



Fluorocarbon Coating for Electrodeposition Masking

1 Scope

1.1 Material Description. This coating is a fluoropolymer-based coating specially applied to the threads and other locations on a fastener (mostly on threads of nuts and studs). The coating prevents electrodeposited primers (E-coat) from adhering to the protected areas.

1.2 Symbols. Not applicable.

1.3 Applicability. Weld studs and nuts; clinch (pierce) nuts and studs; tapping plates.

1.4 Remarks. This specification covers the basic requirements for a fastener coating to prevent buildup of E-coat. Use of this finish on threaded surfaces and/or bearing surfaces of joints could affect the torque-tension relationship. It is recommended that a torque-tension study of the fastener joint be performed before releasing this finish on a new application.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ISO 16047

2.2 GM Standards/Specifications.

GMW3059

GMW14270

3 Requirements

3.1 Appearance and Cure. The coating shall have a uniform appearance and be free of tears, runs, and flaked areas. It shall have an identifiable color. Red color is not permissible.

3.1.1 The cure parameters for the specific coating shall be determined using the appropriate time/temperature relationship as recommended by the coating chemical manufacturer to achieve the performance as listed in this standard. In no case shall the cure cycle affect the mechanical or dimensional properties of the parts being coated.

3.1.2 The properly cured coating shall prevent adhesion of electrodeposition primers and meet the drive torque values specified in Table 1 through Table 3.

3.1.3 The cured coating shall be sufficiently damage resistant to prevent chipping or other coating removal during normal handling and shipping of parts. The coating shall be compatible with plant paint systems.

3.1.4 Plain parts shall be received with a light rust-preventive coating to prevent flash rusting of parts during processing, shipping and short-term plant storage.

3.2 Coating Coverage and Thickness.

3.2.1 The coating shall be applied to the contact surfaces of the internal thread areas of nuts and tapping plates and to the external thread areas of bolts and studs subject to specification restrictions.

3.2.2 Unless otherwise noted on the part drawing, coating locations and coverage shall meet the following restrictions:

3.2.2.1 The coating on externally threaded parts shall extend to the thread run-out for shanked products and to within three (3) thread pitches of the head to shank junction on full-threaded parts. However, in no case shall the coating extend below a plane parallel to the weld nibs. No coating may be present on the head, including the

underhead bearing surfaces of the bolts and studs, the nut hex flats and bearing surfaces, and on the weld projection nibs, flats and any of the head surfaces of weld studs and nuts.

3.2.2.2 The coating shall not be so thick as to interfere with the free insertion of a mating fastener. Free-drive torque is the amount of torque necessary to drive a specified mating fastener through the coated part. The maximum free-drive torque is as listed in Table 1 through Table 3.

3.3 Coefficient of Friction/Free-drive Torque.

3.3.1 After coating, parts shall meet the free-drive torque and torque-tension requirements for their respective sizes and types (Table 1 through Table 3). The torque-tension values shall be measured per ISO 16047.

3.3.2 The coefficient of friction of the threads, as measured per ISO 16047 shall also be measured and controlled to within a 0.06 range during the production life of the part.

3.3.3 For the Production Part Approval Process (PPAP), perform the following tests and include in the PPAP submission:

- Measure free-drive torque on ten (10) random parts.
- Measure torque tension and coefficient of the thread per ISO 16047 on thirty (30) random parts.

3.3.4 For new chemical approval, coat studs, weld nuts, and clinch (pierce) nuts of various sizes, covering the smallest and largest sizes listed in Table 1 through Table 3. Test coated parts per ISO 16047 with at least thirty (30) parts per size and type.

- Each measured free-drive torque value must be at or below the respective maximum free-drive torques in Table 1 through Table 3.
- The $\pm 3 \sigma$ values for torque tension must fall within the limits in Table 1 through Table 3.
- The $\pm 3 \sigma$ range for each group of thread coefficient of friction test results must be within 0.06.

3.4 E-coat Resistance. For new chemical and applicator approval, coat the threads of various studs and nuts, covering the largest and smallest sizes in Tables 1 thru 3. The sample size for each size/type shall be ten (10) samples. The coating must be processed in a regular production line, using normal production coating material, controls and handling. After sufficient curing (24 hours maximum), apply E-coat to the parts and examine for E-coat adhesion to the fluorocarbon coating. Submit all parts to GM for examination.

3.5 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

Table 1: Studs

Basic Size	Free-drive Torque (N·m) Maximum	Torque (N·m)	Tension (kN)
Millimeters:			
M6 × 1	1	8	5.5 to 12
M8 × 1.25	1	20	13 to 24
M10 × 1.5	2	33	15 to 35
M12 × 1.75	2.5	60	22 to 40
Inches:			
1/4 to 20	1	5	4 to 10.5
5/16 to 18	1	9	6 to 15
3/8 to 16	2	15	8 to 18
7/16 to 14	2	25	12 to 23
1/2 to 13	2	40	14 to 27