

TECHNICAL SERVICES DEPARTMENT

BULLETIN

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NEMA and IP Ratings for Liquid-tight Flexible Metal Conduit and Fittings

The purpose of this Bulletin is to help users and manufacturers understand how NEMA enclosure ratings and Ingress Protection (IP) ratings apply to liquid-tight flexible metal conduit (LFMC) and to draw a comparison between the two enclosure rating systems.

The IP rating system is defined in IEC standard 60529-2020 and is a two-digit system of ratings followed by two optional characters. For the purpose of LFMC, only two digits are utilized. The first digit signifies the ability of the enclosure to protect against dust and the second digit signifies the ability to protect against water.

IP ratings apply to liquid-tight flexible metal conduit only when paired with fittings and a suitably rated electrical enclosure. The IP rating of the overall conduit-fitting-enclosure system is the lowest rating of any individual component. An example system consists of a breaker box, LFMC fittings, LFMC, and a motor. If the LFMC is rated for IP 65 yet the breaker box, fittings, and motor are rated to IP 67, the entire installation has a rating of IP 65.

NEMA enclosure type ratings are found in NEMA 250-2020. This standard goes further in testing for additional hazards such as corrosion, rust, icing, oil, and coolants. A complete listing of NEMA enclosure type numbers and the environmental conditions that an enclosure protects against may be found in table 110.28 of NFPA 70 (NEC). Because NEMA enclosure types provide protection against additional hazards, there is not complete equivalency between the NEMA enclosure types and IP ratings. NEMA enclosure types may be converted to IP ratings but because of the additional testing IP ratings may not be converted to NEMA enclosure types.

Table 1 is based on Table A-1 from NEMA 250-2020 and is an equivalent conversion between NEMA enclosure ratings and common IP ratings for LFMC.

Table 1: Common NEMA Enclosure Ratings for LFMC and equivalent IP ratings.

NEMA Enclosure Type Rating	Hazards Tested	Meets and Exceeds IP Rating	Hazards Tested
4, 4X	Access to hazardous parts, ingress of solids, ingress of water (splashing water, rain, snow, and sleet). Corrosion (4x only).	IP65, IP66	Ingress of solids and water.
6	All the above except corrosion but including occasional submersion.	IP65, IP66, IP67	

6P	All the above including corrosion and occasional prolonged submersion.	IP65, IP66, IP67, IP68	
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