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## Tension Pads

<b>Company:</b>	Mark Tool & Rubber
<b>Contact:</b>	Russell
<b>Project:</b>	17886
<b>Date:</b>	October 17, 2002

### Work Performed

Work was tensile, shear and lateral load testing of submitted Tension Pads. Testing was performed to provide mechanical properties of

the polymer tension pad and behavioral characteristics under load of the bonded tension pads.

### Test Procedure

ASTM D 732 shear strength and ASTM D 412 tensile strength tests were performed to provide standardized polymer test data.

Lateral load tests were performed in an attempt to determine the load capacity and load characteristics of the bonded tension pads.

Figure 1 shows one of the submitted tension pads and the fabricated load plate. The load plate was fabricated with matching pins as well as a load-bearing surface on the loaded edge of the lateral load plate. This configuration applies the maximum lateral load possible to the tension pad without modification of the submitted samples.



Figure 1: A photograph of a submitted tension pad with fabricated load application plate.

Figure 2 shows a tension pad ready for testing. The assembled load plate tension pad was compressed between two greased fixture plates by a total compressive load of 20,000 pounds. The tension pad base was held in a fixed position and a vertical load was applied as shown. Initial sliding friction loads were recorded at the start of each test and subtracted out from the maximum load for reporting purposes. Figures 3 thru 9 show testing of one of the tension pads.

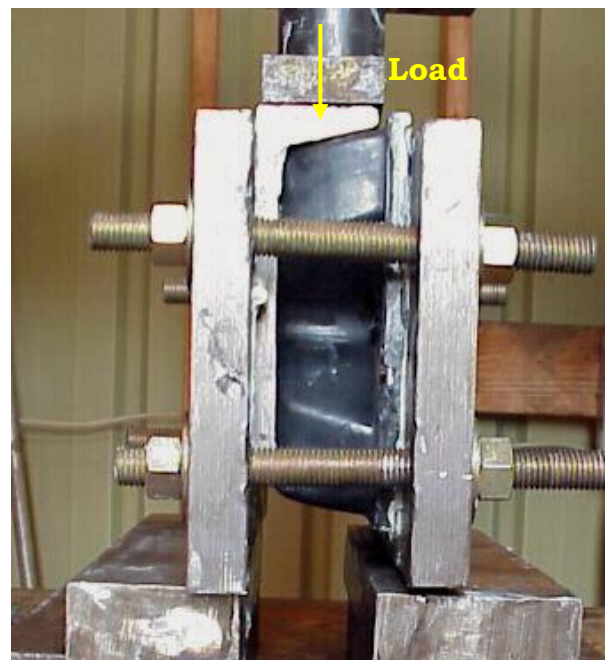


Figure 2: A photograph of a submitted tension pad ready for testing.

## Results

### Shear Test

<u>Sample</u>	<u>Thickness</u>	<u>Area</u>	<u>Load</u>	<u>Shear Strength</u>
1	0.420"	1.315 in <sup>2</sup>	2,839 lbs	2,159 psi
2	0.430"	1.346 in <sup>2</sup>	2,519 lbs	1,871 psi
3	0.415"	1.299 in <sup>2</sup>	2,475 lbs	1,905 psi
4	0.410"	1.283 in <sup>2</sup>	2,828 lbs	2,204 psi
5	0.390"	1.221 in <sup>2</sup>	2,745 lbs	2,248 psi
Average			2,792 lbs	2,204 psi

### Tensile Test

<u>Sample</u>	<u>Thickness</u>	<u>Width</u>	<u>Area</u>	<u>Load</u>	<u>Tensile Strength</u>
1	0.529"	0.445"	0.235 in <sup>2</sup>	569 lbs	2,420
2	0.436"	0.450"	0.196 in <sup>2</sup>	496 lbs	2,530
3	0.550"	0.438"	0.241 in <sup>2</sup>	615 lbs	2,550
4	0.551"	0.446"	0.246 in <sup>2</sup>	550 lbs	2,240
5	0.472"	0.446"	0.211 in <sup>2</sup>	516 lbs	2,440
6	0.471"	0.443"	0.209 in <sup>2</sup>	504 lbs	2,410
Average				537	2,415

### Lateral Load Test

<u>Sample</u>	<u>Maximum Load</u>	<u>Failure location</u>
1	49,500 lbs	Polymer
2	47,500 lbs	Polymer
3	49,750 lbs	Polymer
4	54,850 lbs	Polymer/Base Plate Bond
5	50,800 lbs	Polymer/Base Plate Bond
Average	50,150lbs	

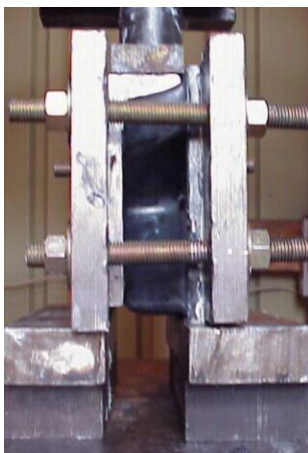


Figure 3: Tension pad at 10,000-pound load.

