.98). A double sided top cap is also available for back-to-back configurations (Article SLACC064.98).

When building back-to-back bays, frame clamps are used to lock frames together for added stability, as illustrated in the scheme below.

Regarding the UNISHelf frame assembly diagram, please refer to page 5. Horizontal frame spacer bars must always be located at the bottom and at the top of each frame.



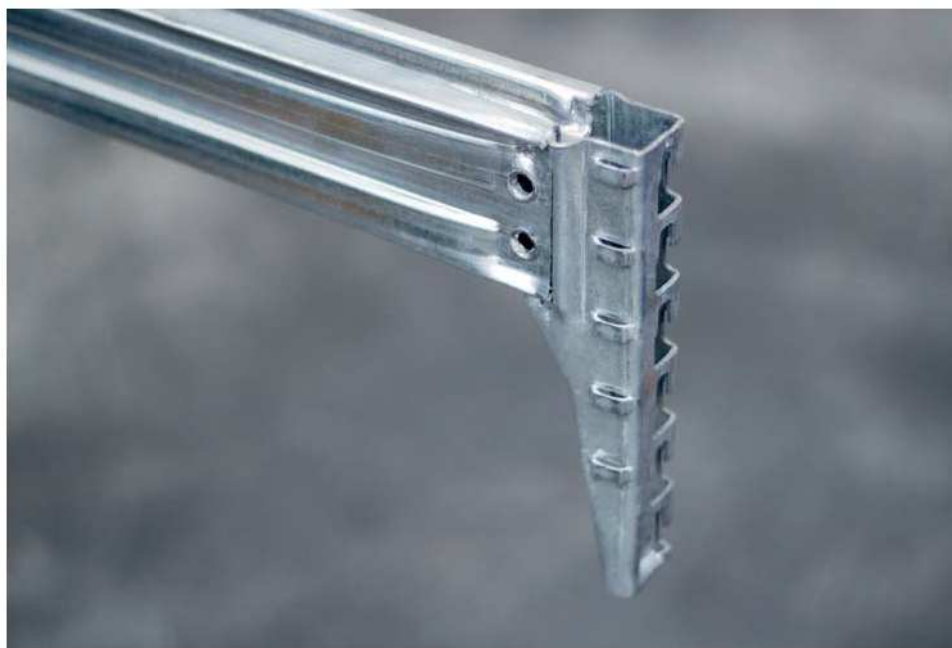


UNISHELF 70 mm high beams are profiled box sections of variable gauge with riveted upright connection brackets at either end. The patented production methods used to create these sections maximise beam load bearing capacity providing an optimal performance to cost ratio.

A groove running along the top face of the beam provides a support point onto which a variety of accessories may be placed. For example shelf panels, secondary beams and a wide range of accessory items such as those illustrated in the following pages.

The patented riveted beam connectors grant an optimised upright/beam connection.

The UNISHELF system is entirely galvanised using the SENDZIMIR procedure, ensuring that both internal and external faces of the product are protected.



