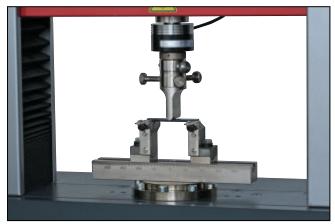


# **Product Information**

3 and 4-point flexure test kits



3-point flexure test kit with specimen

#### Applications

CTA: 45191 157752

The flexure test kit for fiber composites features modular design and covers 3-point and 4-point flexure tests to the following standards:

- ISO 14125
- EN 2562
- ASTM D7264

## **3-point flexure test**

Determination of flexure modulus

- 10 to 50 % Fmax (EN 2562)
- 10 to 25% Fmax (EN 2746)
- between two elastic limits (ISO, ASTM)

Ratio of span to thickness:

- 32:1 (ASTM)
- 20:1 for GFRP, 40:1 for CFRP (ISO)
- 16:1 for GFRP, 40:1 for CFRP (EN standards)

## 4-point flexure test

Determination of flexure modulus

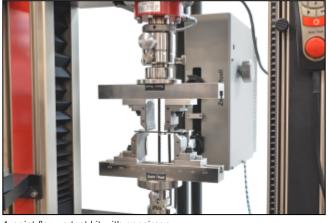
- 0.05 to 0.25% of strain (ISO 14125)
- 0.1 to 0.3 % of strain (ASTM D7264)

## Average span

- 1/3 of lower span (ISO 14125)
- 1/2 of lower span (ASTM D7264)

Ratio of span to thickness:

- 32:1 (ASTM)
- 22.5:1 for GFRP, 40.5:1 for CFRP (ISO)



4-point flexure test kit with specimen

#### **Specimen material:**

 glass-fiber-reinforced plastic (GFRP), carbon-fiberreinforced plastic (CFRP)

## Advantages and features

- Sturdy construction to avoid self-deformation of the test fixture
- Modular design allows retrospective upgrades.
- Reliable positioning of the specimen on the adjustable centering stop
- Accurate alignment of anvils and dies using the appropriate spacing gauge for exact parallelity
- Accurate centering of die and anvil
- High support blocks allow sufficient stroke for testing fiber composites.
- Easy changeover between 3 and 4-point flexure tests and different die and anvil radii.

## **3-point flexure test**

• 3-point flexure tests are common and easy to perform.

## 4-point flexure test

• shear-force-free area between the force application points of the double die



# **Product Information**

3 and 4-point flexure test kits

#### Required

The number of components required is determined by the standard and type of test to be applied. Where multiple standards or types of test are being used, components can be interchanged.

