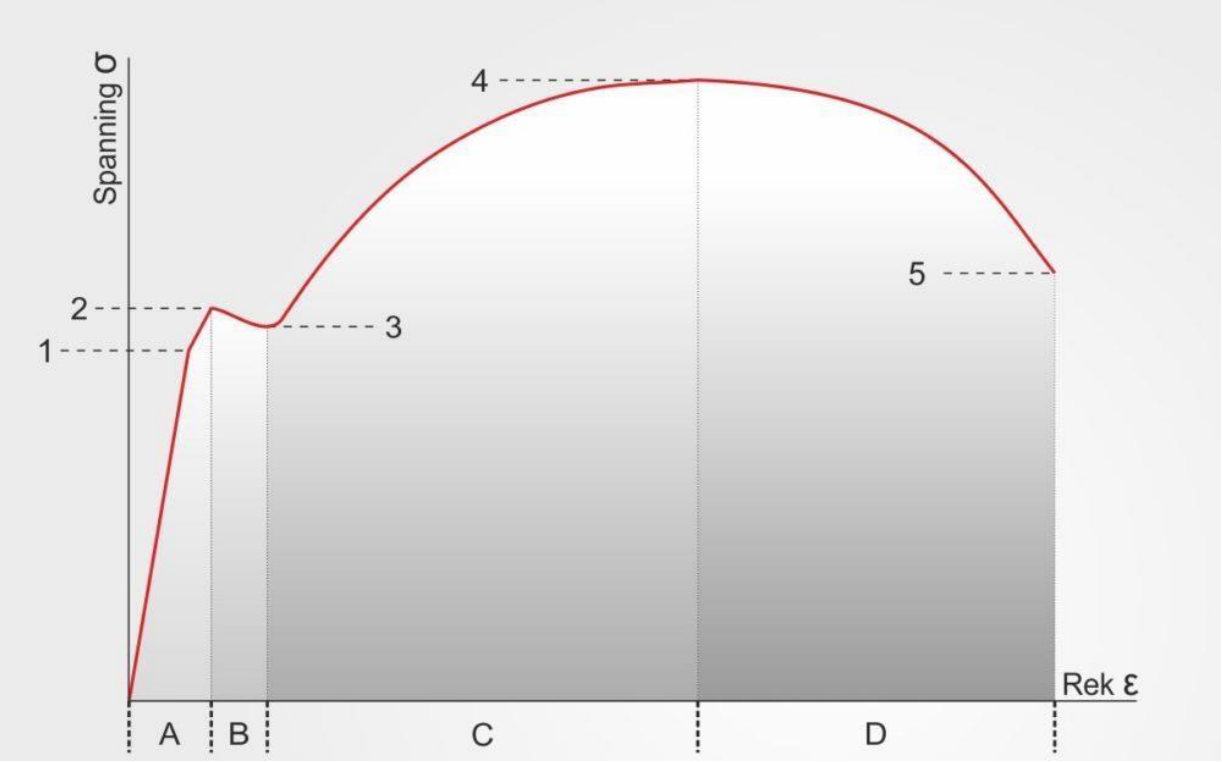
CHARACTERISTIC SHEAR RESPONSE OF STRUCTURAL ADHESIVES

The stress-strain diagram shows the mechanical properties of the adhesive. From the diagram it can be deduced how much, at an amount of applied stress (vertical axis), the material stretches (horizontal axis).
To properly understand the stress-strain diagram, it is important to know a number of concepts.



In the first phase A of the stress-strain diagram, an elastic behavior is shown. As soon as the applied stress is removed, the material will regain its original length. There is complete restoration.
In this first phase, the stretch is proportional to the applied stress. This is also called linear elastic or proportional distortion. The limit of

the proportional elasticity is called the proportionality limit.
The proportionality limit is indicated with point 1. From the proportionality limit to the elastic limit, there is also elastic deformation, but this no longer runs linearly. Non-linear elastic means that with increasing stress the length of the material increases relatively more, or the increased strain is greater than the increased stress.

The elasticity limit (upper yield strength) indicates where the deformation is elastic in nature. The material under this point will return to its original length and shape when the stress is removed. The elasticity limit is just below the elastic limit or upper yield point, indicated with point 2.

In the phase B, the yield point indicated by point 3, the material begins to flow. The applied stress creates plastic deformation. From here, the material is permanently deformed.

From the yield strength to the maximum stress there is plastic deformation (this phase, designated C, is called reinforcement). The maximum stress is the limit to which the material can deform without causing constriction / breakage. The the actual rupture strength or ultimate strength is indicated with point 4.

Then the material is pulled apart so much that it dilutes locally until it finally breaks, indicated by point 5: the rupture strength or breaking stress. This is the point at which the material ultimately collapses under the applied stress. The constriction preceding this begins at the tensile strength until the break point is reached. The breaking stress is lower than the maximum stress.

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