Metal tray system
Fire Resistance

E90 fire resistance

Objective

To contribute to the security of the facilities in case of fire, ensuring the maintenance of its integrity and functionality.

Application

Facilities in Public premises, office buildings, transport infrastructure, tunnels, etc.

Practically, contributes to the functioning of ventilation equipment, fire, and evacuation signage.

Establishes the following requirements to set up a fire-resistant installation approval as E90, to maintain the functioning and integrity of the electrical installation. These requirements are contained in the standard DIN 4102-12.
(See pages 64 and 65 for the description of the test).

Trays **rejiband®** / **pemsaband®** widths from 100 to 400, depth 60 mm.

Distance of RPLUS supports / omega SPLUS is 1200 mm for ceiling or wall.

Using threaded rod connectors, E90 SPLUS (ref. 62035001) and E90 RPLUS (Ref. 62036001), as the support used for fixing the roof or wall system. (See charts, page 61).

Maximum loading of the cables 10 kg / m. (for each tray height).

You can install two lines of tray, depending on the needs of the installation.
The minimum separation distance between the two heights of trays should be 300 mm.

Other considerations

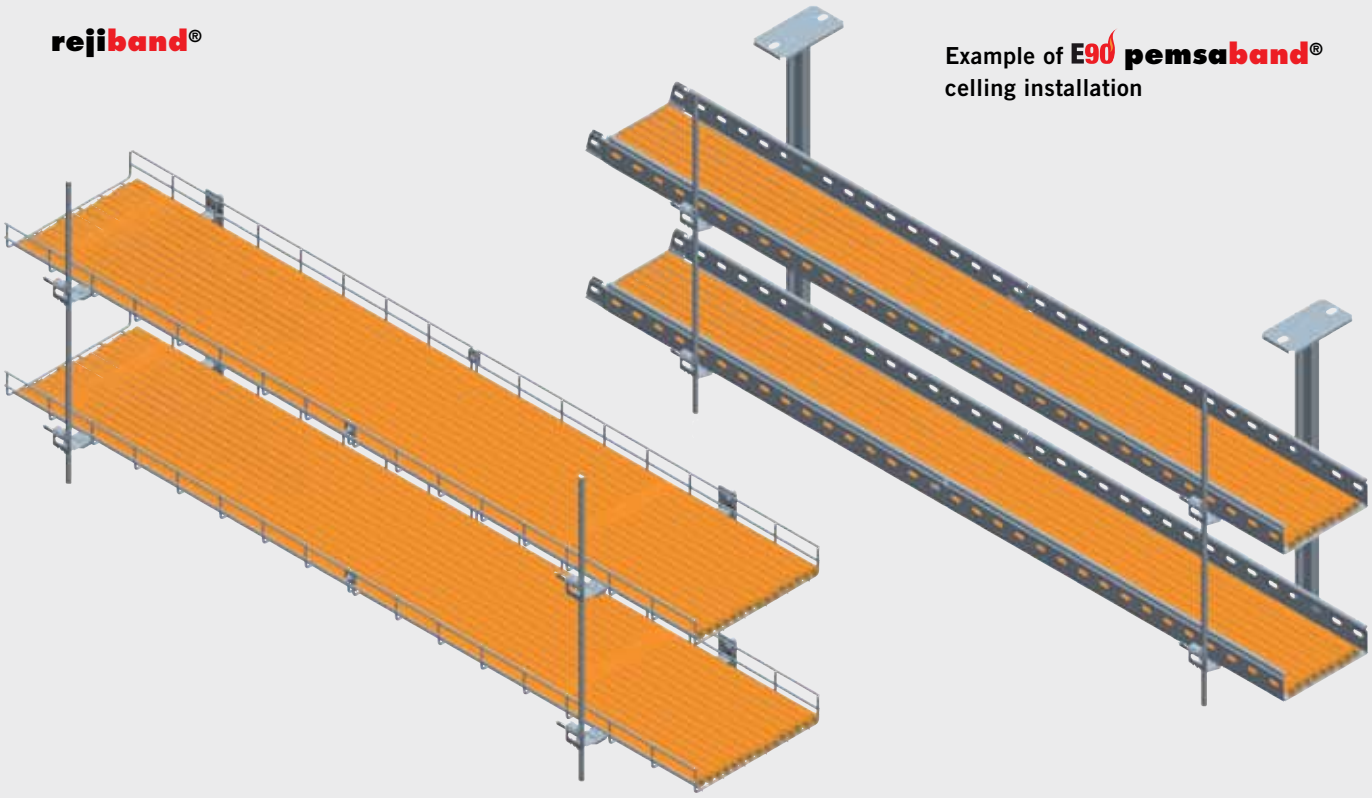
To ensure the correct functioning of the system requires the use of cables with an equivalent fire-resistance rating. Pemsa has conducted its tests on cables:

FE180/E90 NHxH Dätwyler PYROFIL KERAM
NEXANS type FB type RHEYHALON N2Hx-0 / JE-90

To anchor the assemblies to different surfaces a system with suitable properties and characteristics of fire resistance must be used.

