



**Fire Protection Products**

*BURNING ISSUES*



6/9/97 **No. 60**

## Calculating Percent Cable Fill

This letter is to explain how the cross-sectional area fill percentage is calculated. Cross-sectional area fill percentage is the way UL specifies the number of cables that are allowed in a penetration opening for insulated electrical cables.

To calculate the percent fill:

1. Calculate the area of the opening ( $A_o$ )  $A_o(\text{for a circle})= 3.14 \times r^2$  ( $r$ =radius of the circle)
2. Calculate area of each cable and total areas ( $A_c$ ) of the cables.  $A_c= 3.14 \times r^2$  ( $r$ =radius of the cable)
3.  $A_c \div A_o \times 100 = \% \text{ cable fill.}$

In the case of UL System No. WL3031, in item 3, the “max” listed refers to the largest cable size tested for each cable type. For example on item 3A, if the cables are No. 24 AWG copper conductor telecommunication cables, then the individual cables cannot have more than 150 pairs of conductors in each cable. There can be more than one of these 150 pair cables to a maximum 40 percent fill based on the calculation in the beginning of this letter. Hope this helps.

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