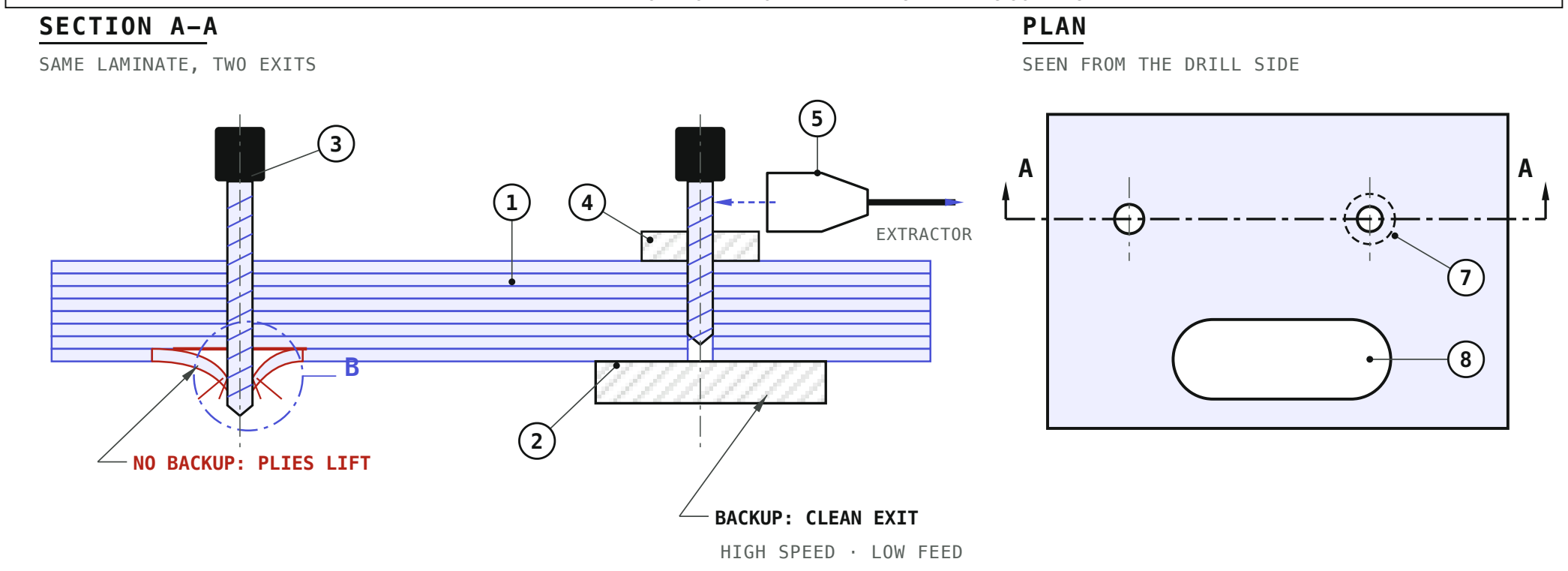
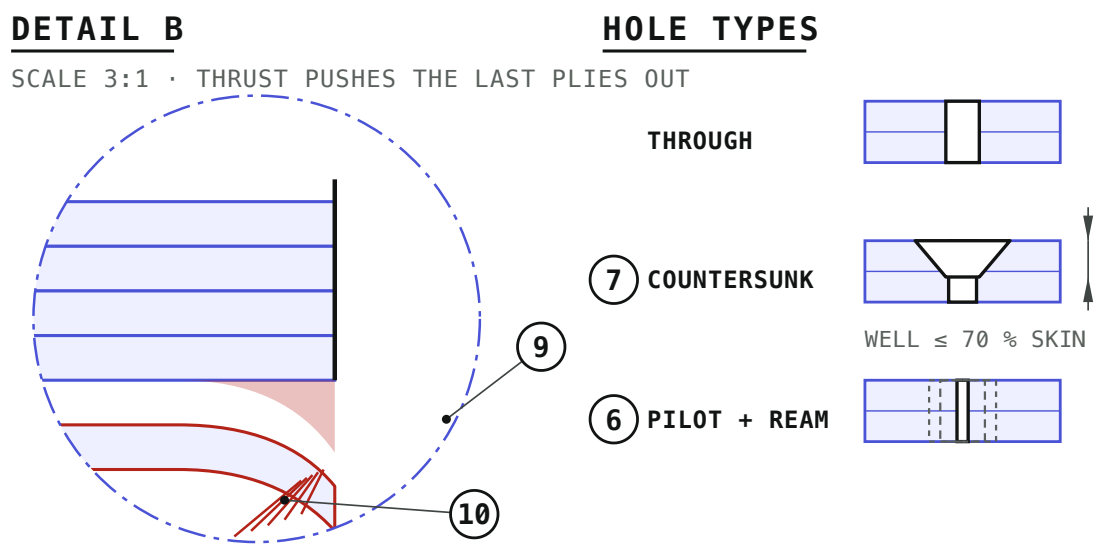
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Cutting and Drilling Composites Without Delamination

