



## INTERNATIONAL STANDARD GUIDE

### Hanging Artwork by Cord or Wire

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#### 1.0 Scope

1. This document examines problems that may occur when hanging framed artwork with a flexible wire or cord hanging system.

#### 2.0 Summary of Practice

- 2.1 The most common method used to hang framed art requires the attachment of a wire or cord to each of the vertical sides of the frame with screw eyes or similar fasteners. The wire or cord is then placed over a single picture hook or similar fastener attached to a wall.
- 2.2 This method places tremendous tension on both the wire and the wire anchor points on the frame. The tension will often break the wire, pull out fasteners, split the frame, and/or bow the sides and top of the frame. Any of the preceding can result in damage to the art within the frame and to the frame itself.
- 2.3 If the wire is fastened to the anchor-points so that it is near horizontal across the back of the frame, the forces on the wire and each anchor-point can be as much as 14 times the weight of the frame. (See Fig. 1)
- 2.4 If the angle of the wire is increased to near-vertical, the forces are reduced to slightly more than one half (1/2) the weight of the frame at each wire anchor-point. (See Fig. 1)
- 2.5 The use of a single hook in the wall, regardless of the frame size, rarely allows for the cord or wire to have more than a 15° or 20° angle up from horizontal. The forces on the wire and anchor-points on each side of the frame are more than 2 times the weight of the frame.
- 2.6 By using 2 hooks in the wall and adjusting the wire to near-vertical, the stresses on the wire and anchor-points are decreased to slightly more than one half (1/2) the weight of the frame at each wire anchor point. (See Fig. 1)
- 2.8 Forces directed near-vertical on the wire anchor-points minimize side forces on the frame, thereby reducing forces on the artwork/glazing package.

#### 3.0 Calculation Formula

- 3.1 The formula for calculating the stress placed on a hanging system is:

$$\text{Force} = \frac{1/2 \text{ Weight}}{\text{Sine of Angle}}$$

The angle is measured in degrees by imagining a horizontal line between the two anchor-points and a vertical line that bisects the horizontal line and intersects the line of the wire/cord as well. ( See Fig.1)

## 4.0 Procedure

- 4.1 Fig. 1 shows a typical rear view of a frame with the anchor-points on the vertical sides of the frame approx. 1/3 down from the top of the frame. The 15° wire angle is common practice, although many framers attach the wire more tightly.
- 4.2 The laws of physics show that for any 10 lb. frame with the wire attached 15° up from the horizontal, the resulting force pulling on the wire from each anchor-point is 19 lbs. The force increases as the angle decreases and decreases as the angle increases.
- 4.3 A common problem (in addition to stripped-out screw eyes, split moulding, and broken wire) resulting from a wire positioned too near to the horizontal is the top of the frame bending upward as a result of the wire forces. The drawing in Fig. 2 is slightly exaggerated to illustrate the problem. With 19 lbs. pulling toward top-center, each side of the frame is pulled inward until stopped by the artwork/glazing package. Each side of the frame will move one half (1/2) of the frame allowance.

The top of the frame will usually bow upward as the sides are drawn together and bent inward.

- 4.4 A typical frame allowance is 1/8" and a typical rabbet width on a modern moulding is 3/16" ñ 1/4"; an un-bowed frame top is engaged a scant 1/16" ñ 1/8" with the top edge of the glazing. (See Fig 3) Gravity ensures the artwork/glazing package is resting on the bottom frame leg. Bowing of the top frame leg can expose the top edge of the glazing. In metal frames, exposing the top edge of the glass combined with pressure from spring clips can break the glass.

## 5.0 Recommendations

- 5.1 Attach the wire so that when the frame is hung from 2 hangers (See Fig. 4) the wire is at least 60° up from horizontal. This procedure significantly reduces the forces mentioned above as well as ensures the frame will hang level.
- 5.2 Remember that one function of the frame allowance is to allow the art, mats, backing and glazing to expand freely with changes in temperature and humidity. If the sides of the frame are pulled inward by excessive force on the wire, the art and the other materials in the frame package can buckle. The side forces can also warp or break the glazing.

