

Regulations for hanging structures in halls at Palacio Municipal. Rigging

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Regulations

1. Object

The purpose of this document is to regulate the conditions that must be met by any element that will be suspended from the existing structures at PALACIO MUNICIPAL DE IFEMA MADRID. This is intended to ensure the safety of people and facilities both in the assembly and disassembly phase and in the finished structure during any event.

2. Scope

This regulation establishes the conditions that must be met by the rigging components used to suspend elements of structures installed in **Auditorium A** and **the Multipurpose Space** at PALACIO MUNICIPAL DE IFEMA MADRID.

The rigging materials covered by the present regulation are lifting and hanging elements, with any elements suspended from the aforementioned elements not subject to review.

3. Conditions applicable to the installation of hanging elements

The organisers and assembly companies will be able to hang elements from those structures indicated in the previous point, pursuant to the request made by said companies to PALACIO MUNICIPAL DE IFEMA MADRID. All hanging elements must comply with the characteristics that are determined based on the specifications of the assembly rules and the plans for the specific installation, as well as the rest of the safeguards that are included in this document.

Hung elements or structures should be designed to ensure the safety of people and the structure of the buildings and must comply with the following guidelines:

- The safety coefficients of the structures of the installations, subject to the loads that are transmitted to them by the suspended elements, should be higher than those established in their respective installation manuals.
- The safety coefficients of the suspended elements should be higher than those established, whether these are structural, lifting equipment or simply decorative.
- The materials used should be of good quality, in a good state of repair and approved by regulations, if required. They should also comply with Point 5 – “Minimum content of hanging plans” below.
- If steel cables are used, the minimum diameter should be 6 mm. See annex concerning the present standards on cables, NTP 155 of the Institute of Safety and Hygiene in the Workplace.
- The structures should be provided with a safety system consisting of tension-free steel cables in sufficient number to support the load in case the main cables break. These elements should be installed in any hanging structure or element, immediately after being raised into place. The arrangement of the safety cables shall be such that in their final state they are not subjected to tension, meaning that their length in relation to the clearance should be less than 10 cm. For a safety cable to work with guarantees, it must be tightened as much as possible to avoid, in case of failure of the main system, the load travelling a great distance and accumulating energy, resulting in a shock load much greater than the initial weight of the load. More than 5-10 centimetres is not a safe option.
- Any element suspended from a truss or structure (spotlights, sound pipes, motors etc.) will have a security system composed of steel wiring.
- These elements should always be hung by IFEMA MADRID personnel. As points specifically prepared for trusses or hangings.
- Each exhibitor shall only use hanging points located in the vertical space corresponding to their stand. If points need to be located outside that area, IFEMA MADRID should authorise this. In the MULTIPURPOSE SPACE, the minimum number of hanging points in any assembly should be two.

4. Requesting authorisation for hanging elements

Organisers wishing to hang an element from the hang points that exist in PALACIO MUNICIPAL DE IFEMA MADRID, whether the Multipurpose Space or from the existing trusses in Auditorium A, must follow the following protocol:

- A hanging certificate or plan shall be sent with its corresponding project management and signed by a qualified technician. This documentation should be endorsed by the corresponding professional association.

The plan should be sent to stecnica@ifema in one of the following formats: jpg, pdf, tif, or any CAD standard. It must include the location, height, resistances and stability of each of the requested points, with the minimum content indicated in Point 5 "Minimum content of hanging plans" of this document. It should be supervised in situ by the project management to ensure that it accurately reflects the certificate or plan.

- The deadline for the delivery of this documentation is fifteen days before the beginning of the assembly of the event.
- If the standards that appear in these rules are not met, the Trade Fair Services Secretariat will notify you of any corrections that the submitted documentation should undergo in order to proceed with the aforementioned assembly. Technical responsibility will be exclusively on the writers of the certificate.

