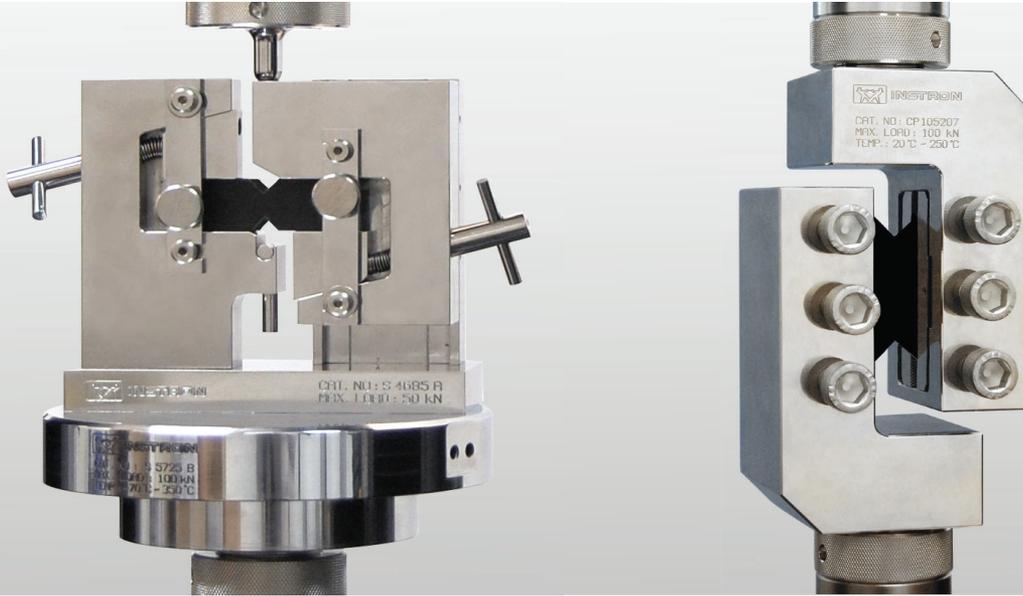


V-NOTCH SHEAR FIXTURES

ASTM D5379 & D7078



Instron® Shear Test Fixtures are designed for in-plane or interlaminar shear testing of composite materials. The V-Notched Beam Method, more commonly known as the Iosipescu Shear Method, is described in ASTM D5379, while the V-Notched Rail Shear Method is outlined in ASTM D7078. Both test methods share many common characteristics and have the distinctive V-notches in the specimen design, which serve to create a localized and approximate uniform shear stress zone between the notches. Also, a $\pm 45^\circ$ two-element strain gauge is often used to directly verify the shear strains applied.

It's important to note that the two fixtures in ASTM D7078 and D5379 are quite different in their specimen design, the way in which load is applied to the specimen, and consequently, the type of results obtained.

For the V-Notched Beam Method, the shear stress is introduced via edge-wise clamping of the specimen. By contrast, the V-Notched Rail Shear Method is derived from the rail shear method with the specimen face clamped on both sides, which gives it a strong rigid hold. The consequence of this is that ASTM D7078 has a longer shear length, or larger gage section, compared to ASTM D5379. This is important particularly for laminates with $\pm 45^\circ$ plies. These laminates have higher shear strengths and an increased risk of premature failure on the specimen edges instead of the area of interest between the V-notches. Bonded tabs are often added to ASTM D5379 specimens as an attempt to overcome this weakness. But it remains a challenge as, with the smaller size of the specimen, the angle plies may not be fully supported and result in incorrect failure modes. Despite this, ASTM D5379 method has had extensive history of use and proven ability to produce good test results, particularly for unidirectional and 0/90 cross-ply laminates.

V-NOTCHED BEAM SHEAR FIXTURE (IOSIPESCU SHEAR)

The key design element of the ASTM D5379 fixture is to ensure the applied test load line passes accurately through the root of the V-notch. Any inaccurate positioning will result in off-axis forces inducing non-shear loads into the specimen. This is achieved via a notch alignment pin that can be raised to set the specimen location as it is being installed. Then, the shear forces are maintained by the use of the almost frictionless cross-roller bearing that ensures movement is vertical and only in the load direction. Movements in all other axes are rigidly constrained, including the out-of-plane Y rotation that occurs with linear bush-based designs.