There are numerous other hanging methods and commercially available hanging systems that allow frames to be hung without stressing either the frame or the art.

Fig. 1

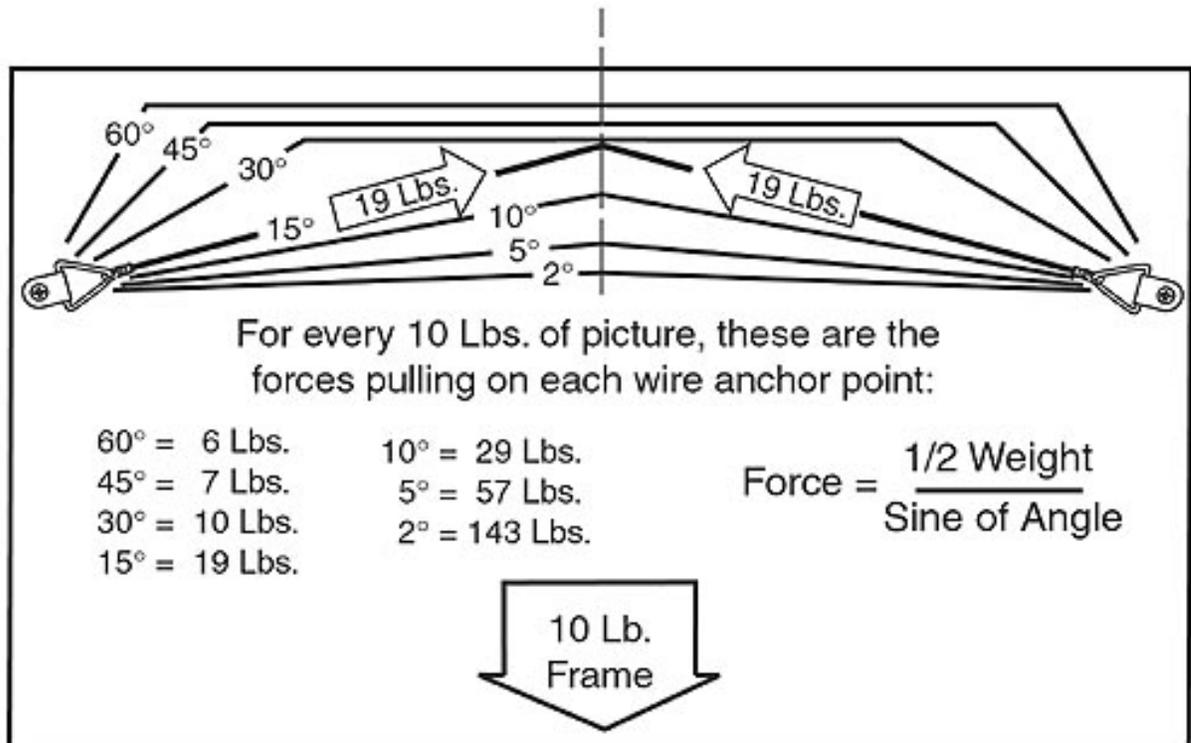


Fig. 2

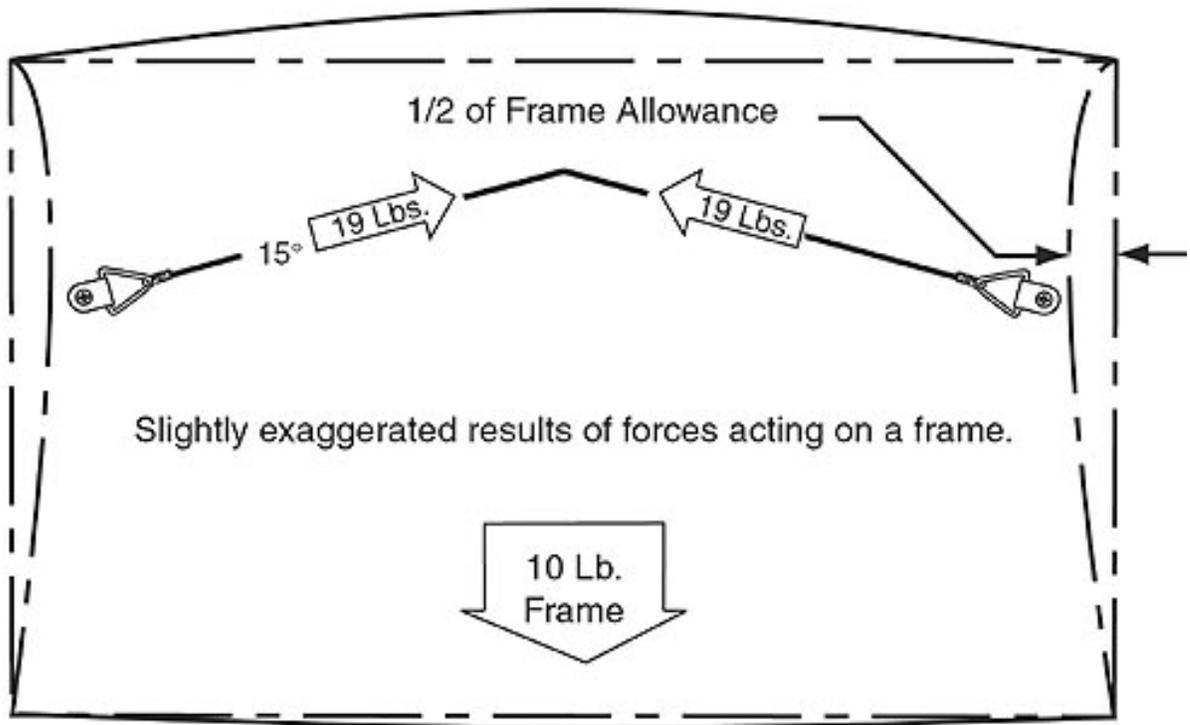


Fig. 3

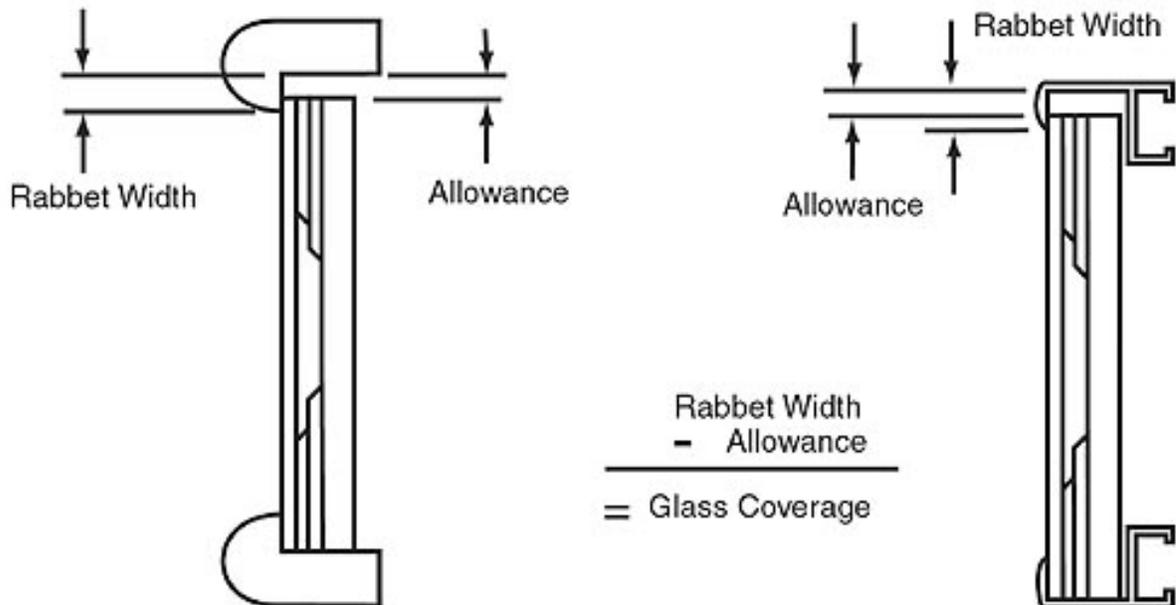


Fig. 4