Tools by fibre · hole types · speeds and backup · dust · inspecting the hole

REFERENCE DRAWING — NOT APPROVED DATA · THE SRM ALWAYS GOVERNS





PARTS LIST

#	ITEM	NOTE
1	Laminate	Fabric breaks out less than tape
2	Backup plate	Hard against the exit face
3	Drill bit	Carbide or diamond coated
4	Drill guide	Thick laminates especially
5	Dust nozzle	At the source, vacuum on
6	Pilot, then ream	Carbide reamer to size
7	Piloted csk	Carbide; pilot checked for wear
8	Damage cut-out	Smooth outline, per SRM
9	Exit delaminat.	Defect: SRM decides
10	Fuzz, loose fibre	Defect: SRM decides

NOTES

1. Dimensions in inches. Do not scale: the SRM sets the values.
2. For reference. The applicable manual always governs.
3. Based on FAA-H-8083-31 ch. 7.

REVISIONS

REV	DESCRIPTION	DATE
A	First issue	2026-10-30

The Aviation Point. Structural repair reference

TITLE			
Cutting and drilling			
DRAWING NO. TAP-DWG-014	REV A	SCALE NTS	SHEET 1 OF 1
APPLIES TO Carbon, glass, aramid			

DO NOT SCALE DRAWING

Section, plan, detail of the exit plies, hole types and parts list, after FAA-H-8083-31 Vol. 1 pp. 7-49 to 7-53.

Tool by fibre

Task	Carbon and glass	Aramid (Kevlar)
Drill bit	Solid carbide or diamond coated, flat-flute or four-flute. Never standard HSS: it dulls at once, overheats and causes delamination and tear-out	Klenk-type sickle drill, or clothes-pin and fish-tail points, that pull the fibre and shear it. HSS is usable, but quality is poor. Between two metal parts, a standard twist drill works
Larger holes	Diamond-coated hole saw, or a fly cutter in a drill press only	Not covered separately; hole saws and fly cutters are listed for composites generally
Trim and cut	Diamond-grit cutters, solid carbide or diamond-coated router bits, toothless carbide or diamond bandsaw blade	HSS cutters work. Hold the part and cut with a shearing action, with a plastic backup plate cut through together
Sanding	Silicon carbide or aluminium oxide; silicon carbide lasts longer	Not covered by the Handbook; aramid frays rather than cuts
Countersink	Carbide cutter, straight flutes, piloted	Carbide, S-shaped positive-rake flutes. Straight flutes: a thick tape on the surface helps, but less
Exit support	Metal plate or sheet, or a firm board	Plastic backup plate

Hole types

Type	When	How	Where it goes wrong
Through	Fastener or pin in structure	Pilot hole, enlarge with carbide or diamond bit, ream with a carbide reamer to size	Exit splintering; hole oversize where metal chips drag through
Countersunk	Flush-head fastener	Piloted carbide cutter with a microstop. 100° tension head or 130° head; controlled radius under the head	Well deeper than 70 % of the skin; worn pilot, off-centre well; splintering if the cutter touches before full rpm
Stepped or pilot-then-ream	Precision holes; tape laminates break out most	Small pilot first, then size-up passes, final ream at about half the drilling speed	Reaming more than about 0.005 in off the diameter with the exit unsupported
Large (hole saw, fly cutter)	Access, inspection, cable pass	Diamond hole saw; fly cutter only in a drill press	A fly cutter in a hand drill
Damage cut-out	Removing damage before a repair	Smooth outline cut to the SRM's size and shape, then clean the edge	Sharp corners and undercuts; cut size from guesswork

Educational reference only, not approved data. Always consult the applicable SRM, AMM, or AC 43.13-1B and your certifying authority.

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Key points

- **No standard HSS** on carbon or glass: it dulls, overheats, delaminates. Carbide or diamond coated.
- **High speed, low feed:** 2,000 to 20,000 rpm, power feed preferred, drill guide on thick laminate.
- **Backup plate** hard against the exit face; also needed when reaming takes more than about 0.005 in off the diameter.
- **Reaming** at about half the drilling speed, carbide reamer.
- **Countersink** piloted, microstop, never past 70 % of the skin depth.
- **Aramid:** shear the fibre (Klenk-type or fish-tail bit, S-flute countersink, plastic backup).
- **Dust:** vacuum at the source, respirator when sanding, downdraft table 100 to 150 cfm; no cutting fluid under 0.25 in carbon.
- **Sizes, edge distance and acceptance limits** come from the SRM.

Step by step

1. Guide or bushing, part and backup plate clamped with no gap.
2. Extraction on; respirator and eye protection.
3. Pilot hole, light constant feed.
4. Enlarge with carbide or diamond bit; hole saw or fly cutter (press only) for large.
5. Ream to size at about half the drilling speed.
6. Countersink last: full rpm in the hole before feeding.
7. Inspect both faces, measure, tap test; SRM decides.

SOURCES · FAA-H-8083-31, AMT Handbook, Airframe, Volume 1, Chapter 7 · AC 43.13-1B with Change 1, Chapter 3, Fiberglass and Plastics

SCAN · OPEN THIS GUIDE
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