



Bridge You and Nano

Exponential Business and Technologies Company

Peel Strength at Varying Peel Angles, Speeds and Temperatures

Pressure sensitive adhesives, PSA, are an important type of adhesives used commonly in everyday life. Their ability to form a bond with a surface as a result of pressure allows them to be applied and removed more easily than other tapes that require heat, water, or solvent to activate the adhesive. This character gives PSA a wide variety of applications that include protected films, bandages, sticky notes, printed labels, and tapes. An important part of these applications is the ability to remove the PSA after use, which can be referred to as the peel strength. The lower the peel strength is, the easier it is to remove the PSA. Therefore peel strength becomes a very important factor in determining if the PSA will work effectively for a given application.

The peel strength of PSA is dependent upon a variety of factors which include peel angle, peel speed, and surface temperature. The Kyowa Versatile Peel Strength Analyzer Model VPA-2 available at Ebatco is capable of varying these parameters when measuring the required peel strength. One end of the PSA is applied with uniform pressure to a stainless steel plate using a weighted roller and the other end is attached to a transducer capable of measuring the peel strength. The steel plate is then mounted to a stage capable of rotating between 0° and 180° and moving at speeds between 3 and 30,000 mm/min. The peel strength as the plate moves away is then plotted as a function of distance, time, or velocity and an average value can be obtained.

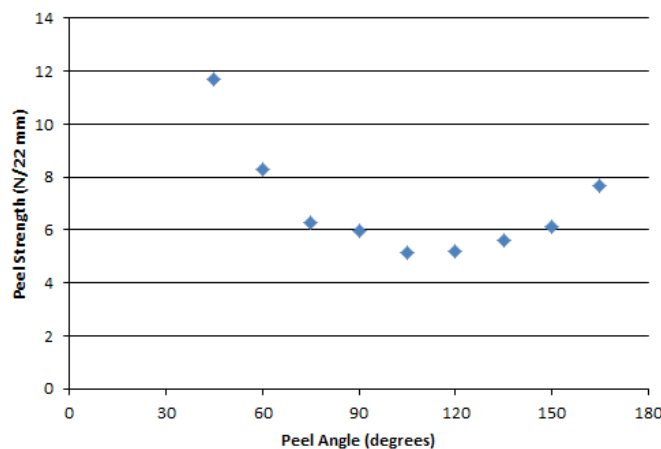


Figure 1. Peel strength as a function of peel angle at a peel speed of 500 mm/min.

Peel test data for a 22 mm wide masking tape at varying peel angles is shown in Figure 1. The peel angle is defined as the angle formed between the surface of the steel plate attached to the stage and the tape being peeled away. The peel strength was measured at 15° increments between 45° and 165° under a constant peel speed of 500 mm/min. The data indicates the minimum peel strength of the masking tape is at around 120° peel angle.

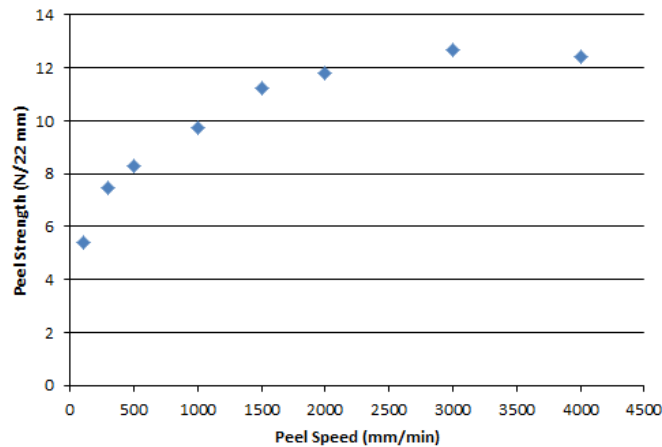


Figure 2. Peel strength as a function of peel speed at a peel angle of 60°.

Peel test data for the same masking tape at varying peel speeds is shown in Figure 2. The peel speed is defined as the rate at which the tape is removed from the steel plate. The peel strength was measured at 100, 300, 500, 1000, 1500, 2000, 3000, 4000 mm/min at a peel angle of 60°. The data indicates an initial increase trend in peel strength as peel speed increases. The peel strength reaches a plateau at around 3000 mm/min.

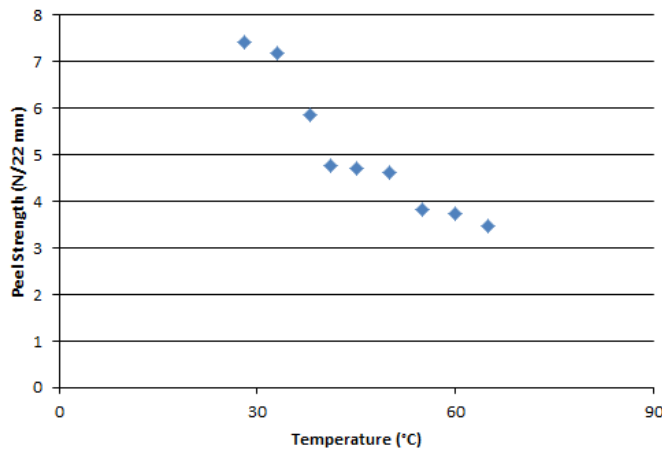


Figure 3. Peel strength as a function of temperature at a peel angle of 60° and a peel speed of 500 mm/min.

Peel test data for the same masking tape at varying temperatures is shown in Figure 3. The data was obtained with temperatures controlled at 5°C increments from room temperature to 65°C at a peel angle of 60° and a peel speed of 500 mm/min. The data indicates a decrease trend in the peel strength with increases in temperature.