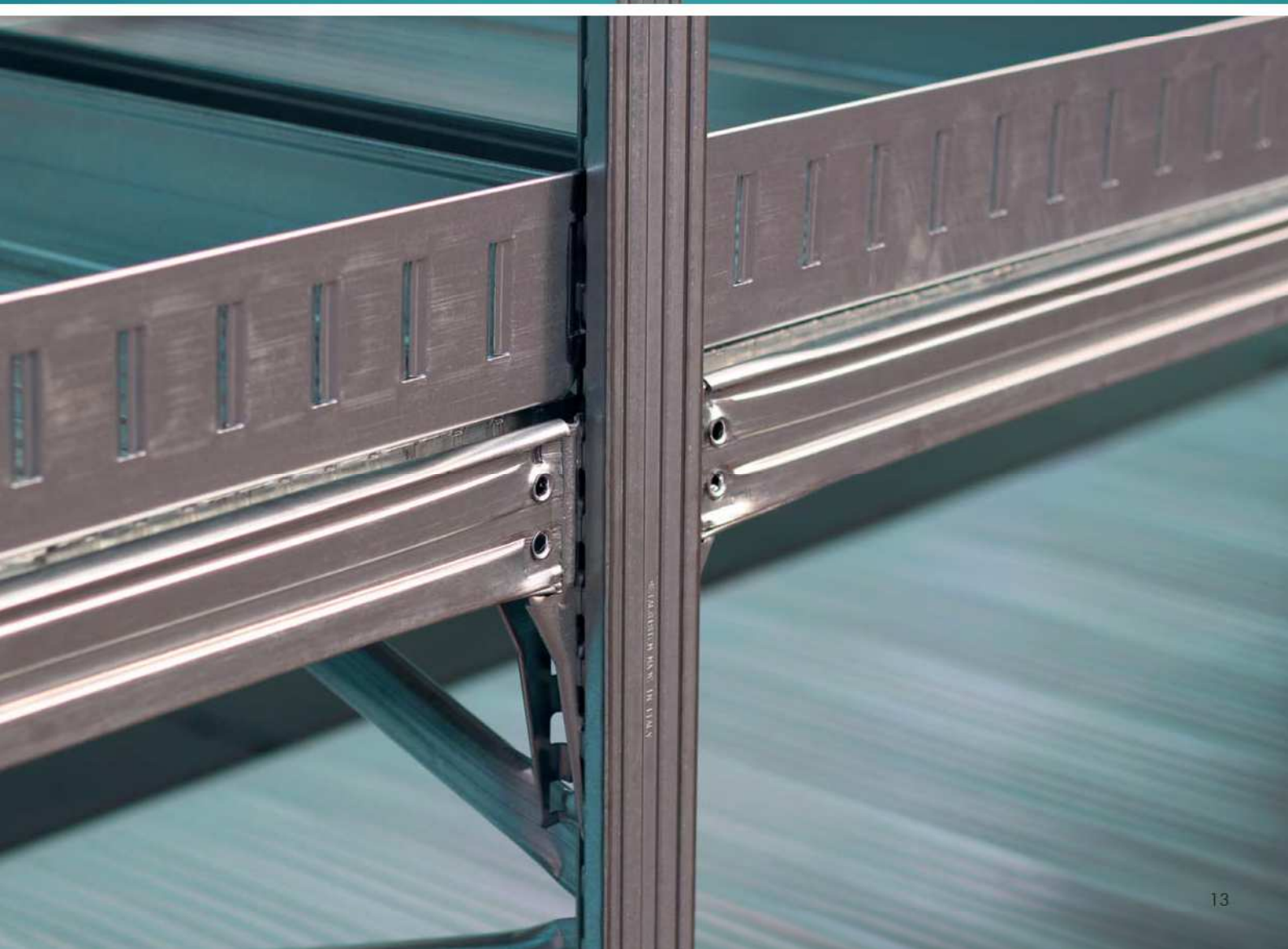