5. Minimum content of hanging plans

Depending on the type of installation, the minimum documentation to be provided shall be as follows:

a. Hanging of the structure of the installation (pre-rigging). When the following are hung from the structure of the installation: pre-rigging and rigging system (trusses, slings, motors, wiring etc.), elements external to the installation itself, which will later support the lighting, sound equipment and other elements that serve the event.

- Explanatory report of the installation to be made.
- Description of the points that will be hung from or the loads that will be transmitted to these hanging points, with the resulting weights in the mentioned points of all the elements that are part of the hanging installation: spotlights, sound pipes, screens, motors, the weight of the trusses themselves, wiring and any element that has a load.
- Diagram showing the elements that make up the assembly and their location.
- Relationship between the materials and their structural role.
- Approval certificates for said materials.
- Description of the safety system, duplicating initial capacity.
- Certificate from a qualified technician regarding the resistance and stability of the hung elements, that the limits established in each case for the structures from which they hang are not exceeded and finally the viability of these hanging installations.

b. Hanging from the trusses of the existing installation. When the lighting equipment, sound, screens etc. that will serve the event are hung from the trusses of the installation.

- Explanatory report of the installation to be made.
- Description of the loads that each section of truss will bear between two motors, point load in the case of elements such as sound pipes or other elements with a significant impact on the weight and linear elements such as spotlights or screens.
- Diagram showing the elements that make up the assembly and their location.
- Approval certificates for said materials.
- Description of the safety system, duplicating initial capacity.
- Certificate from a qualified technician regarding the resistance and stability of the hung elements, that the limits established in each case for the structures from which they hang are not exceeded and finally the viability of these hanging installations.
- See manual on hanging from trusses.

6. Compulsory regulations

- Compliance with the machinery directive Royal Decree 1644 regarding declarations of compliance and compliance with Royal Decree 1215 regarding the annual inspection of lifting equipment.
- Royal Decree on Work Equipment 1215/1997 of July 18.
- Royal Decree on Works at Height 2177/2004 of November 12.
- Royal Decrees on Personal Protective Equipment 773/1997 of May 30 and 1407/1992 of November 20.
- Technical notes on prevention
 - UNE EN 13414. Steel wire rope slings.
 - UNE EN 1677. Series of standards for sling accessories.
 - UNE EN 12385. Steel wire ropes.
 - UNE EN 13411. Terminations for steel wire ropes
 - UNE-CWA 15902-2. Lifting and load-bearing equipment for stages and other production areas within the entertainment industry. Part 2. Specifications for design, manufacture and for use of aluminium and steel trusses and towers.
 - NTP 866. Steel wire rope slings. Safety.
 - NTP 861. Chain slings.
 - UNE EN 1677. Series of standards for sling accessories. Safety.
 - NTP 155. Steel wire ropes. Safety.
 - NTP 221 Steel cable slings.
 - NTP 167: Block & tackle, gin wheels and pulleys.
 - NTP 78: Hand-operated pulley blocks
 - NTP 202: On risk of falls of personnel from a height.
 - NTP 264: Cable traction devices.
 - NTP 634: Mobile elevating work platforms.
 - NTP 682, 683 and 684 on Safety in acrobatic work.
 - CTE. Technical building code.

Manual

1. Object

The purpose of this manual is to provide a series of guidelines for the assembly and disassembly of hanging elements. Its content is complemented by the aforementioned regulations. In case of discrepancy between these documents, that established in the regulations shall prevail.

2. Scope

This manual establishes the conditions that must be met by the rigging components used to suspend elements of structures installed in **Auditorium A** and the **Multipurpose Space** at PALACIO MUNICIPAL DE IFEMA MADRID.

3. Slings method

Depending on the method of slinging, the load capacity of the truss will be reduced. Table 1 gives some examples of slinging methods and the percentage of the payload that can be used.