For more technical information please request a copy of the E90 Fire Resistance dossier from the Pemsa Engineering Department.
info@pemsa.co.uk

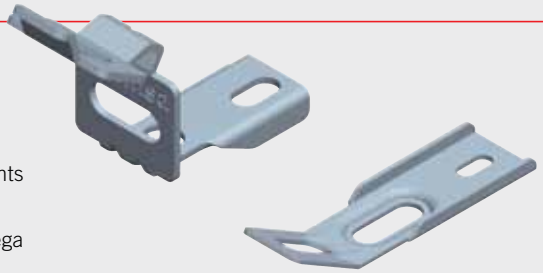
rejiband®



Example of E90 **pemsaband®** celling installation

View the possible **E90** Mounts for Wall and Ceiling on pages 60 to 63

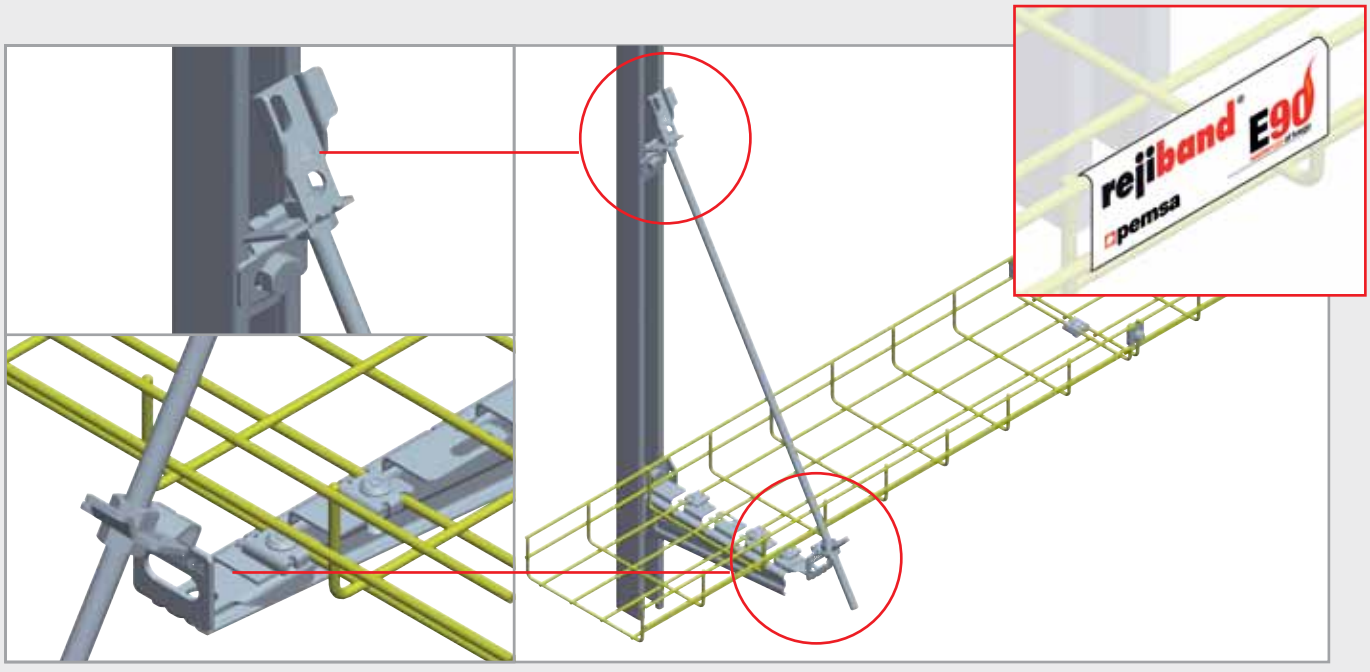
E90 RPLUS and E90 SPLUS Connectors for specific installations E90



Specially designed to provide an installation of trays complying with the requirements of DIN 4101-12.

Their function is to connect the threaded rods to the Reinforced RPLUS and Omega SPLUS brackets.

Identification plates are supplied with these connectors to indicate that the assembly meets the E90 fire resistance criteria.

