



## PERFORMING ARTS VENUES

### PRACTISE – USE OF SCENERY HANGING HARDWARE

These notes are provided as a guide to the LCSD performing arts venues policy in respect of hanging fly scenery.

Within performing arts venues it is important to maintain public, performer and staff safety at all times. Flown Scenery must be hung **SAFELY** to prevent any potential falls. **Proprietary** hanging hardware is suggested and encourage for safe scenery hanging.

#### **(I) Wire and Wire Grip Use**

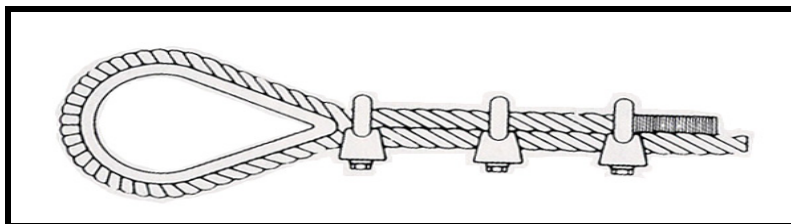
Contractors should use at least 3.2mm (1/8") steel suspension wire for suspending most framed scenery, except for light weight soft draperies and vinyl type banner.

Except for narrow width framed scenery, there should be at least 3 suspension wires on any items.

The safety factor of 8:1 should apply to stage rigging, and 10:1 for performer flying.

Rope diameter (mm)	6 x 19 Plow Steel Wire steel core (kg)	7 x 19 Aircraft Cable (kg)
3.20	-	770
4.80	1232	1628
6.40	2288	2816
8.00	3410	3960
9.50	5104	5280
11.11	6600	7172
12.70	8624	10032

A thimble is used to protect the wire and hold it in shape and wire grips should be used to form a proper fitting as in the diagram shown below. Contractors must to use **3** wire grips on every fitting for wire rope with a diameter of less than 12.7mm (1/2").



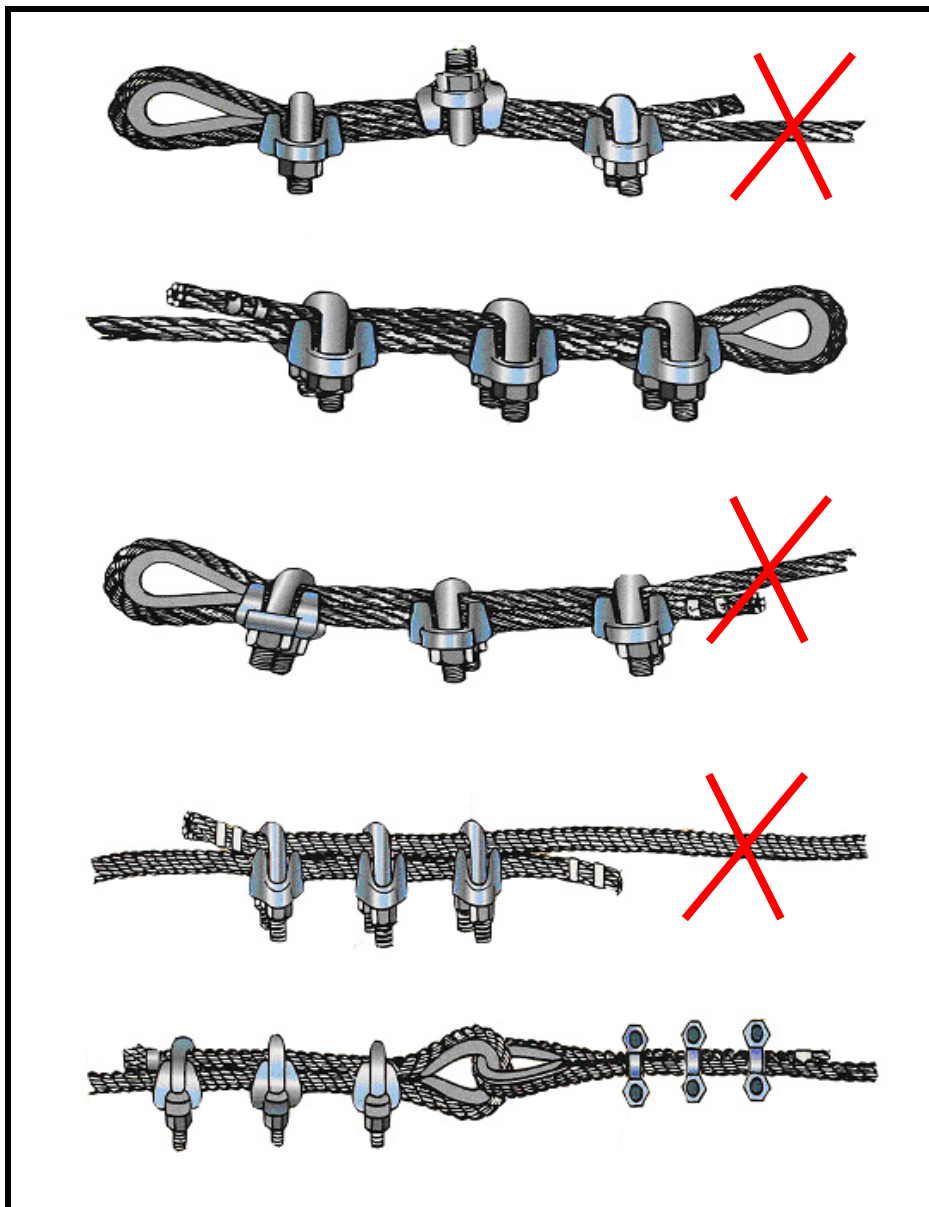
\* Free end of the wire should be under the U-shape of the wire grips for maximum rope strength.

