

Mark Integrity Program

UL Requirements for Counterchecking Knockouts in Sheet Metal Enclosures Authorized in the FUS Procedure

The countercheck of knockouts in sheet metal enclosures is to be assessed using the instructions specified in Follow-Up Service Procedures and UL Standards, when provided. If these documents do not have requirements for the examination and testing of knockouts authorized by the FUS Procedure, a UL field engineer should examine them during the inspection of a UL certified product using the following guidelines.

Guidelines for counterchecking knockouts

- Knockouts shall be neither too tight nor too loose. They shall be readily removable by use of screwdriver and pliers for smaller gauges, a hammer and screwdriver for intermediate gauges (Nos. 14 and 12 MSG steel), and a hammer and chisel for heavier gauges (No.10 MSG steel). Multiple knockouts shall be removable, in size sequence, without dislodging or damaging larger twist-out rings
- Knockouts shall be cleanly cut, except at the tie points, and flattened in place at least one-half the thickness of the metal. The resulting construction shall be “light-tight” before painting and around two-thirds the circumference of each cut. All ties shall be intact with no evidence of cracking. If a part of the web remains during removal, it shall be removed separately by making appropriate use of one of the above tools before judging the knockout removal
- Single and multiple knockouts are considered too loose if they can be displaced or knocked out by ordinary handling
- A knockout is considered too tight if during its removal:
 - there are openings or visible damage to the seams, joints, splices or flanges of the enclosure
 - the surface which carried the knockout has been pounded in or distorted to cause a serious reduction of the anticipated wireway or spacing
 - the resulting distortion of the enclosure prevents adequate bonding and the proper use of the knockout hole
- Enclosure distortion or distortion of the next adjacent ring of a multiple knockout which will reform when conduit lock washers or equivalent are tightened is permissible



A manufacturer may choose to use production materials, test sheets prepared using production tools or production materials rejected for reasons not affecting the knockouts for examination. Materials rejected because of metal thickness, metal hardness or faulty knockout dies are not acceptable for tests.

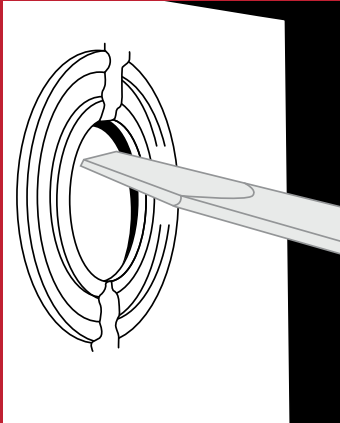


Figure 1

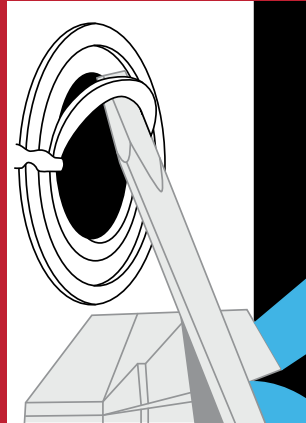


Figure 2

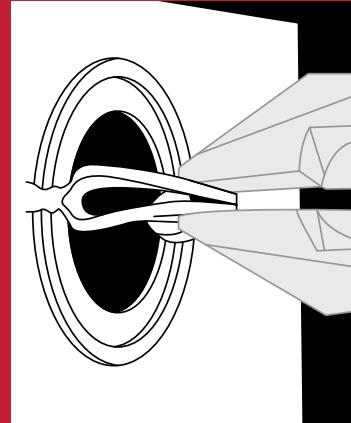


Figure 3

For more information, please contact your local UL Field Engineer.
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