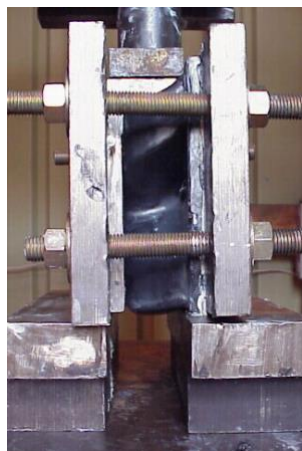


Figure 4: Tension pad at 20,000 pound load.

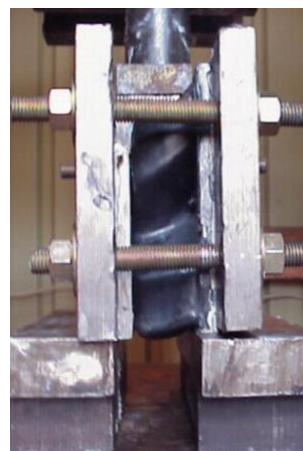


Figure 5: Tension pad at 30,000-pound load.



Figure 6: Tension pad at 40,000-pound load

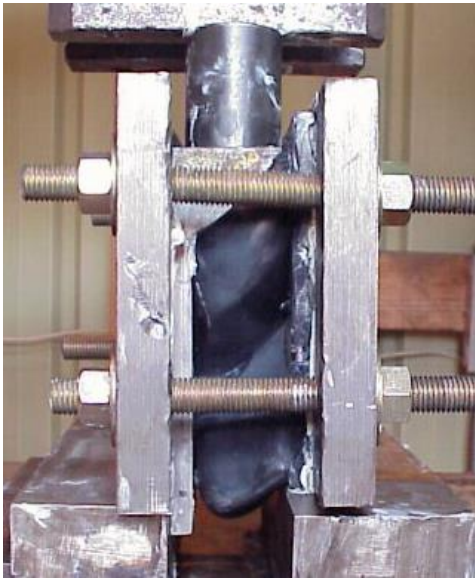


Figure 7: Tension pad at 50,800-pound maximum load.

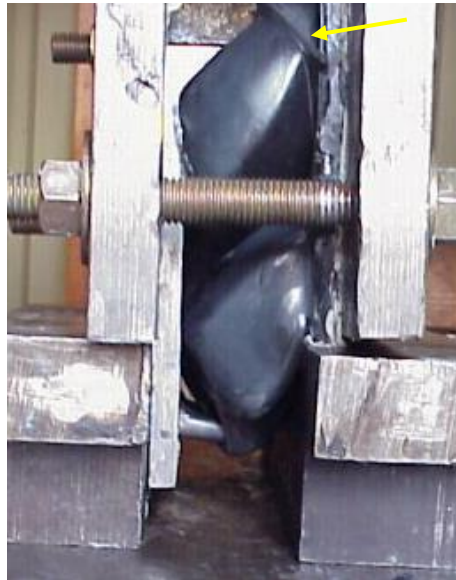


Figure 8: Tension Pad at 40,000-pound load.

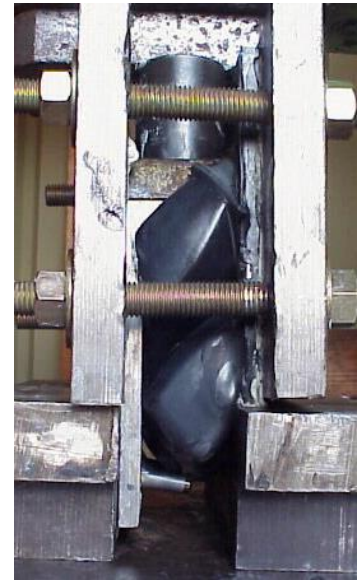


Figure 9: Tension pad at 38,000-pound load.

## Discussion

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The high modulus of the polymer bonded to the tension pad base results in an initial tensile type failure located as indicated by the arrow in figure 8. As the test continues the polymer continues to roll and peels from itself or the base plate.

Scientific Testing Laboratories, Inc.

Performed By: \_\_\_\_\_

Reviewed By: \_\_\_\_\_

NOTE: Test specimen(s) and material remnants from this project will be discarded after thirty (30) days from the date of this report. Any requests for alternative handling must be submitted in writing and received prior to that deadline.

### REFERENCES

ASTM D 412 Standard Test Method for Rubber Properties in Tension

ASTM D732 Standard Test Method for Shear Strength of Plastics by Punch Tool