Item No.Designationflexure testflexure testflexure testflexure testflexure test062364Base unit1x2x1x1x2x3x <t< th=""><th></th><th></th><th>ISO 14125</th><th></th><th>EN 2562</th><th>ASTM D7264</th><th></th></t<>			ISO 14125		EN 2562	ASTM D7264	
062365Centering stop2x2x2x2x2x2x310978Adapter (top)1x1x1x1x1x1x318452Connector (top)1x1x1x1x1xDieOf R31x1x1x1x316715Die R51x1x1x1x062416Die R12.51x1x1x1xAnvil/die R22x4xAnvil/die R32x4x2x2x4xO62414Anvil/die R52x4x2x2x4x062411Anvil/die R52x4x2x2x4xO62419Spacing gauge, 40mm1x1x1x062618Spacing gauge, 50mm1x1x1x1x062636Spacing gauge, 64/32 R21x1x1x1x) <sup>1</sup> 062367Spacing gauge, 64/32 R21x1x1x1x) <sup>1</sup> 062438Spacing gauge, 66/22 R51x1x1x) <sup>1</sup> 062436Spacing gauge, 66/22 R51x1x1x) <sup>1</sup> 062436Spacing gauge, 128/64 R21x1x1x) <sup>1</sup> 062436Spacing gauge, 160/80 R21x1x1x) <sup>1</sup> 062436Spacing gauge, 160/80 R21x1x1x) <sup>1</sup> 062436Spacing gauge, 128/64 R21x1x1x) <sup>1</sup> 062436Spacing gauge, 128/64 R51x1x1x <tr< th=""><th>Item No.</th><th>Designation</th><th>-</th><th>-</th><th>-</th><th>-</th><th>for 4-point flexure test</th></tr<>	Item No.	Designation	-	-	-	-	for 4-point flexure test
310978   Adapter (top)   1x   1x   1x   1x     318452   Connector (top)   1x   1x   1x     Die   1x   1x   1x   1x     062426   Die R3   1x   1x   1x     316715   Die R5   1x   1x   1x     062416   Die R12.5   1x   1x   1x     062416   Die R12.5   1x   1x   1x     062416   Die R12.5   2x   4x   1x   1x     062414   Anvil/die R2   2x   4x   1x   1x   1x     062414   Anvil/die R5   2x   4x   2x   4x   4x     062414   Anvil/die R5   2x   1x   1x   1x   1x     062417   Anvil/die R5   1x   1x   1x   1x   1x   1x     062432   Spacing gauge, 64/32 R2   1x   1x   1x   1x   1x     062432   Spacing gauge, 64/32 R2   1x   1x   1x   1x   1x     062432   Spacing g	062364	Base unit	1x	2x	1x	1x	2x
Numerical (top)   1x   1x     Die   Image: State (top)   1x   1x     062426   Die R3   (1x) <sup>11</sup> 1x     316715   Die R5   1x   1x   1x     062416   Die R12.5   1x   1x   1x     062417   Anvil/die R2   2x   4x   2x   4x     062418   Anvil/die R3   2x   4x   2x   4x     062419   Spacing gauge, 40mm   1x   1x   1x   1x     062419   Spacing gauge, 40mm   1x   1x   1x   1x     062419   Spacing gauge, 40mm   1x   1x   1x   1x   1x     062419   Spacing gauge, 40mm   1x	062365	Centering stop	2x	2x	2x	2x	2x
Die       062426     Die R3     (1x) <sup>1)</sup> 316715     Die R5     1x     1x       062416     Die R12.5     1x     1x       062416     Die R12.5     1x     1x       062414     Anvil/die R2     2x     4x     1x       062415     Anvil/die R3     2x     4x     2x     4x       062411     Anvil/die R5     2x     4x     2x     4x     4x       062413     Anvil/die R5     2x     4x     2x     4x     4x       062414     Anvil/die R5     2x     4x     2x     2x     4x       062417     Spacing gauge, 40mm     1x     1x     1x     1x     1x       062618     Spacing gauge, 80mm     1x     1x     1x     1x     1x       062627     Spacing gauge, 45/15 mm     1x     1x     1x) <sup>1</sup> 1x) <sup>1</sup> 062368     Spacing gauge, 64/32 R2     1x     1x     1x) <sup>1</sup> 1x) <sup>1</sup> 062364     Spacing gauge, 80/40 R2	310978	Adapter (top)	1x	1x	1x	1x	1x