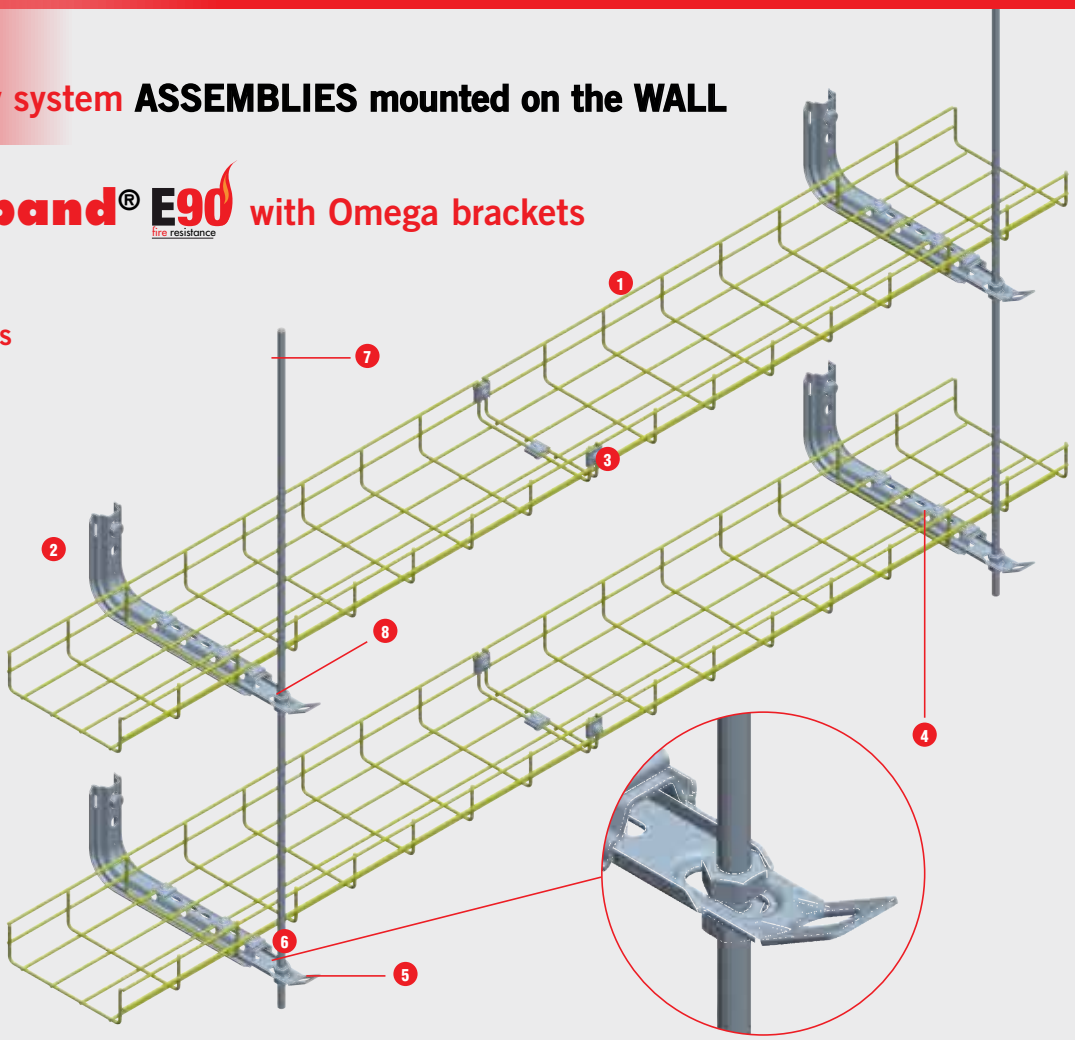


FIRE RESISTANT tray system ASSEMBLIES mounted on the WALL

Wall mounting rejiband® E90 fire resistance with Omega brackets

rejiband®
+ Omega SPLUS Brackets
+ E90 SPLUS Connector

E90 Installation Requirements:
- 1.2m distance between supports.
- Valid for Omega SPLUS and RPLUS Supports.
- Use RPLUS or SPLUS connectors to connect the rod.
- Maximum weight of cables: 10 kg / m. for the height of tray.
- Depending on the needs of the installation two tray lines can be used.
- Minimum distance between trays: 300 mm.



Necessary Materials:

	1					2				3					4				
DIM. AxB	rejiband®					SPLUS Omega Support				Reinforced joint clamp					Part clamp (for connection of the tray to the support)				
	Bycro	E.G.	H.D.G.*	U. M. E90 (m)	U.2 M. E90 (m)	P.G.	H.D.G.*	U. M. E90	U.2 M. E90	Bycro	E.G.	H.D.G.*	U. M. E90	U.2 M. E90	Bycro	E.G.	H.D.G.*	U. M. E90	U.2 M. E90
	Reference	Reference	Reference			Reference	Reference			Reference	Reference	Reference			Reference	Reference	Reference		
100x60	60222100	60212100	60232100	1.2	2.4	62021104	62031104	2	4	64020061	64010061	64030061	2	4	64020060	64010060	64030060	2	4
150x60	60222150	60212150	60232150	1.2	2.4	62021154	62031154	2	4	64020061	64010061	64030061	2	4	64020060	64010060	64030060	2	4
200x60	60222200	60212200	60232200	1.2	2.4	62021204	62031204	2	4	64020061	64010061	64030061	2	4	64020060	64010060	64030060	2	4
300x60	60222300	60212300	60232300	1.2	2.4	62021304	62031304	2	4	64020061	64010061	64030061	3	6	64020060	64010060	64030060	2	4
400x60	60222400	60212400	60232400	1.2	2.4	62021404	62031404	2	4	64020061	64010061	64030061	3	6	64020060	64010060	64030060	2	4

- More rejiband® information on pages 6 and 7.
- More SPLUS Omega Support information on page 40.
- More information of the Reinforced Joint Clamp on page 8.
- More information of the Part Clamp on page 9.

U. M. E90: E90 Mounting Unit. **U. 2 M. E90:** E90 Mounting Unit with 2 heights.

	5		6			7			8				
DIM. MxL	E90 SPLUS Connector		M6x30 Fixing			Threaded Rod			Hexagonal Nuts				
	H.D.G.*	U. M. E90 / U.2 M. E90	H.D.G.*	U. M. E90	U.2 M. E90	Bycro	U. M. E90	U.2 M. E90	Bycro	E.G.	H.D.G.*	U. M. E90	U.2 M. E90
	Reference		Reference			Reference			Reference	Reference	Reference		
M8x500	62031090	2 4	64030160	2	4	67020044	2		67020062	67020095	67030062	4	
M8x1000						67020045	2	4	67020014	67020079	67030014	4	8
M10x1000						67020145	2	4	67020014	67020079	67030014	4	8

- More information about the E90 connector on page 42.
- More information of the M6x30 fixing on page 9.
- More information about Threaded Rod on page 44.
- More information on Hexagonal Nuts on page 53.

Valid for any size of SPLUS Omega support.

Adequate fixing is required for joining the connector to the E90 SPLUS Support.

The choice of M8 or M10 threaded will depend on the requirements of the installation.

U. M. E90: E90 Mounting Unit. **U. 2 M. E90:** E90 Mounting Unit with 2 heights.

NOTES:
- Products, for this E90 solution, are also available in S.S. 304 and S.S. 316 finish. For more detailed information please consult with the Pemsa Engineering Department.
- This solution can also be used with Reinforced RPLUS Supports (See page 41).

