

# MTR<sup>®</sup> T BEAM

## DATA SHEET





# THE MTR® SYSTEM

The MTR® System, produced by **Metal.Ri Srl**, is a mixed steel-concrete constructive system alternative to the traditional construction systems such as the common reinforced concrete, the prestressed concrete and the steel structures. The MTR® System is composed of three different types of trusses: MTR® A, MTR® T and MTR® C, made of structure steel according to the EN 10025. They are assembled in a processing centre with production controls according to the EN 1090-1:2012. Metal.Ri Srl controls the welding processes following the criteria of the quality management system in accordance with the international EN ISO 3834-2 standard. They are filled with in-situ concrete. The beams are suitable for any kind of floor or vertical structure.

The MTR® Beams are **steel-concrete composite structures** with certification of **belonging to the class "A"** of the "Linee guida per l'utilizzo di travi tralicciate in acciaio conglomerate nel getto di calcestruzzo collaborante e procedure per il rilascio dell'autorizzazione all'impiego" (*Guidelines for the use of steel trusses embedded in concrete and procedures for authorized use*). (Advice no. 9638 of 06/12/2013 issued by the President of the C.S.LL.PP., S.T.C. - Superior Council of Public Works - Central Technical Service). Their design is carried out taking account of these norms.

The specific application software Software MTR® does the calculations of the MTR® Beams. It is developed following the EN ISO 9001:2008 quality standard requirements.

The system represents the alternative and ideal solution against the limitations of the traditional systems. This building structure solution makes possible to build **structural frames no matter what seismic design category** and to satisfy any architectural requirement through the best combination of floor and beam, according to the kind of building and its performances. Since the sections of beams are reduced if compared to the reinforced concrete structures, the MTR® System follows the rules of NTC 2018 concerning the **dimensionless ratio between beam and column**. In particular, it is possible to make MTR® elements integrated in the floor with small bases without oversizing the columns as required by the production of reinforced concrete beams integrated in the floor with suitable width. In addition, both smaller sections and the selfsupporting feature reduce the buckling (bending moment) in the columns; it becomes easier to respect the **capacity design procedure based on column - beam joints**.

The MTR® System is **simple and quick to assemble**. It does not require the use of specialized workers. Assembly diagrams accompany each delivery and each





beam arrives on site marked for identification by a label that indicates beam. Each beam is provided with an identification label that indicates where exactly to place them. Even the additional reinforcement bars used for the beam-column connection are wrapped and provided with an identification label that indicates where exactly to place them and they have to be assembled according to the assembly diagrams.

The **CE MARKING** appears on all the Metal.Ri Srl products according to the EN 1090-1:2012. Metal.Ri Srl controls the production in the factory in order to assure the correct production.

The elements of the MTR® System have no standard dimensions so they represent the suitable solution to get **architectural and structural thinness**; in addition, they can be used for both **new constructions and restorations**.

## ADVANTAGES OF THE MTR® T BEAM

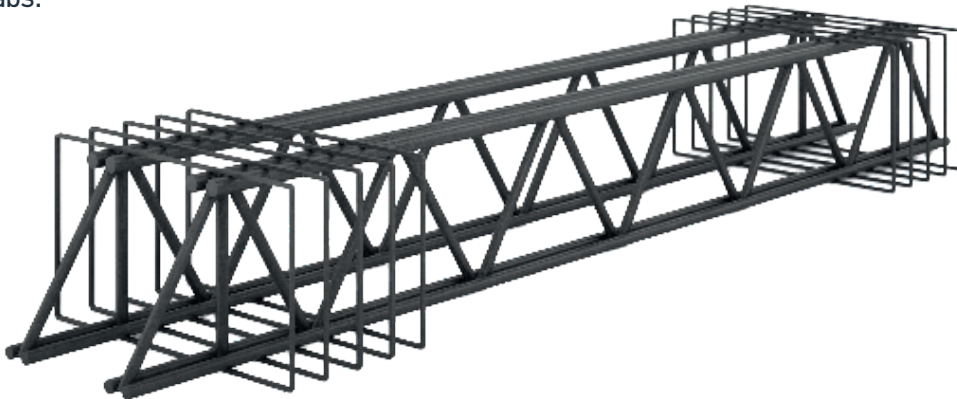
Easy and simple installation. The MTR® T Beams allow the:

Reduction of floor building times of 50%
Reduction of works in situ and the reduction of manpower costs and risks
Reduction of the number of columns and their sections, permit to optimize the interior spaces
Reduction of beam sections (integrated beams in the floor can be made where it is not possible for reinforced concrete)
Reduction of column buckling
Reduction of the concrete used for beams
Fire resistance with no additional costs and works



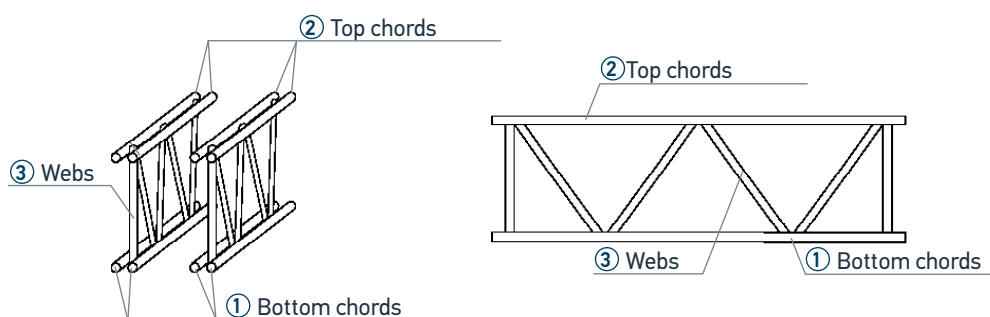
# MTR® T BEAM

The **MTR® T BEAM** consists of one or more steel lattice trusses according to the EN ISO 10025-2 standard. They are assembled together with a variable distance from 15 to 25 cm: each single truss consists of two upper chords and two lower chords connected by a central reticular web possibly equipped with additional diagonals at the end. It has to be cast-in-situ with collaborating concrete. The installation can be done on wooden formwork or on the bottom of the predalle slabs.