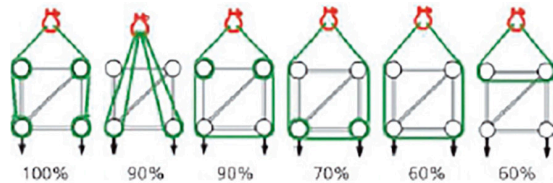


Table 1

The angle formed by the ends of the sling at the point of union (**generally a clevis shackle**) **must not exceed 90°**. **If the angle is between 90° and 120° the load capacity of the truss should be reduced by 50 %, in addition to the reduction taking into account the slinging method.**

Slings with an angle greater than 120° cannot be performed (the upward or downward orientation of the sling is irrelevant).

If the sling is only installed on one side, the load capacity will be 50 % and only half of the elements that make up the truss will work.

If a load is hung on both sides of the truss, but two spot anchoring points are used, such as a Line Array type sound system, the decompensation of both loads should not be greater than 60 % to 40 %. The sum of both must not exceed 100% of the permissible load of the truss according to the maximum load values established. In case of a decompensation greater than 60 % to 40 % the load capacity of the truss will be 50 %.

4. Clips/claws

Depending on the type of clip used to hang the different loads (bulbs, tubes etc.), the truss can suffer permanent damage (for example, perforation of the tubes by the clamping screw of the claw). In order to prevent this from happening and lengthen the life of trusses when claws are used, the following working methods will be taken into account:

General

Claws will only be placed on the main tubes of the truss (tubes whose diameter is 50 mm). **It is strictly forbidden to place claws on tubes whose diameter is less than 50 mm.**

The tightening torque should never be enough to deform the truss tube.

According to the clip type

The type of claw shown in Photo 1, in which the screw rests directly on the tube of the truss without any type of plate to distribute the load generated, may only be used when the load hangs down. It is forbidden to use mechanical aids (spanner, multi-purpose tools etc.) and should only be tightened by hand. **It is totally forbidden to hang loads flag-style with these types of claws.**



Photo 1

This type of claw shown in Photos 2 and 3 is very unlikely to damage the truss, meaning that they will be the only types that can be used to hang loads flag-style.

In addition they will be the only ones that can be used to tie other trusses or structures to the trusses in Auditorium A, either above or below it. The double claw type in photo 3 can be fixed or rotating, as long as it sits perfectly on the trusses and does not generate extra forces due to poor support, or to lever the diagonalisation tubes.

The tightening torque that will be given to this type of claw should be as follows:

- If the load is hanging down, the torque generated by manual force is without mechanical aids.
- If the load is hanging flag-style, the torque is generated by manual force with the help of a tool with a lever arm that does not exceed 15-20 centimetres in length.



Photo 2



Photo 3

5. Types and placement of loads

Uniform Distributed Load UDL

The load distributed along the entire surface of a truss or between the surface of two or more supports (in our case motors). If it is composed of several elements or equipment, they should have the same weight (for example, moveable spotlights distributed evenly).

The placement of this type of load should be undertaken in the following ways:

A: If the load does not exceed 60 % of the total per linear metre, a single main pipe can be hung.

B: If the load exceeds 60 % of the maximum UDL, it should be hung distributed between two main tubes, front and the rear, never front up/down or rear up/down.

Point Load PL

Any load whose weight exceeds 100 kg, if this load is placed in the centre of a span, is called the Central Point Load or CPL, and this is the value that is usually given in the tables to be the most unfavourable load configuration.

Point loads distributed throughout the span may be placed, as long as the sum of the loads applied does not exceed 100 % of the given CPL for this span.

For point loads in the front and rear tubes and that may be unbalanced (for example "Line Array" sound systems) the decompensation may not be greater than 60 % - 40 %.

A single load of 150 % of the value of the CPL may be placed, as long as the distance of the load to the nearest motor does not exceed 1/5 of the total length of the span.

The placement of this type of loads must be centred and attached to the front and rear and upper and lower tubes according to the slinging criteria in Point 1 of this document. All point loads must be placed at the nodes of the trusses.