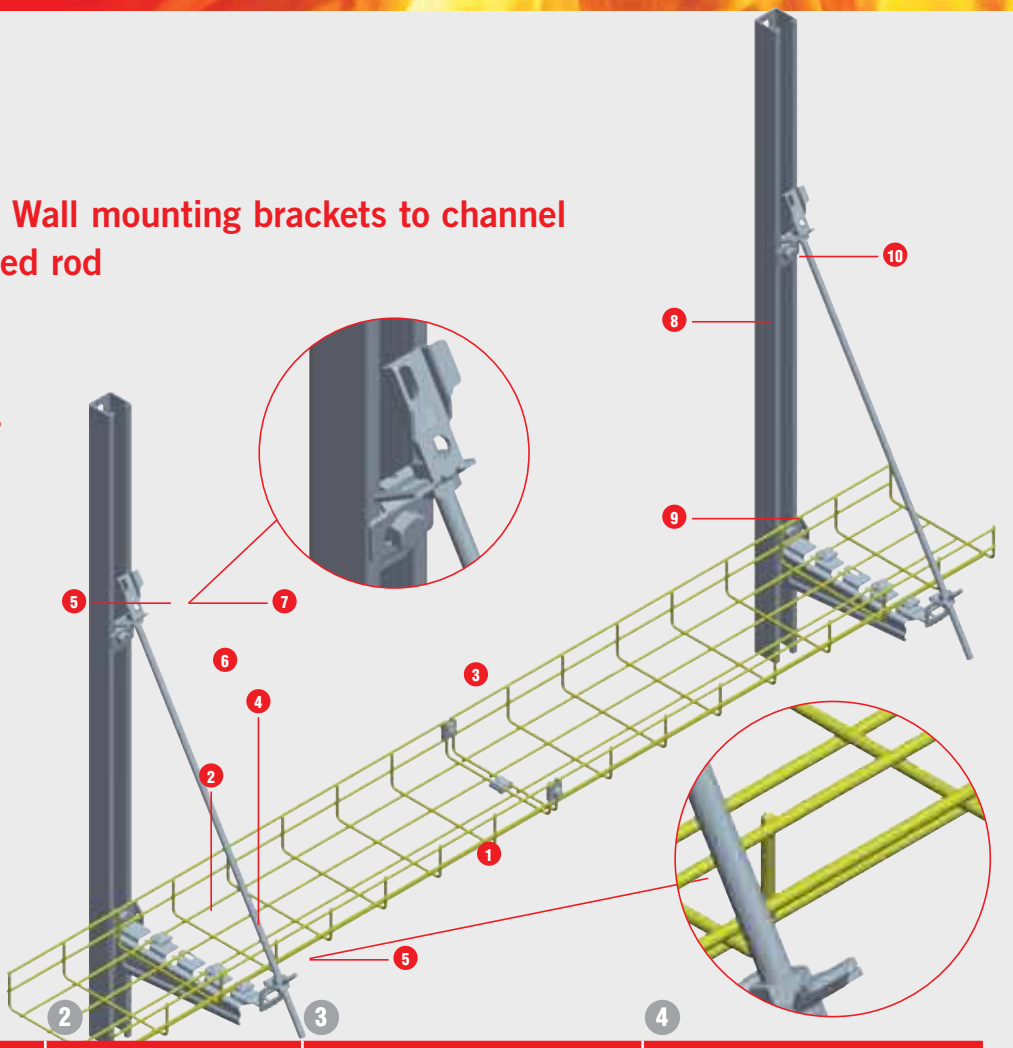
pemsaband® OPTION:
- This installation is available for **pemsaband® SX** Tray. For more information please consult the Pemsa Engineering Department.

Bycro / E.B.	Electrolytic Bichromate BS-EN ISO 2081	P.G.	Pre-galvanised BS-EN 10346
E.G.	Electrogalvanised BS-EN ISO 2081, available on request	H.D.G.	Hot-dip galvanised BS-EN-ISO 1461
S.S. 304	Passivated stainless steel AISI 304		
S.S. 316	Passivated stainless steel AISI 316		

rejiband® E90 fire resistance Wall mounting brackets to channel with an angled threaded rod

rejiband®
+ **RPLUS Supports**
+ **RPLUS E90 Connector**
+ **Threaded Rod**

E90 Installation Requirements:
- 1.2m distance between supports.
- Valid for Omega SPLUS and RPLUS Supports.
- Use E90 SPLUS connectors for connecting the rod to the E90 SPLUS or RPLUS Support.
- This method is appropriate when the distance to secure the rod to the roof is very large making the preferred option to brace the rod to the wall.
- Maximum weight of cables: 10 kg / m



Necessary Materials:

DIM. AxB	1 rejiband®					2 RPLUS Support				3 Reinforced joint clamp					4 Part clamp (for connection of the tray to the support)				
	Bycro Reference	E.G. Reference	H.D.G.* Reference	U. M. E90 (m)	U.2 M. E90 (m)	P.G. Reference	H.D.G.* Reference	U. M. E90	U.2 M. E90	Bycro Reference	E.G. Reference	H.D.G.* Reference	U. M. E90	U.2 M. E90	Bycro Reference	E.G. Reference	H.D.G.* Reference	U. M. E90	U.2 M. E90
100x60	60222100	60212100	60232100	1.2	NO	62025103	62035103	2	NO	64020061	64010061	64030061	2	NO	64020060	64010060	64030060	2	NO
150x60	60222150	60212150	60232150	1.2	NO	62025153	62035153	2	NO	64020061	64010061	64030061	2	NO	64020060	64010060	64030060	2	NO
200x60	60222200	60212200	60232200	1.2	NO	62025203	62035203	2	NO	64020061	64010061	64030061	2	NO	64020060	64010060	64030060	2	NO
300x60	60222300	60212300	60232300	1.2	NO	62025303	62035303	2	NO	64020061	64010061	64030061	3	NO	64020060	64010060	64030060	2	NO
400x60	60222400	60212400	60232400	1.2		62025403	62035403	2	NO	64020061	64010061	64030061	3	NO	64020060	64010060	64030060	2	NO

- More **rejiband®** information on pages 6 and 7.
- More RPLUS Omega Support information on page 41.
- More information of the Reinforced Joint Clamp on page 8.
- More information of the Part Clamp on page 9.