V-NOTCHED RAIL SHEAR FIXTURE

To ensure alignment of the specimen to the load line, for the ASTM D7078 V-Notched Rail Shear Fixture, plastic V-bars are included. These are placed between the two half fixtures to align the specimen as the clamping screws are tightened. Once setup, the location devices can be removed and testing can begin. The clamping screws on each fixture half are provided on both front and back so that the clamping jaws can be properly centered depending on the specimen thickness. Also, with a thick lock ring, both upper and lower fixture halves are rigidly held, ensuring an accurate test.

FEATURES AND BENEFITS

V-NOTCHED BEAM SHEAR FIXTURE (IOSIPESCU SHEAR)

- Complies fully with ASTM D5379
- Includes precision notch alignment pin
- High-strength stainless steel construction for corrosion resistance and durability
- Supplied in MIL-Standard polypropylene utility case
- Vertically sliding section utilizes cross roller bearings for very low friction and precision alignment

V-NOTCHED RAIL SHEAR FIXTURE

- Complies fully with ASTM D7078
- Includes notch alignment guide plates
- Supplied in MIL-Standard polypropylene utility case

APPLICATION RANGE

V-NOTCHED BEAM SHEAR FIXTURE (IOSIPESCU SHEAR)

- Type of loading: Shear
- Specimen material: Continuous-fiber or discontinuous-fiber-reinforced composites
- Specimen shapes: Tab or untabbed, flat and notched specimens per ASTM D5379

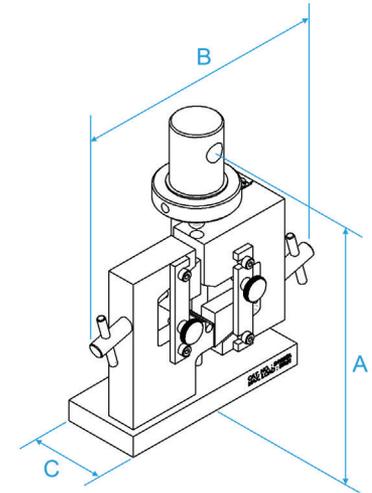
V-NOTCHED RAIL SHEAR FIXTURE

- Type of loading: Shear
- Specimen material: Continuous-fiber or discontinuous-fiber-reinforced composites
- Specimen shapes: Flat and notched specimens per ASTM D7078

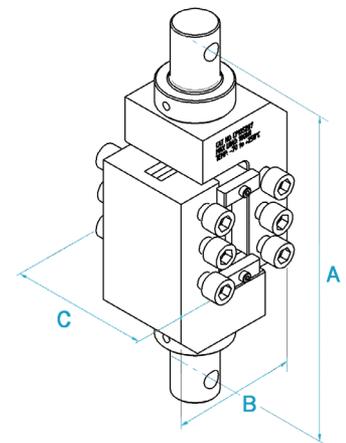
SPECIFICATIONS

		S4685A	CP105207
Test Standard		ASTM D5379	ATSM D7078
Maximum Load	kN	50	100
	lbf	11,000	22,000
Temperature Range	°C	-70 to +250	-70 to +250
	°F	-94 to +482	-94 to +482
Mass	kg	4	8
	lb	8.8	17.6
Upper Interface		1/2 in clevis pin (Type Dm)	1/2 in clevis pin (Type Dm)
Lower Interface		Compression Platen (>100 mm diameter)	6 mm clevis pin (Type Om)
Effect Length (A)	mm	181	258
	in	7.1	10.2
Overall Width (B)	mm	178*	95.4
	in	7.0*	3.8
Depth (C)	mm	53	107*
	in	2.1	4.2*

* Dependent upon specimen dimensions



V-Notched Beam Shear Fixture (Iosipescu Shear)*



V-Notched Rail Shear Fixture*

OPTIONAL STRAIN GAUGE ACCESSORY

2210-892 Strain gauge adapters for 350 ohm strain gauges are designed for use with Instron® Strain channels with a minimum of two channels required. ASTM D7078 also recommends the use of strain gauges on both sides of the specimen to evaluate % of twist in specimen under load. Four Channels of strain input is then required.

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