Combinations of loads

In order to combine different types of loads, the following rule should be applied:

The sum of the percentage (%) of each type of load shall be 100 %.

For example:

An 8-metre span of 52 x 52 gold UDL = 1,200 kg, CPL = 600 Kg.

If we hang a UDL of 720 kg this will be 60 % of the total (1,200kg) of the admissible UDL, therefore we only have 40 % of CPL (600 kg) that we can apply 240kg.

If we add the % of each load type the result (40 %+60 %) is 100

Load represented by workers on trusses

If it is expected that work is to be carried out on the trusses at height, the load generated by the worker must be added to the loads provided for the support, **only one worker per truss at the same time**, during the time the worker is in position.

This load will be the weight of the worker multiplied by a factor of 1.2 (due to movement) as a general rule, and provided that the weight of the worker, with PPE and tools, does not exceed 80 kg. For the theoretical calculation this load is considered to be 100 kg, and should be taken into account at any of the points on the truss.

- At each of the motors.
- At the middle of each span.
- At the UDL load.

Load at fixed points

Loads at fixed points in the Multipurpose Space only admit a fully vertical point load of 350 kg at each point.

6. Work at height or vertical work on trusses

To access a truss raised to work height, the access methods commonly used in the sector may be used, as long as they are legal and the loads generated in the truss by the means of access are taken into account:

As a general rule:

- Rope ladder or steel cable ladder

Load to include in the calculations: the weight of the heaviest worker multiplied by 1.2.

- Ropes:

Load to include in the calculations: the weight of the heaviest worker multiplied by 1.3.

The use of the truss as a life line is strictly prohibited:

- Anchoring vertical life lines to the truss. **Prohibited.**
- The correct way to secure oneself when climbing up to/descending from the truss will be installing vertical life lines on the master rings that join the truss to the motor.
- Move through the truss using fall arrest systems (double hook type) anchoring these directly to the truss. **Prohibited..**
- Using the cable collection systems of the PMC trusses installation is **prohibited..**

The correct way to secure horizontal movements along the truss will be by installing horizontal life lines to the master rings that join the truss to the motor, reducing the motor load by 600 kg (load generated in a factor 2 fall by a worker). Before tensioning them, the truss should be loaded with the expected weight, which must be such that the horizontal tension caused by the life line does not move the plumb line of the motor chain from its original position. If this is not the case, alternative methods should be used for workers to position themselves at height, such as, for example, "IPAF Category 1" elevated platforms.

7. Fireproofing of truss anchoring systems

The materials of which the anchoring systems of the trusses at PALACIO MUNICIPAL DE IFEMA MADRID are built, as well as the other anchoring systems that are used, must be resistant to heat (minimum temperature of use 200 degrees Celsius). If this requirement is not met, a secondary anchor must be installed, placed to give a maximum clearance of 5 centimetres, so that in case of failure of the main anchor, the dynamic forces generated do not pose a risk to the strength of the secondary anchor.

8. Rigging machinery and accessories

All machinery (chain or cable hoists, electric or manual) and all rigging accessories used must be in perfect working order, labelled and/or marked, accompanied by their Declarations of Conformity with the Machinery Directive 2006/42/CE of May 17, 2006 and with its corresponding periodic inspections as indicated by the manufacturer (at least on an annual basis).


9. Andling of the rigging structures and motors in Auditorium A

The handling of existing motors and rigging structures that hang from these may only be carried out by the personnel of companies approved by IFEMA MADRID at the current rates.

The minimum hiring period shall be half a day (four continuous hours).

Annex

Example of graphical documentation to be submitted and calculation by load area



Application for authorisation to hang structures/rigging at Palacio Municipal

Fair services department.