**Amount of wire rope turn back from the thimble & clip sizes**

Rope diameter (mm)	Clip Size (mm)	Turn Back (mm)	No. of Clips
4.80 (3/16")	4.80	130	3
6.40 (1/4")	6.40	130	3
8.00 (5/16")	8.00	140	3
9.50 (3/8")	9.50	162	3
11.11 (7/16")	11.11	180	3
12.70 (1/2")	12.70	295	3

Contractors should follow the said amount and distribute wire grips evenly along the wire free end.

**Gripping Method**



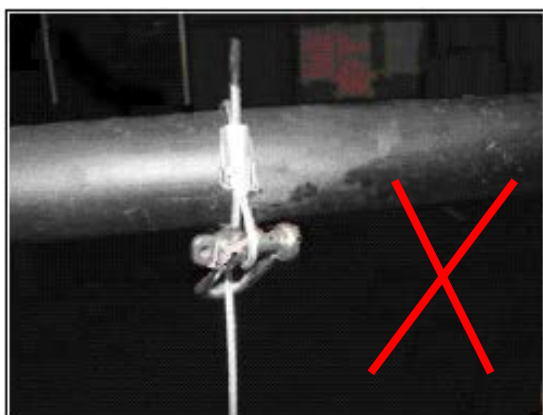
(Source: Occupational Safety & Health Council)

## (II) Attaching Wires to the Flying Bar

Steel chain or slings should be used to connect the suspension wires to the flying bar in order to maintain the full SWL rating of the suspension wire.



Twisting or bending the wire onto the flying bar is not recommended.