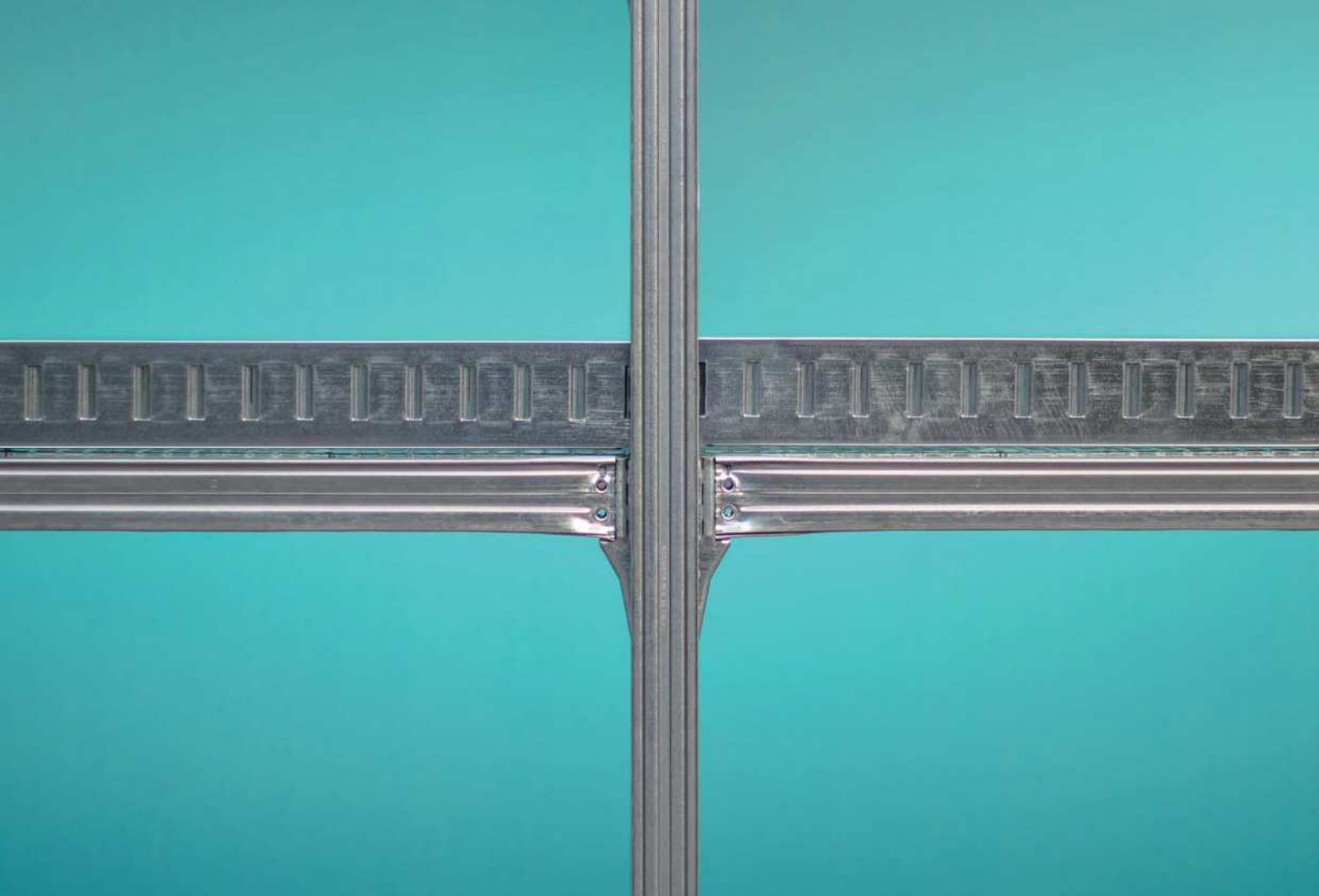
Beam Profile with riveted connectors