INSTITUCIÓN FERIAL DE MADRID
Avda. del Partenón, 5
28042 Madrid
España

NIF: 02873018B

+34 91 722 30 00

atencionalcliente@ifema.es

ifema.es

Send to: stecnica@ifema.es

Data to be filled in by the installer company

Fair/Event _____

Details of the company requesting authorisation

Company _____ N.I.F. [Tax ID N°.] _____

Trade name _____

Address _____ Postcode _____

City _____ Province _____

Country _____ Tel. n°. _____ Fax _____

Email _____ Website _____

Contact person _____ Position _____

Location of the installation

Multipurpose space _____

Auditorium A _____

Check the corresponding box

Documentation to submit

A rigging certificate or plan must be submitted at a later date, specifying the corresponding project management and signed by a competent technician. This documentation must be endorsed by the corresponding professional body.

The plan must be sent to stecnica@ifema.es in one of the following formats; jpg, pdf, tif, or any standard CAD format.

It must include the location, height, tolerances and stability of each of the requested points, with the minimum content indicated in point five of the Regulations for hanging structures in IFEMA PALACIO MUNICIPAL / Rigging. It must be supervised "in situ" by the project management to ensure that what appears on the certificate or plan corresponds to what is actually suspended.

IMPORTANT ANNOUNCEMENT: Before assembly work begins, the installation company must report any deterioration of the structural elements in the area where the installation will take place. If no deterioration is reported, IFEMA will understand that the installer is satisfied with the area and that any deterioration detected from then on will be understood to have been caused by your company. Likewise, the installation company undertakes to clear up all the elements referred to in this authorisation once the event has ended. If they are not cleared up or if there is any damage to the facilities, IFEMA will bill the aforementioned company for the cost of the clearance, repair and/or replacement of the same to their original condition.

The installer company is responsible for the veracity of the data provided, both in the present application and in its accompanying documents such as the rigging plan and especially everything related to the weights and dimensions of each element of the system.