062426   Die R3   1x   1x     316715   Die R5   1x   1x     062416   Die R12.5   1x   1x     062416   Die R12.5   1x   1x     062416   Die R12.5   1x   1x     062417   Anvil/die R2   2x   4x   2x   4x     062418   Anvil/die R3   2x   4x   2x   4x     062411   Anvil/die R5   2x   4x   2x   2x   4x     062413   Anvil/die R5   2x   4x   2x   4x   2x   4x     062419   Spacing gauge, 40mm   1x   1x   1x   1x   1x     062618   Spacing gauge, 50mm   1x   1x   1x   1x   1x     062617   Spacing gauge, 80mm   1x   1x   1x   1x   1x     062367   Spacing gauge, 64/32 R2   1x   1x   1x   1x   1x)     062438   Spacing gauge, 80/40 R2   1x   1x   1x)   1x)   1x)     062436   Spacing gauge, 81/127 R2	318452	Connector (top)		1x			1x
316715   Die R5   1x   1x     062416   Die R12.5   1x   1x     062416   Die R12.5   1x   1x     062414   Anvil/die R2   2x   4x   1x     062415   Anvil/die R3   2x   4x   2x   2x   4x     062411   Anvil/die R5   2x   4x   2x   2x   4x     062419   Spacing gauge, 40mm   1x		Die					
062416 Arvil/dieDie R12.51x062414Anvil/die R22x4x062415Anvil/die R3	062426	Die R3				(1x) <sup>1)</sup>	
Anvil/dieAnvil/dieR2 $4x$ $(2x)^1$ $(4x)^1$ 062415Anvil/dieR3 $x$ $2x$ $2x$ $4x$ 062411Anvil/dieR5 $2x$ $4x$ $2x$ $2x$ $4x$ 062412Spacing gauge, 40m $1x$ $x$ $x$ $x$ $x$ $x$ 062413Spacing gauge, 50m $1x$ $x$ $x$ $x$ $x$ $x$ 062414Spacing gauge, 80m $1x$ $x$ $x$ $x$ $x$ $x$ 062415Spacing gauge, 80m $1x$ $x$ $x$ $x$ $x$ $x$ 062617Spacing gauge, 45/15 mm $1x$ $x$ $x$ $x$ $x$ $x$ 062368Spacing gauge, 66/22 R5 $1x$ $(1x)^1$ $(1x)^1$ $(1x)^1$ 062364Spacing gauge, 81/127 R2 $1x$ $(1x)^1$ $(1x)^1$ $(1x)^1$ 062453Spacing gauge, 128/64 R2 $x$ $1x$ $(1x)^1$ $(1x)^1$ 062454Spacing gauge, 128/64 R2 $x$ $1x$ $(1x)^1$ $(1x)^1$ 062569Spacing gauge, 128/64 R2 $x$ $1x$ $(1x)^1$ $(1x)^1$ 062569Spacing gauge, 128/64 R2 $x$ $x$ $x$ $x$ $x$ 062569Spacing gauge, 128/64 R2 $x$ $x$ $x$ $x$ $x$ 062569Spacing gauge, 128/64 R2 $x$ $x$ $x$ $x$ $x$ 062569Spacing gauge, 128/64 R2 $x$ $x$ $x$ $x$ $x$ 062569Spacing	316715	Die R5	1x			1x	
062414   Anvil/die R2   2x   4x     062415   Anvil/die R3   2x   4x   2x   4x <sup>1</sup> )     062411   Anvil/die R5   2x   4x   2x   4x     062411   Anvil/die R5   2x   4x   2x   4x     062411   Spacing gauges   1x	062416	Die R12.5			1x		
062415   Anvil/de R3   (2x) <sup>1</sup> )   (4x) <sup>1</sup> )     062411   Anvil/de R5   2x   4x   2x   2x   4x     062419   Spacing gauge, 40mm   1x		Anvil/die					
062411     Anvil/die R5     2x     4x     2x     2x     4x       Spacing gauges     Spacing gauge, 40mm     1x	062414	Anvil/die R2	2x	4x			
Spacing gauges     062419   Spacing gauge, 40mm   1x     062618   Spacing gauge, 50mm   1x     062423   Spacing gauge, 80mm   1x     062617   Spacing gauge, 80mm   1x     062617   Spacing gauge, 80mm   1x     062617   Spacing gauge, 45/15 mm   1x     062367   Spacing gauge, 64/32 R2   1x     062432   Spacing gauge, 64/32 R2   1x     062434   Spacing gauge, 64/22 R5   1x     062436   Spacing gauge, 64/22 R5   1x     062436   Spacing gauge, 81/127 R2   1x     062450   Spacing gauge, 128/64 R2   1x     062453   Spacing gauge, 160/80 R2   1x     062453   Spacing gauge, 128/64 R5   1x     1065366   Spacing gauge, 64/32 R5   1x	062415	Anvil/die R3				(2x) <sup>1)</sup>	(4x) <sup>1)</sup>
