Requirements for Distribution System Restraints
Definitions and Locating Requirements

SMACNA has developed a set of restraint placement criteria based on analytical review, practical experience, and historical analysis. The criteria presented in this manual is generally based on the SMACNA criteria, with the only exceptions being an extrapolation of the data to higher seismic force levels and an increase in allowable spacing where restraint hardware capacity (as illustrated in the SMACNA guide) would be exceeded.

With respect to the conceptual restraint arrangement illustrations, the SMACNA concepts are appropriate and are referenced here.

In general, conduit and bus ducts are restrained in lengths called “runs.” Therefore before getting into a detailed review of the restraint systems it is imperative that a definition of “run” as well as other key terms be addressed.

Definitions

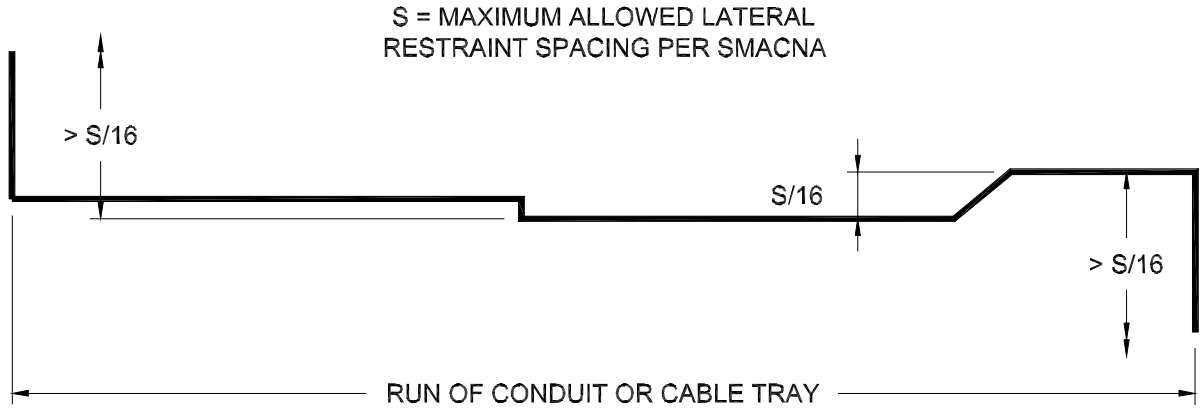
Axial In the direction of the axis of the run.

Lateral Side to side when looking along the axis of the run.

Pipe or Conduit Clamp A heavy duty split ring clamp tightened against the conduit to the point that it can be used to control the axial motion of the conduit, tray or duct.

Restraint Any device that limits the motion of a conduit or duct in either the lateral or axial direction.

Run A more or less straight length of conduit or duct where offsets are limited to not more than S/16 where S is the maximum permitted lateral restraint spacing (a function of conduit or duct size and seismic forces) and the total length is greater than S/2. (Note: S dimensions for various conditions are listed in Chapter D4.)