5 E90 RPLUS Connector			DIM. MxL	6 Threaded Rod			7 Hexagonal Nuts					8 9 10 Channel + Hexagonal Nut + Channel Nut				
H.D.G.* Reference	U. M. E90	U.2 M. E90		Bycro Reference	U. M. E90	U.2 M. E90	Bycro Reference	E.G. Reference	H.D.G.* Reference	U. M. E90	U.2 M. E90	Pieza	E.G. Reference	H.D.G.* Reference	U. M. E90	U.2 M. E90
67035001	4	NO	M8x500	67020044	2	NO	67020062	67020095	67030062	8	NO	41x41 Channel	67030053	67030057	2	NO
			M8x1000	67020045	2	NO	67020014	67020079	67030014	8	NO	M10 Hexagonal Nut	67020077	67030077	6	NO
			M10x1000	67020145	2	NO	67020014	67020079	67030014	8	NO	M10 Channel Nut	67020158	67030158	6	NO

- More information about the E90 connector on page 42.

Valid for any size of RPLUS Omega support.

- More information of Threaded Rod on page 44.

The choice of using M8 or M10 threaded rod and nuts depends on the loadings and support distances within the installation.

- More information on Hexagonal Nuts on page 53.
- More information:
  REF 41x41 Channel on page 47.
  Hex Screw on page 52.
  Channel Spring Nut 41 on page. 48.

NOTES:
- Products, for this E90 solution, are also available in S.S. 304 and S.S. 316 finish. For more detailed information please consult with the Pemsa Engineering Department.
- This solution can also be used with Reinforced Omega SPLUS Supports (See page 40).

pemsaband® OPTION:

- This installation is available for **pemsaband® SX** Tray.
  For more information please consult the Pemsa Engineering Department.

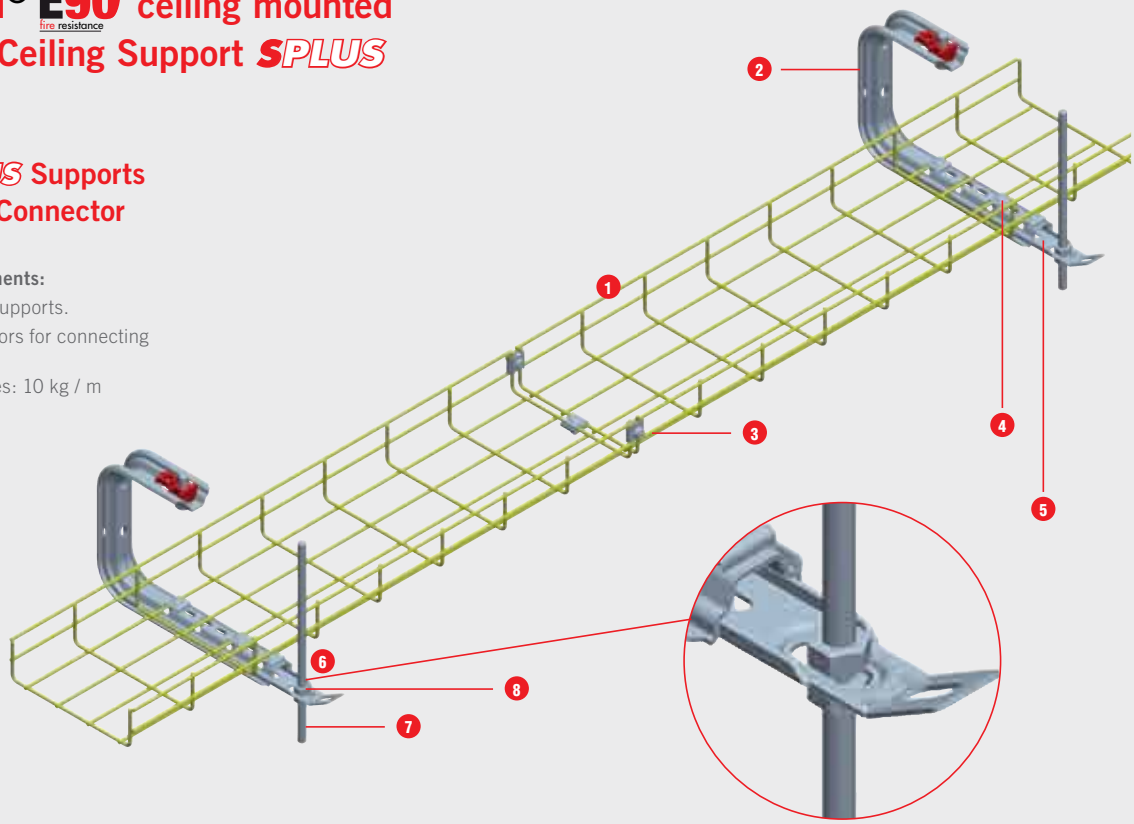
U. M. E90: E90 Mounting Unit. **U. 2 M. E90:** E90 Mounting Unit with 2 heights.