062419   Spacing gauge, 40mm   1x     062618   Spacing gauge, 50mm   1x     062423   Spacing gauge, 80mm   1x     062617   Spacing gauge, 45/15 mm   1x     062367   Spacing gauge, 64/32 R2   (1x) <sup>11</sup> )     062432   Spacing gauge, 64/32 R2   (1x) <sup>11</sup> )     062434   Spacing gauge, 66/22 R5   1x     062436   Spacing gauge, 80/40 R2   (1x) <sup>11</sup> )     062368   Spacing gauge, 81/127 R2   1x     062445   Spacing gauge, 128/64 R2   (1x) <sup>11</sup> )     062453   Spacing gauge, 160/80 R2   (1x) <sup>11</sup> )     062453   Spacing gauge, 128/64 R5   1x     1065709   Spacing gauge, 64/32 R5   1x	062411	Anvil/die R5	2x	4x	2x	2x	4x
062618   Spacing gauge, 50mm   1x     062423   Spacing gauge, 80mm   1x     062617   Spacing gauge, 80mm   1x     062617   Spacing gauge, 80mm   1x     062367   Spacing gauge, 45/15 mm   1x     062432   Spacing gauge, 64/32 R2   (1x) <sup>1</sup> )     062432   Spacing gauge, 64/32 R2   (1x) <sup>1</sup> )     062434   Spacing gauge, 66/22 R5   1x     062434   Spacing gauge, 80/40 R2   (1x) <sup>1</sup> )     062366   Spacing gauge, 81/127 R2   1x     062445   Spacing gauge, 128/64 R2   (1x) <sup>1</sup> )     062453   Spacing gauge, 160/80 R2   (1x) <sup>1</sup> )     1065386   Spacing gauge, 128/64 R5   1x     1065709   Spacing gauge, 64/32 R5   1x		Spacing gauges					
062423   Spacing gauge, 80mm   1x     062617   Spacing gauge, 80mm   1x     062367   Spacing gauge, 45/15 mm   1x     062432   Spacing gauge, 64/32 R2   (1x) <sup>1</sup> )     062368   Spacing gauge, 66/22 R5   1x     062434   Spacing gauge, 80/40 R2   (1x) <sup>1</sup> )     062366   Spacing gauge, 81/127 R2   1x     062445   Spacing gauge, 128/64 R2   (1x) <sup>1</sup> )     062453   Spacing gauge, 128/64 R5   1x     1065709   Spacing gauge, 64/32 R5   1x	062419	Spacing gauge, 40mm	1x				
062617   Spacing gauge, 80mm   1x     062367   Spacing gauge, 45/15 mm   1x     062432   Spacing gauge, 64/32 R2   (1x) <sup>1</sup> )     062368   Spacing gauge, 66/22 R5   1x     062434   Spacing gauge, 80/40 R2   (1x) <sup>1</sup> )     062366   Spacing gauge, 81/127 R2   1x     062445   Spacing gauge, 128/64 R2   (1x) <sup>1</sup> )     062453   Spacing gauge, 160/80 R2   (1x) <sup>1</sup> )     1065386   Spacing gauge, 128/64 R5   1x     1065709   Spacing gauge, 64/32 R5   1x	062618	Spacing gauge, 50mm			1x		
062367   Spacing gauge, 45/15 mm   1x     062432   Spacing gauge, 64/32 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062368   Spacing gauge, 66/22 R5   1x   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062434   Spacing gauge, 80/40 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062366   Spacing gauge, 81/127 R2   1x   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062445   Spacing gauge, 128/64 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062453   Spacing gauge, 160/80 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     1065386   Spacing gauge, 64/32 R5   1x   1x	062423	Spacing gauge, 80mm	1x				
R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062432   Spacing gauge, 64/32 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062368   Spacing gauge, 66/22 R5   1x   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062434   Spacing gauge, 80/40 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062366   Spacing gauge, 81/127 R2   1x   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062445   Spacing gauge, 128/64 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062453   Spacing gauge, 160/80 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     1065386   Spacing gauge, 128/64 R5   1x   1x   1x     1065709   Spacing gauge, 64/32 R5   1x   1x   1x	062617	Spacing gauge, 80mm			1x		