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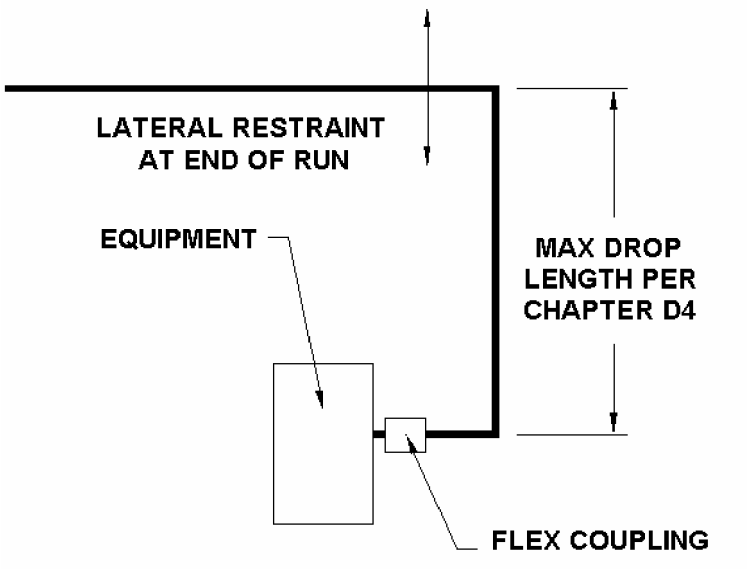
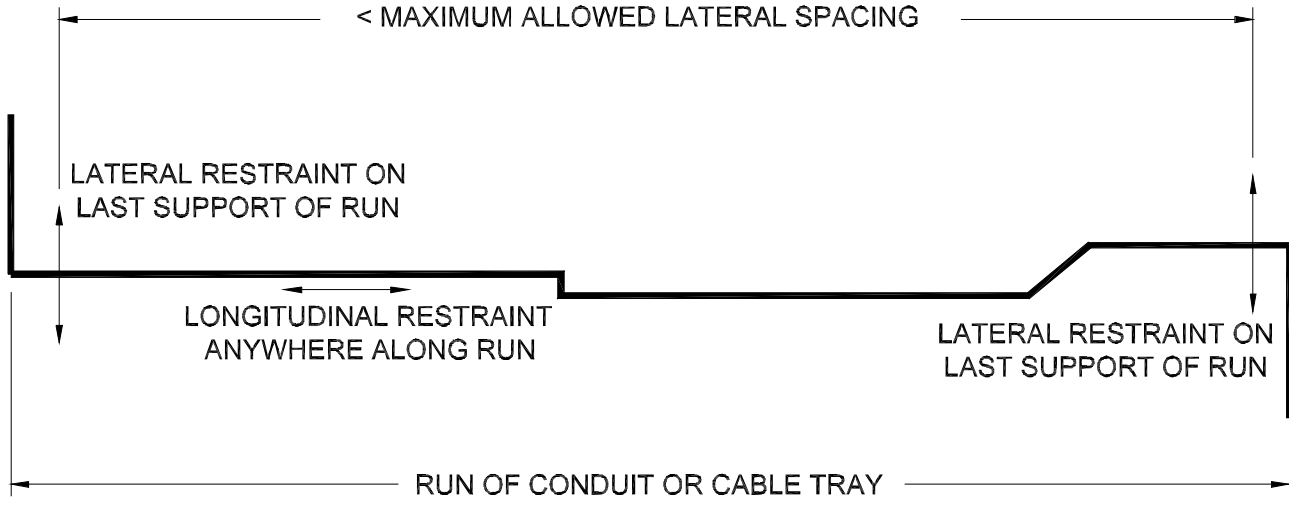
Short Run A run as defined above where the total length is less than S/2 and where it is connected on both ends to other runs or short runs.

Drop A length of conduit that normally extends down from an overhead distribution system and connects to a piece of equipment, usually through some type of flex connector. The drop can also extend horizontally. In order to qualify as a drop, the length of this conduit must be less than S/2. If over S/2, the length of conduit would be classified as a run.



Restraint Requirements

1) Full runs greater in length than S/2) must be restrained in both the axial and lateral direction. If the run is not a short run or a drop, it must, as a minimum, be laterally restrained at the last support location on each end.



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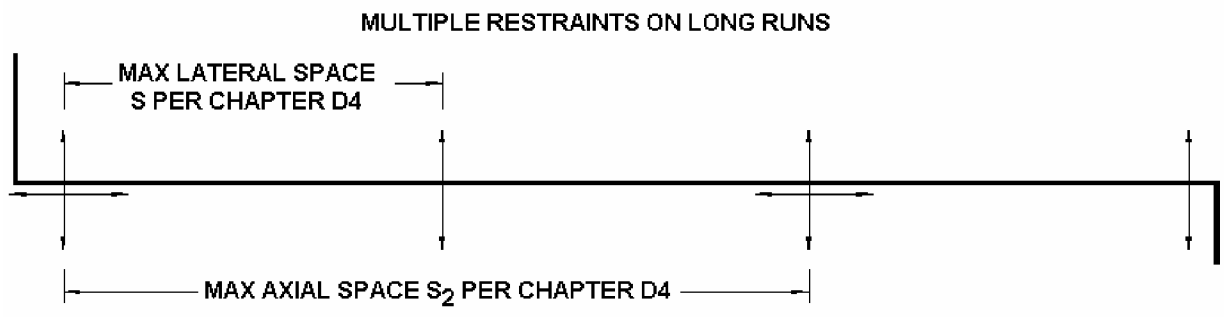
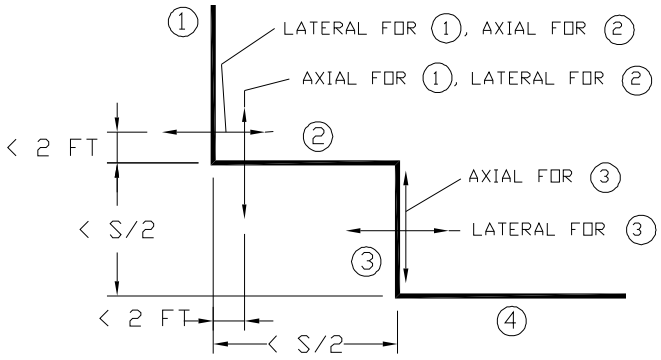
2) If a run is longer than “S”, intermediate restraints are required to limit the spacing to that permitted by the building code (see table in Chapter D4).