(*) The hot dip galvanized finish is NOT AN ACCURATE AESTHETIC FINISH. It is a very effective corrosion protection. COLOUR DIFFERENCES CAN OCCUR (shades of grey), brightness and surface finish (roughness, smoothness), created during the process employed. This is normal and does NOT AFFECT THE QUALITY AND DURATION OF THE ANTI-CORROSION PROTECTION.

rejiband® E90 fire resistance ceiling mounted using Omega Ceiling Support SPLUS

rejiband®
+ Omega SPLUS Supports
+ E90 SPLUS Connector

E90 Installation Requirements:
- 1.2m distance between supports.
- Use SPLUS E90 Connectors for connecting the rod.
- Maximum weight of cables: 10 kg / m



Materials required:

DIM. AxB	1 rejiband®					2 Omega Ceiling Bracket SPLUS				3 Reinforced joint clamp				4 Part clamp (for connection of the tray to the support)				
	Bycro	E.G.	H.D.G.*	U. M. E90 (m)	U.2 M. E90 (m)	P.G.	H.D.G.*	U. M. E90	U.2 M. E90	Bycro	E.G.	H.D.G.*	U. M. E90	U.2 M. E90	Bycro	E.G.	H.D.G.*	U. M. E90	U.2 M. E90
	Reference	Reference	Reference			Reference	Reference			Reference	Reference	Reference			Reference	Reference	Reference		
100x60	60222100	60212100	60232100	1.2	–	62022104	62032104	2	–	64020061	64010061	64030061	2	–	64020060	64010060	64030060	4	–
150x60	60222150	60212150	60232150	1.2	–	62022154	62032154	2	–	64020061	64010061	64030061	2	–	64020060	64010060	64030060	4	–
200x60	60222200	60212200	60232200	1.2	–	62022204	62032204	2	–	64020061	64010061	64030061	2	–	64020060	64010060	64030060	4	–
300x60	60222300	60212300	60232300	1.2	–	62022304	62032304	2	–	64020061	64010061	64030061	3	–	64020060	64010060	64030060	4	–
400x60	60222400	60212400	60232400	1.2	–	62022404	62032404	2	–	64020061	64010061	64030061	3	–	64020060	64010060	64030060	4	–

- More **rejiband®** information on pages 6 and 7.
- More SPLUS Omega Support information on page 40.
- More information of the Reinforced Joint Clamp on page 8.
- More information of the Part Clamp on page 9.

U. M. E90: E90 Mounting Unit. **U. 2 M. E90:** E90 Mounting Unit with 2 heights.

5 Connector E90 SPLUS			6 M6x30 Fixing			DIM. MxL	7 Threaded Rod			8 Hexagonal Nuts				
H.D.G.*	U. M. E90	U.2 M. E90	H.D.G.*	U. M. E90	U.2 M. E90		Bycro	U. M. E90	U.2 M. E90	Bycro	E.G.	H.D.G.*	U. M. E90	U.2 M. E90
Reference			Reference				Reference			Reference	Reference	Reference		
62031090	2	–	64030160	2	–	M8x500	67020044	2	–	67020062	67020095	67030062	4	–

- More information about the E90 connector on page 42.
- More information of the M6x30 fixing on page 9.
- More information about Threaded Rod on page 44.
- More information on Hexagonal Nuts on page 53.

Adequate fixing is required for joining the connector to the E90 SPLUS Support.

The choice of M8 or M10 threaded will depend on the requirements of the installation.

U. M. E90: E90 Mounting Unit. **U. 2 M. E90:** E90 Mounting Unit with 2 heights.

NOTES:
- Products, for this E90 solution, are also available in S.S. 304 and S.S. 316 finish. For more detailed information please consult with the Pemsa Engineering Department.

pemsaband® OPTION:

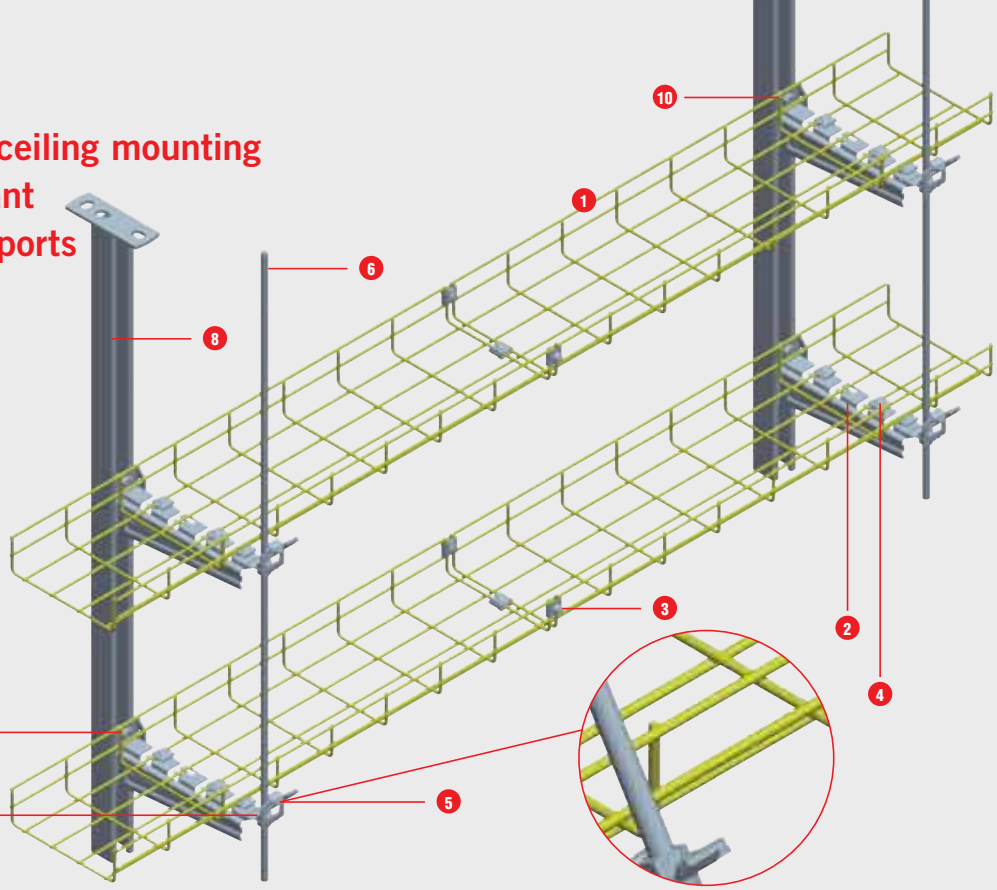
- This installation is available for **pemsaband® SX** Tray. For more information please consult the Pemsa Engineering Department.