Beam Safety Pin



The use of safety pins is mandatory
(Article SLACC000.95)



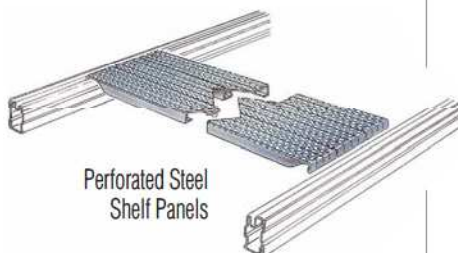
ACCESSORIES

METALSISTEM's UNISHELF long span shelving series is intended for hand loaded applications only.

UNISHELF bays, adopt the complete range of METALSISTEM structural steel shelf panels and are fully compatible with all standard accessories.

UNISHELF bay depths range from 400 to 1200 mm and span upto a maximum length of 3000 mm ensuring maximum flexibility.

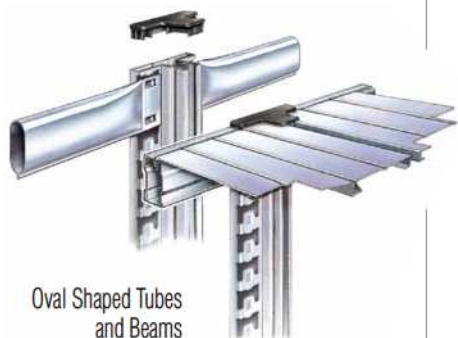
Bay depth ranging between 400 to 700 mm maintain full capability with all shelving series panels (H25/H29 mm shelves and modular containers) and accessories while depths ranging between 800 and 1200 mm are fully compatible with all standard pallet racking accessories.



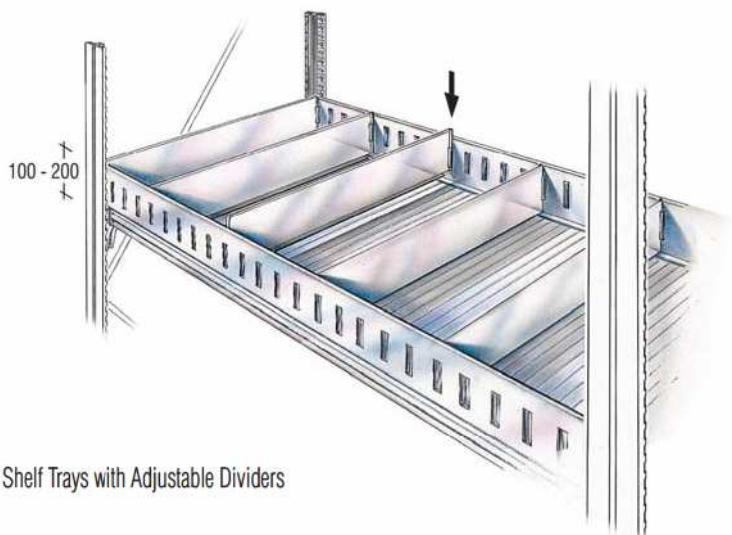
Perforated Steel Shelf Panels



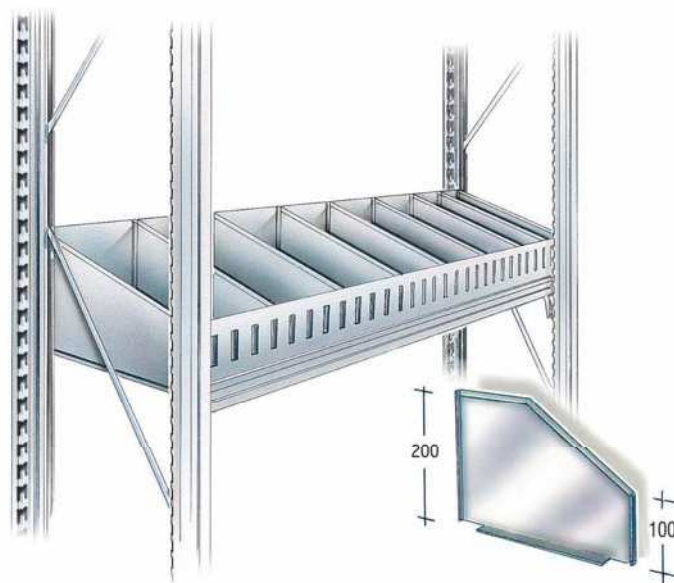
Modular Steel Shelf Panels
H25 / H29 with flanged ends