The MTR® T BEAM is not self-supporting so formwork and props are necessary for its installation; its static behavior is unequivocal: after the curing of the concrete, the formworks are eliminated. Then, the MTR® T BEAM is anchored to the adjacent supporting structures (beams and columns), with consequent hyperstatic structural scheme (frame or continuous beam), subject to all loads both permanent and accidental agents, with a steel-concrete mixed structure resistant section.

The static structure of the MTR® T BEAM is given below:



1. Bottom chords made of round or square bars;
2. Top chords made of round or square bars;
3. Webs or web members, connection elements, made of round bars welded both to bottom chords and top chords.

The MTR® T BEAM can be used with any kind of vertical structure and floor.

The MTR® T BEAM type is suitable for residential buildings in combination with the MTR® A BEAM. They can be used in the building sectors where the selfsupporting





feature is not indispensable, but where the advantages of the MTR® System should be useful together with less costs and fire resistance without additional costs

## TECHNICAL SPECIFICATIONS OF THE MTR® T BEAM

<b>Steel Structure</b>	It is made of structure steel according to the EN ISO 10025-2 standard
<b>Concrete finishing</b>	Class C25/30, unless otherwise indicated
<b>Self-supporting capacity</b>	No
<b>Welding</b>	Continuous wire welding with shielding gas (Process EN ISO 4063-135) in accordance with European technical standard
<b>Normative References</b>	<ul style="list-style-type: none"> <li>- Eurocodes 2, 3 and 4.</li> <li>- For the structures built in seismic zones, Eurocode 8.</li> </ul>
<b>How a beam is supported</b>	Our engineers follow the calculation procedure of the Software MTR® according to the existing law
<b>Engineering Design Process</b>	We use intumescent varnish, heat-resistant plaster or fire protection plasterboards
<b>Post-fire mechanical properties (R)</b>	It depends on the bottom concrete cover or on the thickness of the predalle slabs where it lays on





Base	No
------	----

## CALCULATION OF THE MTR® T BEAM

The calculation procedure developed for the mixed steel-concrete beams of the MTR® System produced by METAL.RI S.r.l. incorporates the constructive technology of the specific construction system, and follows the recommendations and indications provided by the Structural Eurocodes according also to Technical Standards for the Buildings attached to the Ministerial Decree of the Interior Ministry and Civil Protection of the 17 January 2018.

The MTR® T Beam from a material point of view is bi-component and consequently the reference standard is:

- EN 1994-1-1:2005 (March 2005) Eurocode 4 - Design of composite steel and concrete structures - Part 1-1: General rules and rules for buildings

The aforementioned standard refers to the norms listed below when concerning the verification of specific stress conditions at the ultimate limit state or the verification of the operating limit states:

- EN 1993-1-1:2005 (1/08/2005) Eurocode 3 - Design of steel structures - Part 1-1: General rules and rules for buildings (integrated with corrigenda of February 2006, October 2007, September 2008 and April 2009);
- EN 1992-1-1:2005 (November 2005) Eurocode 2 - Design of concrete structures - Part 1-1: General rules and rules for buildings.

The MTR® T Beam becomes a composite steel-concrete structure it is subject to the verifications as follows:

1. Compression and bending verification of the steel-concrete beam;
2. Shear verification of the steel-concrete beam;
3. Slip verification of connectors;
4. Serviceability Limit States (SLS) Verification.





The MTR® System is the result of testing carried out in collaboration with the Polytechnic University of Bari, the University La Sapienza of Rome and the University of Basilicata.

**Metal.Ri Srl holds the following product and quality certifications:**

- CE Marking on products according to the EN 1090-1 (Factory Production Control);
- CE Marking on products according to the EN 13225 (Factory Production Control for Linear Precast Concrete Elements);
- EN ISO 9001 (Certificate of Quality Management System for product);
- EN ISO 3834-2 (Certificate of the Welding Processes);
- INTERNATIONAL CERTIFICATE of management system in accordance with the EN ISO 3834-2 standard;
- Certificate for the MTR® System classified as Class A issued by the Central Technical Service;
- Certificate as processing centre no. 2529/13 issued by the C.S.LL.PP. - Servizio Tecnico Centrale (Superior Council of Public Works - Central Technical Service);
- EUROPEAN UNION PATENT of the MTR® System.

*Metal.Ri Srl reserves the right to make technical changes of any kind without prior notice. The customer is also required to verify that this technical data sheet is still valid and subsequent editions have not replaced it.*





METAL·RI S.r.l.

---

Headquarter  
Via Giuseppe Abbruzzese, 42  
70020 • Bitetto (BA) • Italia  
T +39 080 9921197  
[tecnica@metalri.it](mailto:tecnica@metalri.it)

---

North-Italy establishment  
Via Garibaldi, 41  
20836 • Briosco (MB)  
frazione Capriano  
T +39 371 5360754



[www.metalri.it](http://www.metalri.it)



WATCH THE VIDEO