Bycro / E.B.	Electrolytic Bichromate BS-EN ISO 2081	P.G.	Pre-galvanised BS-EN 10346
E.G.	Electrogalvanised BS-EN ISO 2081, available on request	H.D.G.	Hot-dip galvanised BS-EN-ISO 1461
S.S. 304	Passivated stainless steel AISI 304		
S.S. 316	Passivated stainless steel AISI 316		

rejiband® E90 fire resistance ceiling mounting with Heavy duty pendant drop and RPLUS Supports

rejiband®
+ **RPLUS Supports**
+ **E90 RPLUS Connector**

E90 Installation Requirements:
- 1.2m distance between supports.
- Valid for Omega SPLUS and RPLUS Supports.
- Use E90 SPLUS Use E90 connectors for connecting the rod to the E90 SPLUS or RPLUS Support.
- This method is appropriate when the distance to secure the rod to the roof is very large making the preferred option to brace the rod to the ceiling
- Maximum weight of cables: 10 kg / m.



Materials required:

DIM. AxB	1 rejiband®					2 Reinforced Support RPLUS				3 Reinforced joint clamp					4 Part clamp (for connection of the tray to the support)				
	Bycro	E.G.	H.D.G.*	U. M. E90 (m)	U.2 M. E90 (m)	P.G.	H.D.G.*	U. M. E90	U.2 M. E90	Bycro	E.G.	H.D.G.*	U. M. E90	U.2 M. E90	Bycro	E.G.	H.D.G.*	U. M. E90	U.2 M. E90
	Reference	Reference	Reference			Reference	Reference			Reference	Reference	Reference			Reference	Reference	Reference		
100x60	60222100	60212100	60232100	1.2	2.4	62025103	62035103	2	4	64020061	64010061	64030061	2	4	64020060	64010060	64030060	6	12
150x60	60222150	60212150	60232150	1.2	2.4	62025153	62035153	2	4	64020061	64010061	64030061	2	4	64020060	64010060	64030060	6	12
200x60	60222200	60212200	60232200	1.2	2.4	62025203	62035203	2	4	64020061	64010061	64030061	2	4	64020060	64010060	64030060	6	12
300x60	60222300	60212300	60232300	1.2	2.4	62025303	62035303	2	4	64020061	64010061	64030061	3	6	64020060	64010060	64030060	6	12
400x60	60222400	60212400	60232400	1.2	2.4	62025403	62035403	2	4	64020061	64010061	64030061	3	6	64020060	64010060	64030060	6	12

- More **rejiband®** information on pages 6 and 7.
- More RPLUS Omega Support information on page 41.
- More information of the Reinforced Joint Clamp on page 8.
- More information of the Part Clamp on page 9.

5 Connector E90 RPLUS			DIM. MxL	6 Threaded Rod			7 Hexagonal Nuts					8 9 10 Pendant + Hexagonal Nut + Channel Nut				
H.D.G.*	U. M. E90	U.2 M. E90		Bycro	U. M. E90	U.2 M. E90	Bycro	E.G.	H.D.G.*	U. M. E90	U.2 M. E90	Pieza	P.G.	H.D.G.*	U. M. E90	U.2 M. E90
Reference				Reference			Reference	Reference	Reference				Reference	Reference		
62035001	2	4	M8x500	67020044	2		67020062	67020095	67030062	4	8	Soporte techo 41x41 500 mm		67030660	2	
			M8x1000	67020045	2	2	67020014	67020079	67030014	4	8	Soporte techo 41x41 1000 mm		67030661	2	2
			M10x1000	67020145	2	2	67020014	67020079	67030014	4	8	Tornillo Hexagonal M10	67020077	67030077	4	8
												Tuerca Rail Muelle M10	67020158	67030158	4	8

- More information about the E90 connector on page 42.

Valid for any size of RPLUS Omega support.

- More information about Threaded Rod on page 44.

The choice of using M8 or M10 threaded rod and nuts depends on the loadings and support distances within the installation.

- More information on Hexagonal Nuts on page 53.

- More information:
  REF 41x41 Channel on page 47.
  Hex Screw on page 52.
  Channel Spring Nut 41 on page 48.

NOTES:
- Products, for this E90 solution, are also available in S.S. 304 and S.S. 316 finish. For more detailed information please consult with the Pemsa Engineering Department.
- This solution can also be used with Reinforced Omega SPLUS Supports (See page 40).

pemsaband® OPTION:

- This installation is available for **pemsaband® SX** Tray.
  For more information please consult the Pemsa Engineering Department.