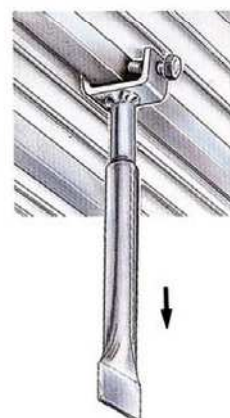
Oval Shaped Tubes
and Beams



Shelf Trays with Adjustable Dividers

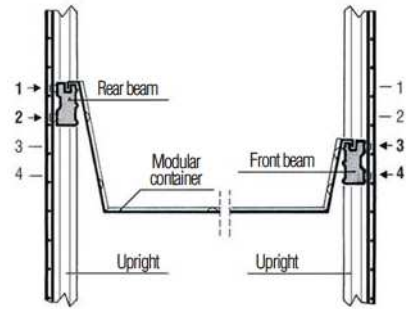
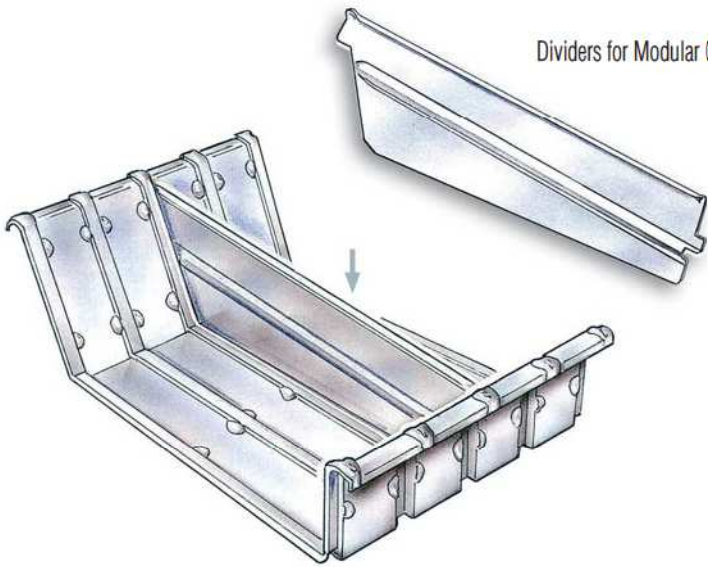


Plastic Label Holder

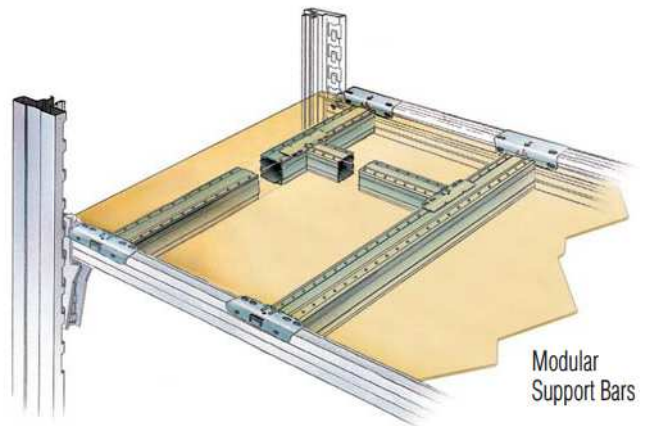
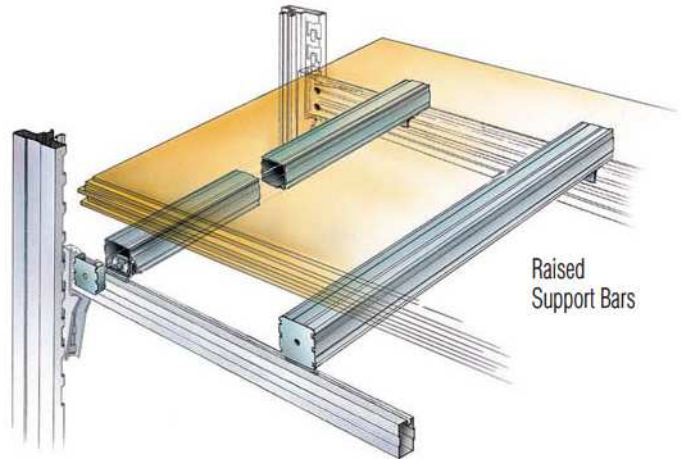
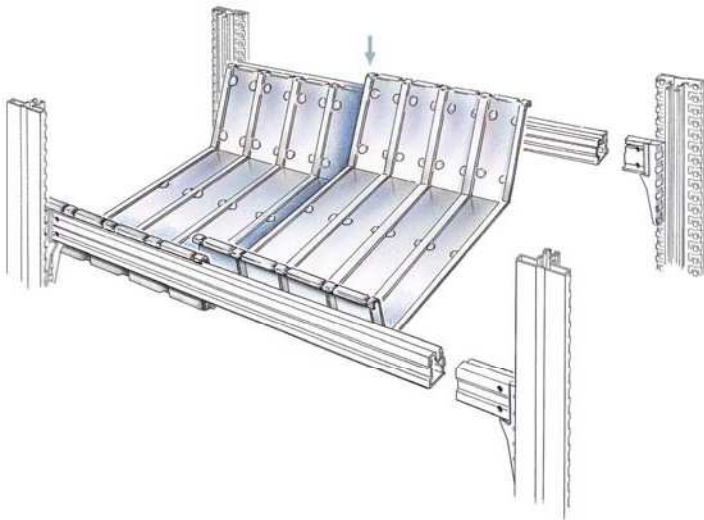