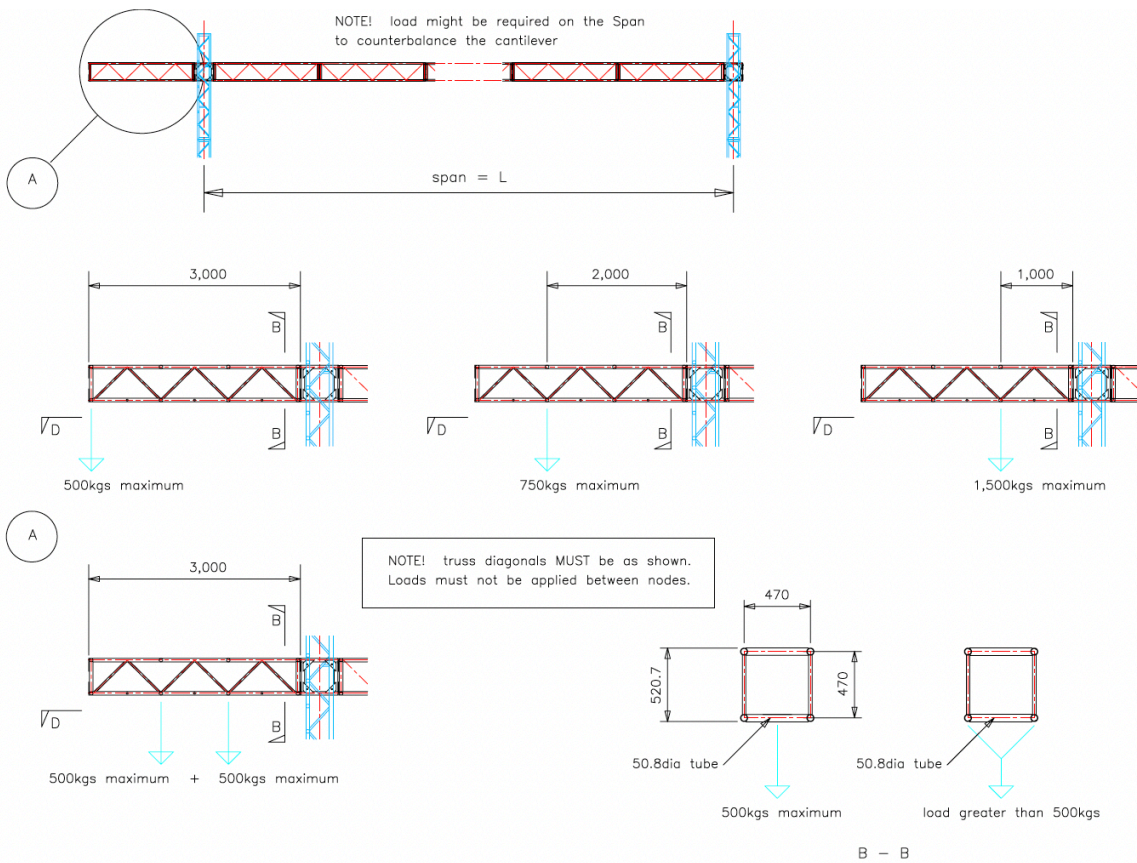
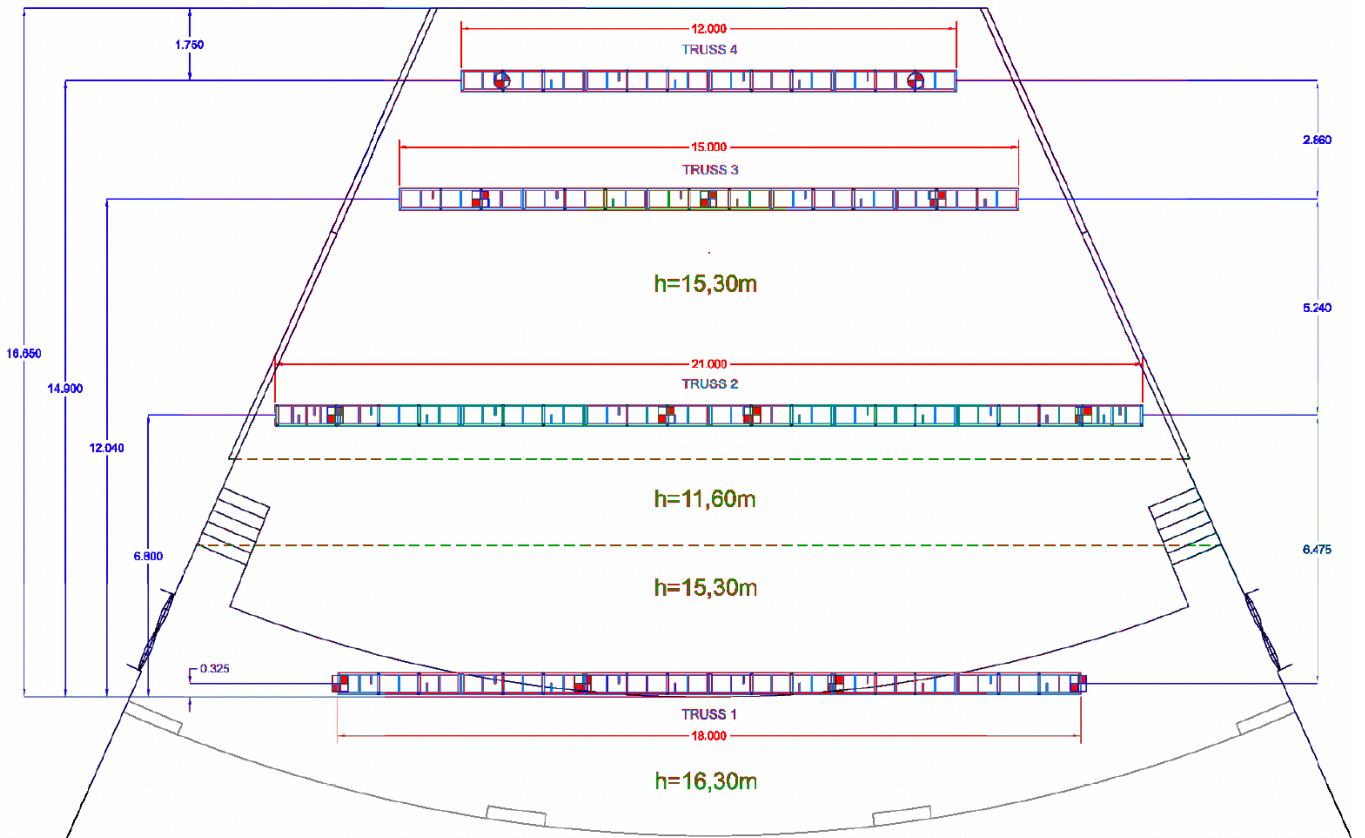
The authorisation of the present application in no way implies that IFEMA or its collaborating companies for this service are responsible for the structural solution.