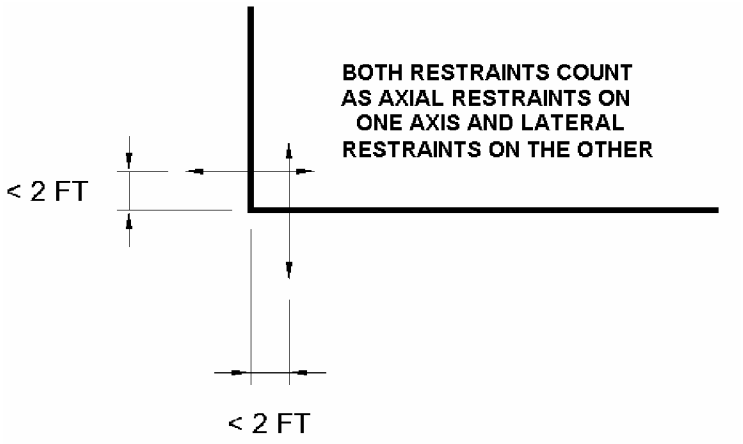


3) Axial restraints attached to the run of conduit along its length must be connected using a conduit clamp (as previously defined).

4) Short runs or drops need only have one lateral and one axial restraint.



5) If a lateral restraint is located within 2 feet of a corner (based on a measurement to the conduit or duct centerline), it can be used as an axial restraint on the intersecting run.



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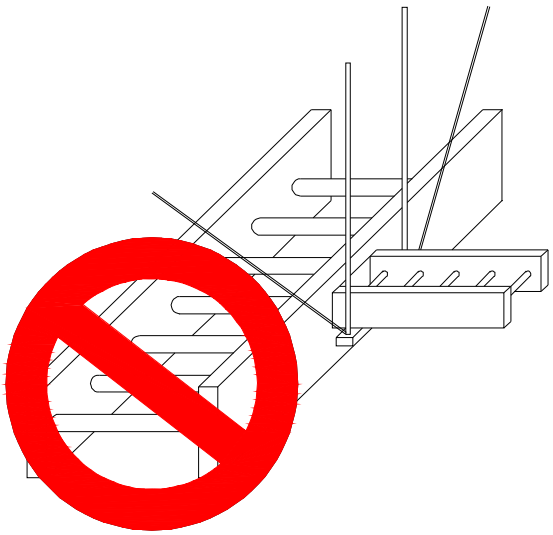
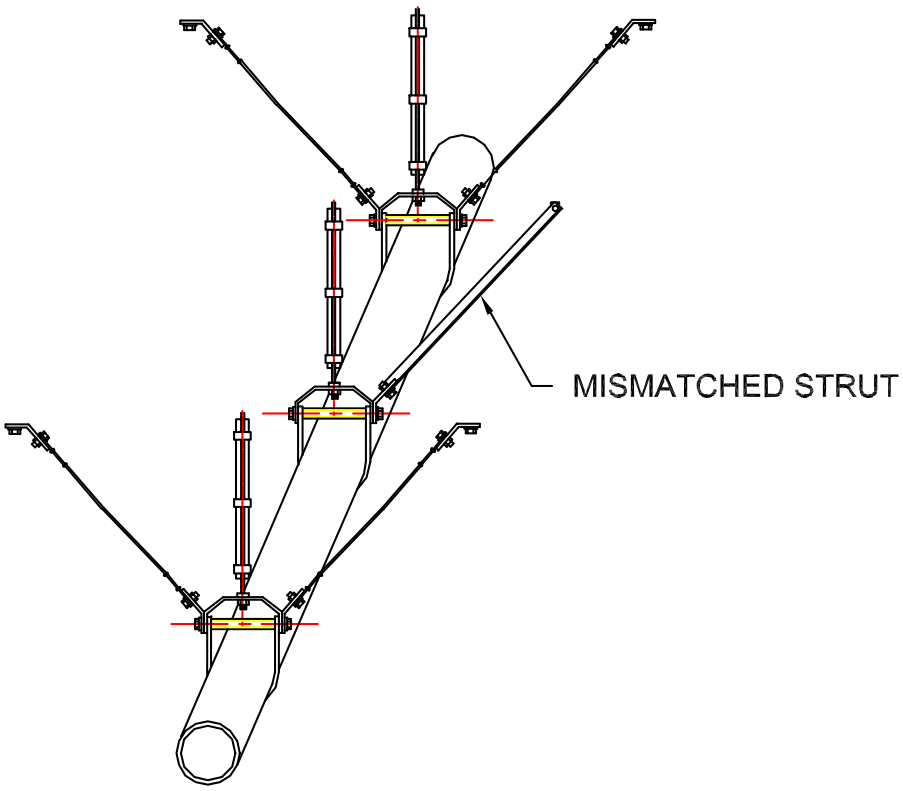
6) Larger trays or conduit cannot be restrained with restraints located on smaller branch runs.