Telescopic Tube Dividers

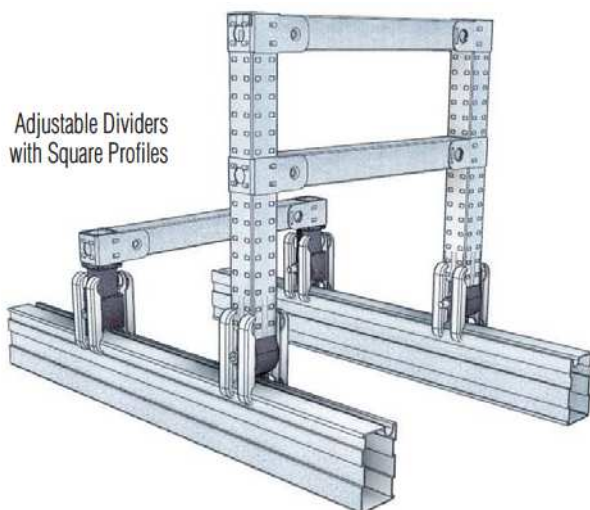
Dividers for Modular Containers



Modular Containers



Adjustable Dividers with Square Profiles



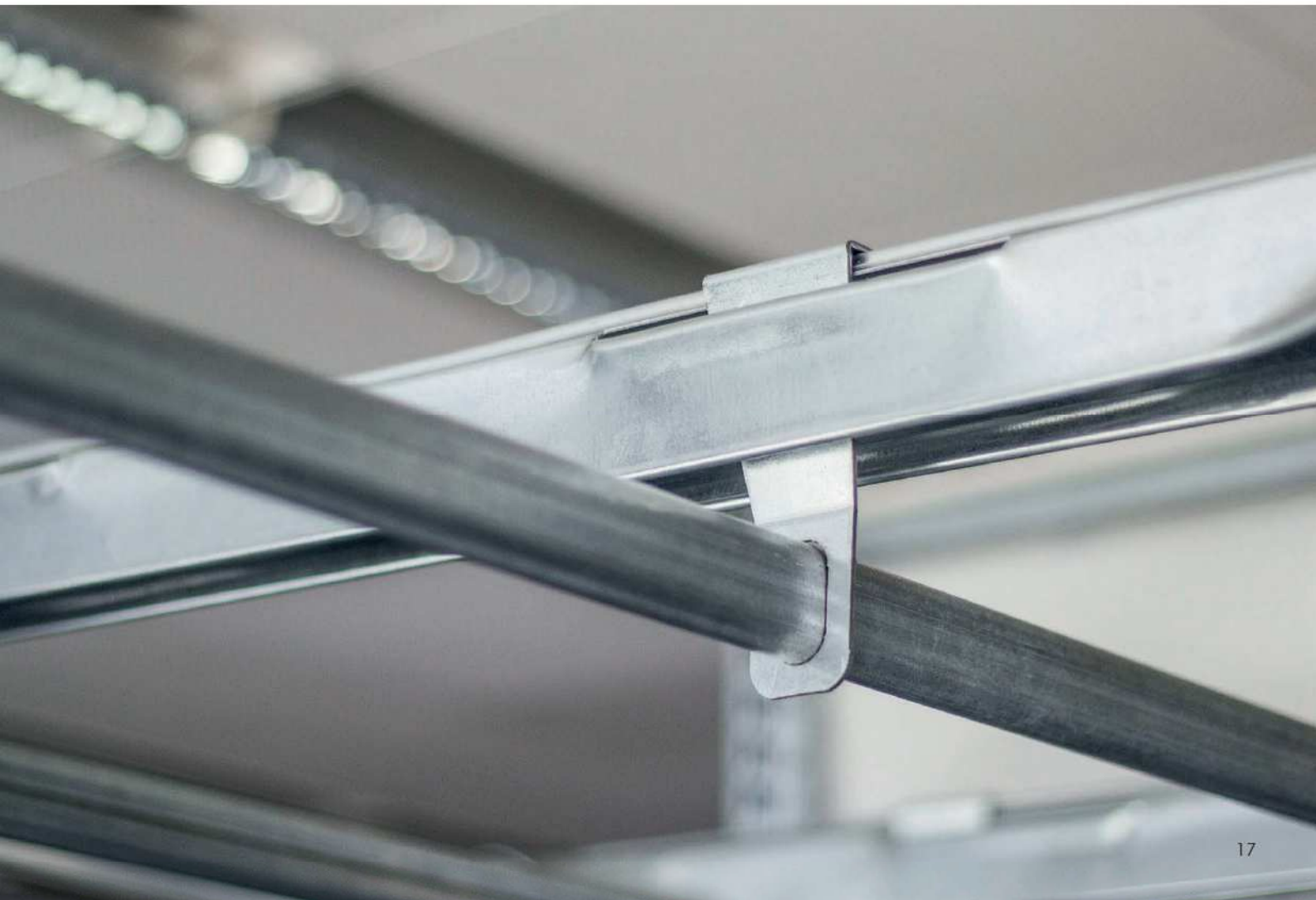


Shelf Trays with adjustable dividers





Oval Profiles & Slotted Support Bars for Hanging Garments





UNISHELF

Cost effectiveness, ease of assembly and flexibility
are the key aspects of METALSISTEM's
Unishelf long span system.



METALSISTEM®



FEM section X

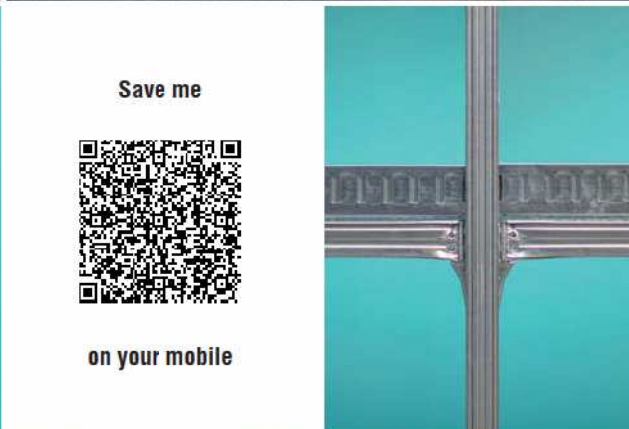


Our dedication to making a difference: creating **MORE VALUE** with **LESS IMPACT!**
 METALSISTEM is proud to adopt **ECO-EFFICIENCY** concepts in its business model.
 ZERO emission and ZERO ecological impact thanks to a **UNIQUE MANUFACTURING PROCESS!**
 METALSISTEM has achieved energy self-sufficiency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



more information
here

UNISHELF



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 STRUTTURE ED AUTOMAZIONE
 MADE IN ITALY

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01	09/2015	00	09/2015	09/2015	INGENIAS.000.98