Representative of the installation company

Date and signature

The applicant company confirms that it is aware of and accepts the prevailing rules (see note on reverse).

Print



52cm GP TRUSS – STRUCTURAL ANALYSIS
CANTILEVER LOADS

52 X 52 CM TRUSS GOLDEN OUTER COLOUR - PERMITTED LOADS

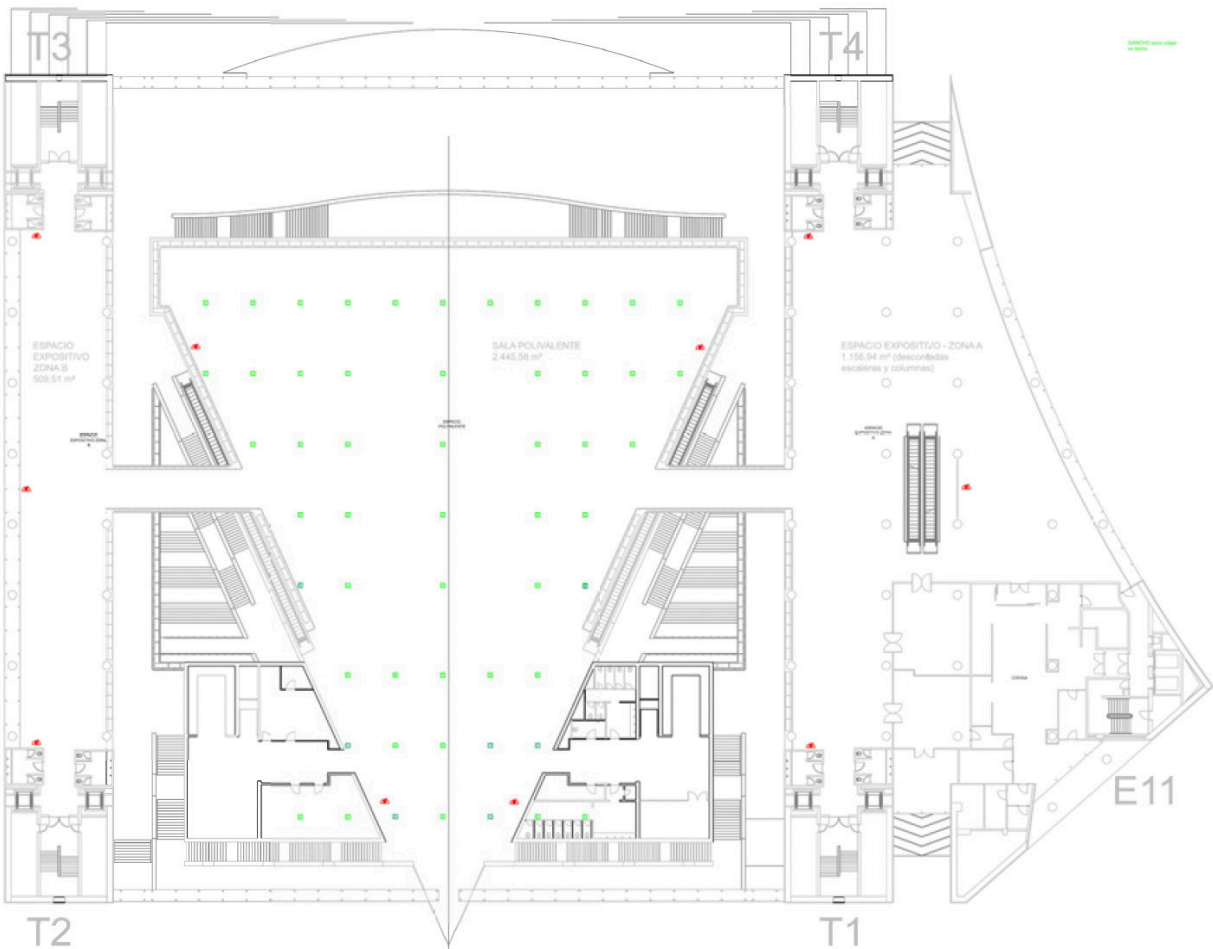
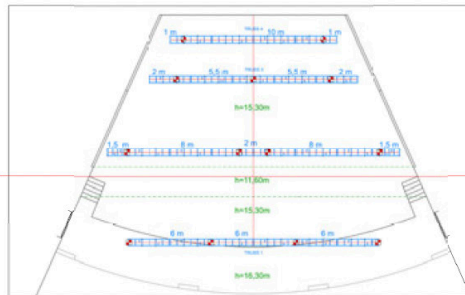
Length of the span		Uniform Distributed Load (UDL)						MAXIMUM ADMISSIBLE POINT LOAD							
		kg		lbs		mm		Centre Point Load (CPL)		Third Point Load (TPL), load per point		Quarter Point Load (QPL), load per point		Fifth Point Load (FPL), load per point	
m	ft	kg	lbs	Kg/m	lbs/ft	mm	inch	Kg	lbs	Kg	lbs	Kg	lbs	Kg	lbs
2	6,6	2.000	4.414,0	1.000	672,8	2	0,07	1.000	2.207	550	1.214	367	810	275	607
4,4	14,4	1.350	2.979,5	307	206,4	8	0,31	675	1.490	506	1.117	338	745	253	559
5,5	18,0	1.700	3.751,9	309	208,0	13	0,51	850	1.876	638	1.407	425	938	319	703
6	19,7	1.500	3.310,5	250	168,2	15	0,59	750	1.655	563	1.241	375	828	281	621
8	26,2	1.200	2.648,4	150	100,9	24	0,94	600	1.324	450	993	300	662	225	497
8,7	28,5	1.100	2.427,7	126	85,0	25	0,98	550	1.214	413	910	275	607	206	455
10	32,8	750	1.655,3	75	50,5	31	1,21	375	828	281	621	188	414	141	310

* A single point load of 150% of the value of the approved CPL may be placed, as long as the distance of the load to the nearest motor does not exceed one fifth (1/5) of the total length of the span. For the anchoring of this load to the truss, using any of the configurations that appear in the tables, the slinging criteria established in the Manual of Good Practices and Uses of Rigging in the Palacio Municipal de Congresos must be followed.

CANTILEVERS - PERMITTED LOADS

52 X 52 cm GOLDEN OUTER COLOUR

Length of the span		Uniform Distributed Load (UDL)		End Point Load (EPL)	
		kg/m	lbs/ft	Kg	lbs
1	3,3	570	383,5	469	1.035
1,5	4,9	341	229,4	396	874
2	6,6	231	155,4	342	755
3	9,8	129	86,8	267	589



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