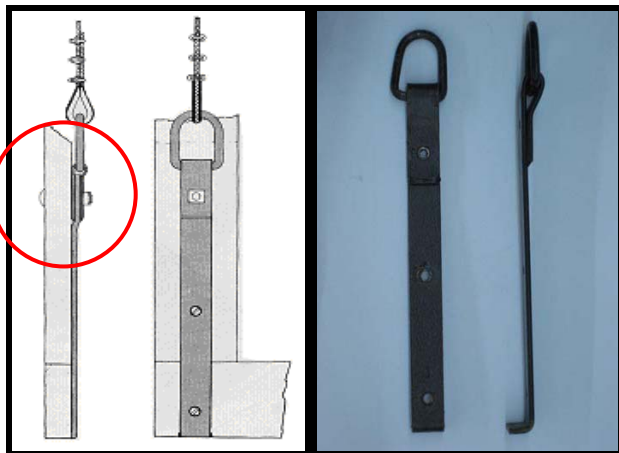
### Notes:

- Don't over load the wire beyond its SWL
- Use suitable wire for the particular loading of scenery
- Don't use damaged wire
- Check the wire regularly, especially before each use

### (III) Flying Iron

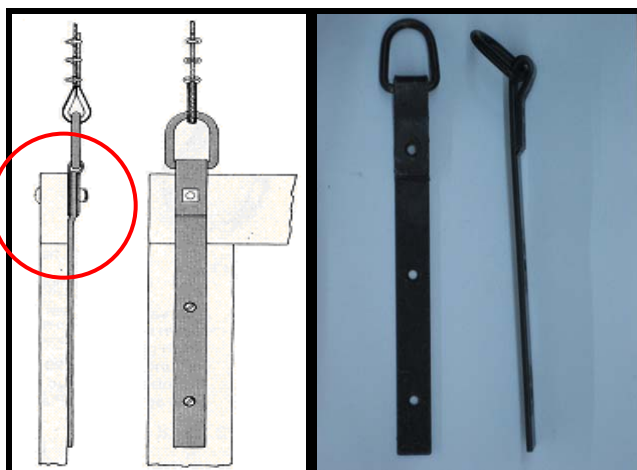
A test certified flying iron should be used for all fittings onto framed scenery.

Flying irons should be fitted with two screws plus a set of bolt and nut shown as the illustration below. (Size of the illustrated flying iron is 370 x 30 x 2.2mm with a S.W.L. of 185 Kg)



Lipped flying iron

The Lipped Flying Iron is to pick up the scenery from the base, usually with a turn buckle to tension and make fine adjustments to cables.



Plain flying iron

The Plain Flying Iron is suitable for use where picking up from the base of the scenery is not feasible.

Contractors are advised **NOT** to use self made flying iron unless those flying irons are certified by government approved engineer.

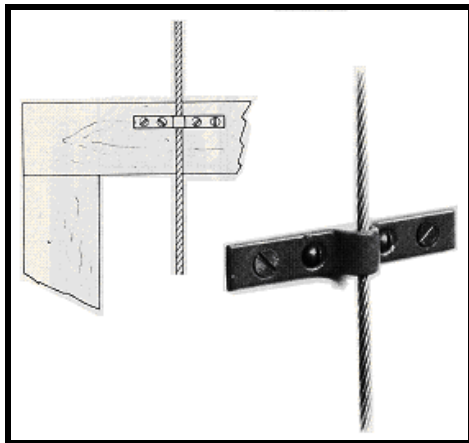


## **(IV) Grommet**

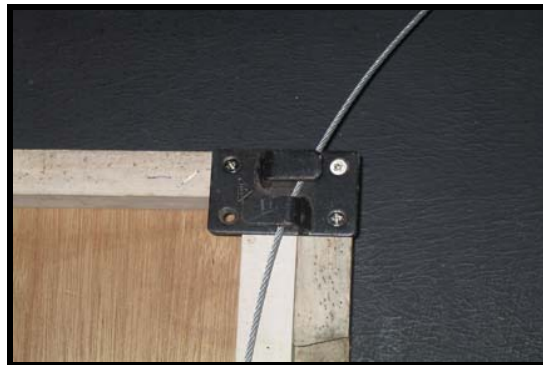
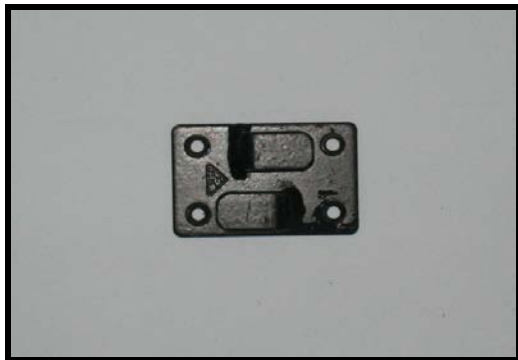
A grommet is designed to screw and bolt to the top of framed scenery to hold flying cables in position. In some cases for tall scenery additional grommets can be added in between the flying iron and the top grommet.