062368   Spacing gauge, 66/22 R5   1x     062434   Spacing gauge, 80/40 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062366   Spacing gauge, 81/127 R2   1x   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062453   Spacing gauge, 128/64 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062453   Spacing gauge, 160/80 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     1065386   Spacing gauge, 128/64 R5   1x   1x     1065709   Spacing gauge, 64/32 R5   1x   1x	062367			1x			
062434   Spacing gauge, 80/40 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062366   Spacing gauge, 81/127 R2   1x   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062445   Spacing gauge, 128/64 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062453   Spacing gauge, 160/80 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     1065386   Spacing gauge, 128/64 R5   1x   1x     1065709   Spacing gauge, 64/32 R5   1x   1x	062432	Spacing gauge, 64/32 R2				(1x) <sup>1)</sup>	(1x) <sup>1)</sup>
No. 100 State No. 100 State No. 100 State No. 100 State   062366 Spacing gauge, 81/127 R2 1x (1x) <sup>11</sup> (1x) <sup>11</sup> 062445 Spacing gauge, 128/64 R2 (1x) <sup>11</sup> (1x) <sup>11</sup> 062453 Spacing gauge, 160/80 R2 (1x) <sup>11</sup> (1x) <sup>11</sup> 1065386 Spacing gauge, 128/64 R5 1x 1x   1065709 Spacing gauge, 64/32 R5 1x 1x	062368	Spacing gauge, 66/22 R5		1x			
062445   Spacing gauge, 128/64 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     062453   Spacing gauge, 160/80 R2   (1x) <sup>1</sup> )   (1x) <sup>1</sup> )     1065386   Spacing gauge, 128/64 R5   1x   1x     1065709   Spacing gauge, 64/32 R5   1x   1x	062434	Spacing gauge, 80/40 R2				(1x) <sup>1)</sup>	(1x) <sup>1)</sup>
062453     Spacing gauge, 160/80 R2     (1x) <sup>1</sup> )     (1x) <sup>1</sup> )       1065386     Spacing gauge, 128/64 R5     1x     1x       1065709     Spacing gauge, 64/32 R5     1x     1x	062366	Spacing gauge, 81/127 R2		1x			
1065386   Spacing gauge, 128/64 R5   1x   1x     1065709   Spacing gauge, 64/32 R5   1x   1x	062445	Spacing gauge, 128/64 R2				(1x) <sup>1)</sup>	(1x) <sup>1)</sup>
1065709     Spacing gauge, 64/32 R5     1x     1x		Spacing gauge, 160/80 R2				. ,	(1x) <sup>1)</sup>
	1065386	Spacing gauge, 128/64 R5				1x	1x
		Spacing gauge, 64/32 R5				1x	1x
1065710     Spacing gauge, 80/40 R5     1x     1x	1065710	Spacing gauge, 80/40 R5				1x	1x
1065711     Spacing gauge, 160/80 R5     1x     1x	1065711	Spacing gauge, 160/80 R5				1x	1x

1) Validated for ASTM D7264 with date of issue 2006 and 2007. From issue date 2015 onwards R5 anvils/dies are used.

#### **Technical data**

Flexure test	3-point flexure test	4-point flexure test	
Test load, max. (Fmax)	10	10	kN
Span	40 to 160	40 to 160	mm
Double die spacing	-	15 to 80	mm

# Zwick Roell

# **Product Information**

3 and 4-point flexure test kits

Flexure test	3-point flexure test	4-point flexure test	
Finish	rustproof - chemical nickel- plating	rustproof - chemical nickel- plating	
Ambient temperature	-80 to +250	-80 to +250	°C
Upper connection	Adapter, 16 <sup>H7</sup>	TK 40 connector	
Fla T-slotted		onnector inge d system rosshead	