



Joint Acceptance Criteria and Repair Method Self-Piercing and Extruding Screws

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This specification provides the acceptance criteria and repair methods for parts that are joined with self-piercing and extruding flow drill screws (FDS) or flow form screws (FFS).

1.2 Applicability. The criteria established in this standard become mandatory when referenced on a product drawing or Statement of Requirements. Deviation from any acceptance criteria provided in this standard shall be identified on the product drawing or Statement of Requirements.

1.3 Remarks. This specification is limited to self-piercing and extruding flow screws. This specification does not apply to joints using thread cutting fasteners, such as sheet metal screws.

Self-piercing and extruding flow screw joints are considered satisfactory when they meet the expected design service loads and satisfy functional performance requirements. The evaluation criteria contained in this document have been established as a basis for the manufacturing acceptance of self-piercing and extruding flow screw joints and are the same for all applications using self-piercing and extruding flow screws regardless of service load. Furthermore, screwed joints identified as discrepant often retain a percentage of their mechanical properties and may contribute to the integrity of the product.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- Global Fastening Catalog (<https://gmweb.gm.com/sites/fastening1/Pages/Home.aspx>)
- PCPB005 Flow Drill Screws (Process Control)

3 Requirements

3.1 General Acceptance Criteria.

3.1.1 Presence. A self-piercing and extruding flow screw that is missing or not installed is discrepant. Adjacent self-piercing and extruding flow screws that are missing or not installed cause the product to be nonconforming regardless of the pattern tolerance. Missing or not installed self-piercing and extruding flow screws at either end of components joined by a linear distribution of self-piercing and extruding flow screws cause the product to be nonconforming regardless of the pattern tolerance.

3.1.1.1 Process self-piercing and extruding flow screws are not required to be present. Process self-piercing and extruding flow screws are installed to facilitate in-process assembly and must be approved by Product and Manufacturing Engineering. These fasteners are identified on product drawings as FDS-PROC.

3.1.2 Fully Driven and Seated. A self-piercing and extruding flow screw that is not fully driven with the head of the fastener in contact with the part surface is discrepant (see Figure A1 in Appendix A).

3.1.2.1 Process self-piercing and extruding flow screws are not required to be seated. Process self-piercing and extruding flow screws are installed to facilitate in-process assembly and must be approved by Product and Manufacturing Engineering. These fasteners are identified on product drawings as FDS-PROC.

3.2 Visual Acceptance Criteria.

3.2.1 Head Broken Off. A self-piercing and extruding screw whose head is broken off is discrepant.

3.2.1.1 Process self-piercing and extruding flow screws whose head are broken off are not discrepant. Process self-piercing and extruding flow screws are installed to facilitate in-process assembly and must be approved by Product and Manufacturing Engineering. These fasteners are identified on product drawings as FDS-PROC.

3.2.2 Cracks. A crack that is fully contained within the extrusion is a condition that does not cause the joint to be discrepant. When visible cracks extend beyond the extrusion to the part surface, the process should be adjusted to the original qualified setup to eliminate the condition (see Figure A2 in Appendix A).

3.3 Measurable Acceptance Criteria.

3.3.1 Location. A self-piercing and extruding screw that is placed outside the location tolerance indicated on the assembly drawing is discrepant. If no location tolerance is specified, screws located > 10 mm from the nominal design location are discrepant. Self-piercing and extruding screws must be contained with all edges of the material being joined. A screw is discrepant if the screw head extends over the edge of the top sheet regardless of location tolerance (see Figure A3 in Appendix A).

3.3.2 Torque. A self-piercing and extruding screw that does not meet a minimum static torque of 3 Nm and fully driven, seated, and not stripped (FDSNS) is discrepant.

3.3.2.1 Process self-piercing and extruding screw does not need to meet any minimum static torque requirements. These fasteners are identified on product drawings as FDS-PROC.

3.3.3 Stripped Screws. Stripped screws are discrepant.

3.3.3.1 Process self-piercing and extruding screw does not need to meet any minimum static torque requirements. These fasteners are identified on product drawings as FDS-PROC.

3.4 Disposition/Repair Procedure.

3.4.1 FDS Pattern Conformance and Disposition. The FDS pattern is a collection of screws to which a tolerance is applied to meet structural requirements and for determining manufacturing acceptance of the product. Process self-piercing and extruding screws are not included in the pattern conformance and disposition. The default pattern is all FDS on the structure installed at the same manufacturing plant. The quantity tolerance for the single FDS default pattern is no more than 5% of the total number of screws can be discrepant.

The FDS pattern is conforming when the number of acceptable screws (not discrepant per the requirements of this standard) within the pattern meets or exceeds the default pattern tolerance or the tolerance as stated on the product release information. Manufacturing acceptance of product is based on all patterns conforming. Disposition of product nonconforming to this standard shall be handled in accord with GM Global Quality Requirements for Corrective Action and Nonconforming Material.

Note: Adjacent self-piercing and extruding flow screws that are missing or not installed cause the product to be nonconforming regardless of the pattern tolerance. Missing or not installed self-piercing and extruding flow screws at either end of components joined by a linear distribution of self-piercing and extruding flow screws cause the product to be nonconforming regardless of the pattern tolerance.

3.4.2 Repair Methods. For FDS the repair requirement is a minimum static torque of 3 Nm and fully driven, seated, and not stripped (FDSNS).

3.4.2.1 Missing Fastener. Drill a pilot hole, if necessary, at the design location using the drill size indicated in Appendix A, Table A1. Install the specified repair screw.

3.4.2.2 Repair of Screws with Head Broken Off. When possible, extract remainder of the damaged screw. Drill a pilot hole through all parts as close as possible to the originally documented screw location using the drill size indicated in Appendix A, Table A1 and install the specified repair screw.

3.4.2.3 Screws Not Fully Seated. Tighten screw to achieve a fully driven, seated and not stripped fastener. If the screw strips, see "Stripped Screws".

3.4.2.4 Under Torque Screws. Tighten screw to achieve a fully driven, seated and not stripped fastener. If the screw strips, see "Stripped Screws".

3.4.2.5 Stripped Screws. Remove stripped screw. Enlarge pilot hole using the drill size indicated in Appendix A, Table A1 and install the specified repair screw.

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