Grommet should be fixed with a minimum of 2 x 5mm dia. round head machine screws & nuts and 2 x 25mm wood screws with one machine screw and nut on each side of the grommet.

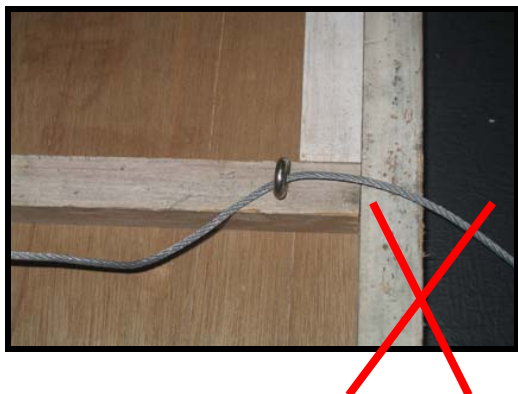
### Closed Grommet



### Open Grommet



Contractors are advised **NOT** to use screw eyes for this purpose.



## (V) Shackles

Shackles are used to connect between suspension wires, turnbuckles and flying irons.



Shackles are sized by diameter at the opening of the bow or the D ring.

Nominal size (mm)	Safe working load (kg)
6.4	1760
9.5	3520
12.7	6160
15.9	9680
19.0	14080
25.4	24640



Dee shackle

Bow shackle

Notes:

- Don't overload the shackle beyond its SWL
- Ensure the shackle bolt is tightened before use
- Shackle shall always be used vertically
- Be aware that the shackle does not fall to one side when hanging scenery, a small metal plate can be used to help fix the shackle in position when necessary

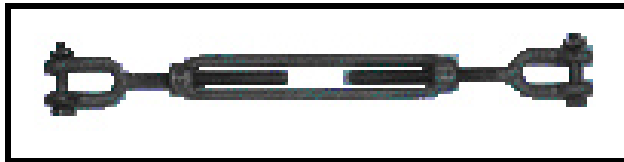
## (VI) Turnbuckle

Turnbuckle is used for tensioning or making fine adjustments to cable lengths.  
 Observe safe working load figures.

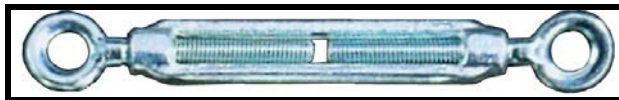
End fitting stock diameter (mm)	Any combination of jaw end fittings and eye end fittings (kg)	Any turnbuckle with hook end fitting (kg)
6.4	1100	880
8.0	1760	1540
9.5	2640	2200
12.7	4840	3300
15.9	7700	4950
19.0	11440	6600
22.0	15840	8800
25.4	22000	11000

These safe working load figures refer only to turnbuckles made of weldless, forged alloy steel.

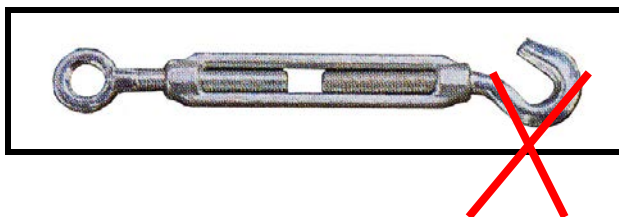
Jaw turnbuckle



Eye turnbuckle



Hook Turnbuckle is ***not*** advised to be used on stage even if the hook is wired shut.



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