7) Within a run, the type of restraint used must be consistent. For example, mixing a strut with cable restraints is not permitted.



DEFINITIONS AND LOCATING REQUIREMENTS

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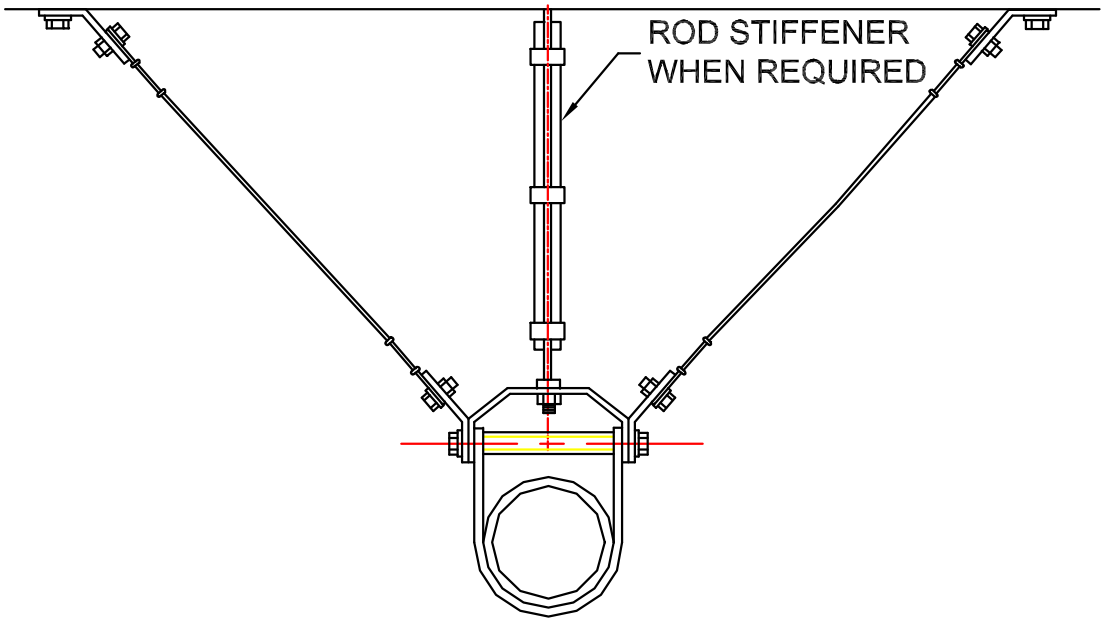
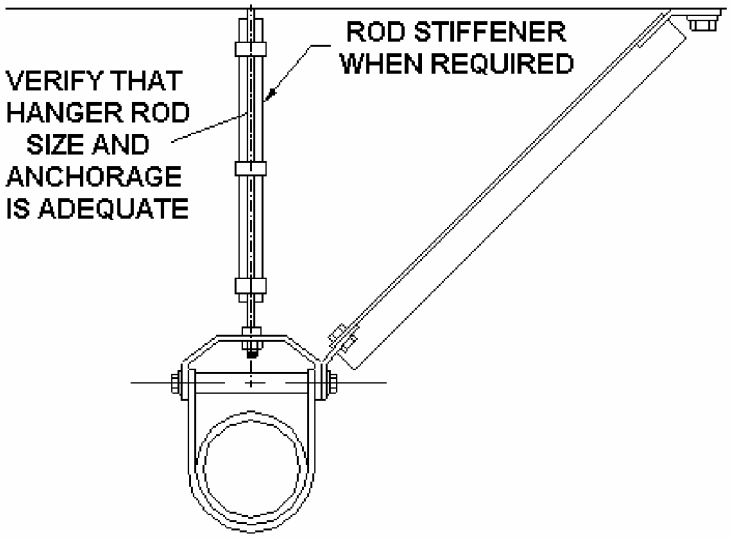
8) With longer hanger rods, rod stiffeners are likely to be required. Refer to the appropriate table in Chapter D4 to determine: (1) if needed, (2) what size stiffener material is appropriate, and (3) how frequently it needs to be clamped to the hanger rod.