U. M. E90: E90 Mounting Unit. **U. 2 M. E90:** E90 Mounting Unit with 2 heights.

(*) The hot dip galvanized finish is NOT AN ACCURATE AESTHETIC FINISH. It is a very effective corrosion protection. COLOUR DIFFERENCES CAN OCCUR (shades of grey), brightness and surface finish (roughness, smoothness), created during the process employed. This is normal and does NOT AFFECT THE QUALITY AND DURATION OF THE ANTI-CORROSION PROTECTION.

Fire Resistance

Safety is a growing concern within electrical installations.

In the event of a fire the behaviour of electrical equipment, when exposed to high temperatures, determines whether the installation achieves a certain safety level. rejiband® wire mesh cable tray complies with these requirements with a number of features and properties as described in the E90 Certification.

rejiband® E90 fire resistance

rejiband® wire mesh cable tray is manufactured in accordance with the requirements and tests of the product standard **IEC 61537** *"Cable Tray and Cable Ladder Systems."*

So far this standard has not yet covered the fire risks and fire resistance.

DIN 4102-12 "Cable Tray and Cable Ladder Systems"

When studying the properties of **rejiband®** wire mesh cable tray against fire, **pemsa** has used the German Standard DIN 4102-12 which is the main reference in other European countries.

This standard tests the complete installations, in order to evaluate the structural integrity of the assembly and how the components react when exposed to fire.

A 3m length of wire mesh tray, accessories and power cables are the subject of the test. According to the final results, the certification may be issued at three different levels:

Table Standards.

STANDARDS	E30	E60	E90
Time	30 min.	60 min.	90 min.
Temperature	840 °C	950 °C	1000 °C

The purpose of this test is to validate the correct operation of the electrical system and to ensure that critical services (fire suppression system, emergency lighting, ventilation and other basic installations) remain functional for long enough to organise evacuation in the event of fire.

rejiband® E90 fire resistance

Test Set-up

The test set-up consisted of a 3 m length of wire mesh tray, including joints and accessories, supported on brackets at intervals of 1.2 m. The power cables, up to 1 kV, should be fire resistant at the same or higher level than halogen free, high safety cables. The wire mesh tray was then loaded with chains to simulate the cable weight and other standard conditions of the test.

During the test, a standardised temperature vs. time curve is imposed in the test oven, obtaining the 3 levels of certification and their corresponding times and temperatures as shown on table 1.

The results prove that the cables maintain electrical continuity during the test, and therefore the operational integrity of the installation is maintained.

As the test was progressing, both cables and trays were damaged by the high temperatures as defined in DIN 4102-12. Trays are deformed but maintain their support function. The cable sheathing starts to burn causing risk to the correct functioning of the system.

As shown in figure 3, **rejiband**® wire mesh cable tray and its accessories neither collapsed nor were they detached from the supports, ensuring enough structural resistance within the system.

The wire mesh cable tray exceeded the fire resistance test, qualifying for the highest level of resistance proposed by this standard, the **E90**. The tray with cables were tested for **90 minutes** at temperatures of **1,000ºC** (in accordance with the conditions of DIN 4102-12), maintaining circuit integrity against fire.

Figure 1. General View Of The Assembly

Conclusions

The combined use of **rejiband**® wire mesh tray with high safety halogen-free electrical cables improves substantially the safety of the installation. Since both components provide a self extinguishing system, which does not produce toxic, corrosive or opaque fumes (more typical for polymeric & halogen materials), this allows a period of time long enough for evacuation and emergency works.

Investing in safety equipment and systems with high fire resistance must be accompanied by a safe installation that ensures their correct functioning in the most critical situations.

Figure 2. Assembly Before Test

Figure 3. Assembly After Test

Pemsa Metal Tray Systems:
Behaviour in the event of fire: A1 (the Safest: Non Combustible)

New European Classification System in compliance with the Directive 89/106/EC, according to the Fire Behaviour of the Materials:

		CLASSIFICATION (*)		ADDITIONAL CLASSIFICATION
1	The safest	A1 ✔	Non combustible ✔	-
2		A2	Slightly combustible	Smoke Production **(S)** Smoke Density Flaming droplets/particles **(D)**
3		B	"	
4		C	Combustible	
5		D	"	
6	Less Safe (in decreasing order)	E	"	
7		F	No performance determined	-

(*) In accordance with EN 13501-1:2002

Behaviour in the event of fire

Materials	Directive 89/106/EC	Smoke Emissions	Smoke Opacity	Smoke Toxicity	Contained Halogens
Steel Trays ✔	A1, NON COMBUSTIBLE ✔	No Smoke ✔	No Smoke ✔	No Smoke ✔	NO ✔
Halogen-free cables	COMBUSTIBLE / FIRE RESISTANT	Reduced Smoke Emission	Reduced Opacity of Smoke	Smoke with Low Toxic Particles Level	NO
P.V.C.	COMBUSTIBLE / FLAME PROPAGATOR	Dangerous Smoke Emission	High Opacity of Smoke	Smoke with Toxic Particles Level	YES

The **rejiband®** and **pemsaband®** Metal Tray (A1) systems guarantee safety in that they do NOT emit toxic gases or halogens, they do NOT emit opaque smoke (luminous transmittance), they do NOT emit corrosive gases and they do NOT propagate fire.

Maximum service temperatures of cables and trays (*)

Conventional PVC Cables	70°C
Halogen-free Cables	90°C ✔
PVC Trays	60°C
rejiband® and **pemsaband®** Metal Trays	150°C ✔

(*) For cables and trays, data according to manufacturer catalogues.

rejiband® and **pemsaband®** Metal Trays do not limit the maximum service temperature of halogen-free cables.

rejiband® and pemsaband® metal trays comply with the standard UNE-EN-61 537 "Cable Tray and Cable Ladder Systems for cable management" (REBT ITC-BT-28 "public places")