9) In addition to possibly requiring rod stiffeners, when struts are used to restrain conduit, the size of the hanger rod and its anchorage also become critical. Again refer to the appropriate table in Chapter D4 to determine the minimum allowable size for the hanger rod and anchor.



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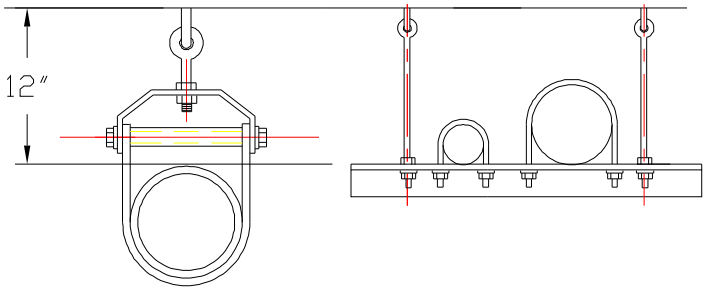
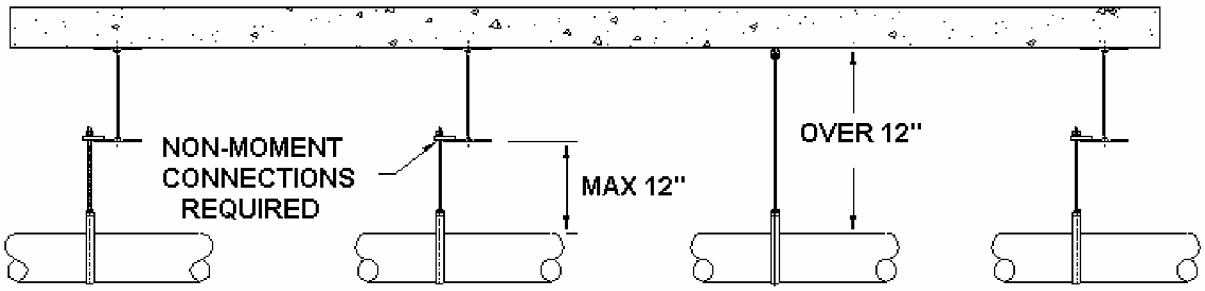
10) In some cases, it may be possible to locate the electrical distribution system close enough to the support structure (12”) to eliminate the need for restraint. (Refer to the building code review chapter (D2) to determine if this exemption is applicable.) If it is applicable, the 12” dimension is measured as shown below.



11) When using the above rule it is critical that all support locations in a run conform. If even one location exceeds 12”, the run cannot be exempted from restraint.



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