

MK 50-03, MK 50-06 and MK 50-13 are a two component, 1:1 ratio methacrylate adhesive designed for the bonding of unprepared metals with minimal surface preparation, as well as engineering plastics and composite materials.

### *MK 50-03 Shear Strength Performance at Elevated Temperatures*

Cold rolled steel lap shear samples were bonded with MK 50-03 as per ASTM D1002 and after 24 hours cure time, were exposed to temperatures up to 204°C for 1 hour then assessed for shear strength at temperature.

Figure 1 and Table 1 provide an outline of the capability of MK 50-03 when exposed to elevated temperatures. At higher temperatures, the strength does decrease and it is crucial that assemblies are properly fixed in place to avoid the joint slipping during the paint bake process.

Figure 1: MK 50 - 03 Shear Strength versus Temperature

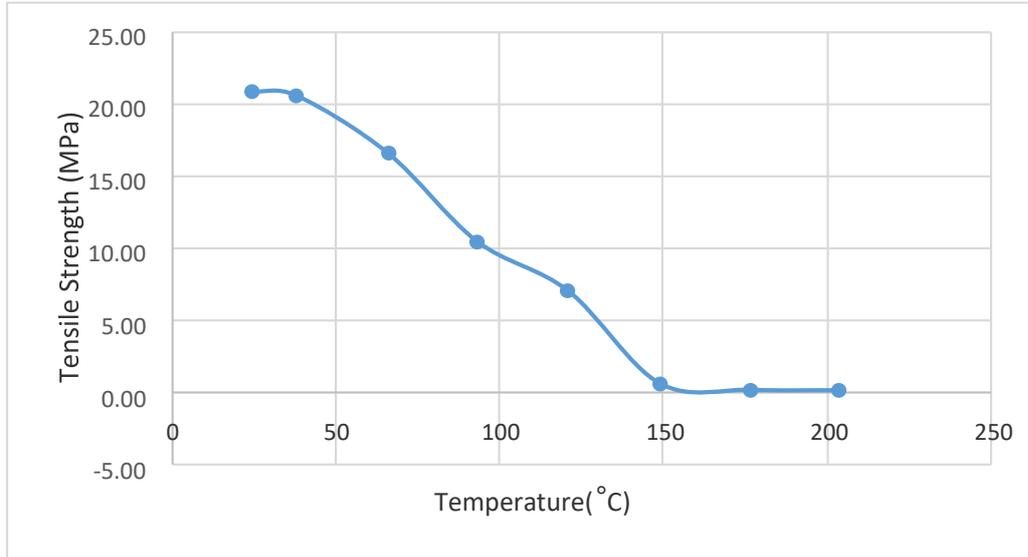


Table 1:MK 50-03 Shear Strength versus Temperature Data

Temperature (°C)	Tensile Stress (MPa)	Failure Mode (adhesive/cohesive/substrate)
24	20.86	0/100/0
38	20.58	0/100/0
66	16.56	0/100/0
93	10.46	0/100/0
121	6.99	0/100/0
149	0.55	20/80/0
177	0.11	40/60/0
204	0.08	50/50/0

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### *MK 50-03 Shear Strength Performance after Exposure to Elevated Temperatures*

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Cold rolled steel lap shear samples were bonded with MK 50-03 as per ASTM D1002 and after 24 hours cure time, were exposed to temperatures up to 204°C for 1 hour then cooled back to room temperature before being assessed for shear strength.

MK 50-03 retains good strength after exposure to temperatures up to 204°C, with the integrity of the bond being unchanged. Full cohesive failure is observed after exposure to temperatures up to 149°C after which the cohesive failure drops to 80% at temperatures up to 204°C.

At higher temperatures, the appearance of the cured adhesive can change in colour, with the adhesive appearing more tanned rather than black. This colour change typically happens due to exposure to higher temperatures during typical painting processes. Whilst there is a colour change, the integrity of the bond remains unchanged.

Figure 2: MK 50-03 Shear Strength versus Temperature Before and After Exposure

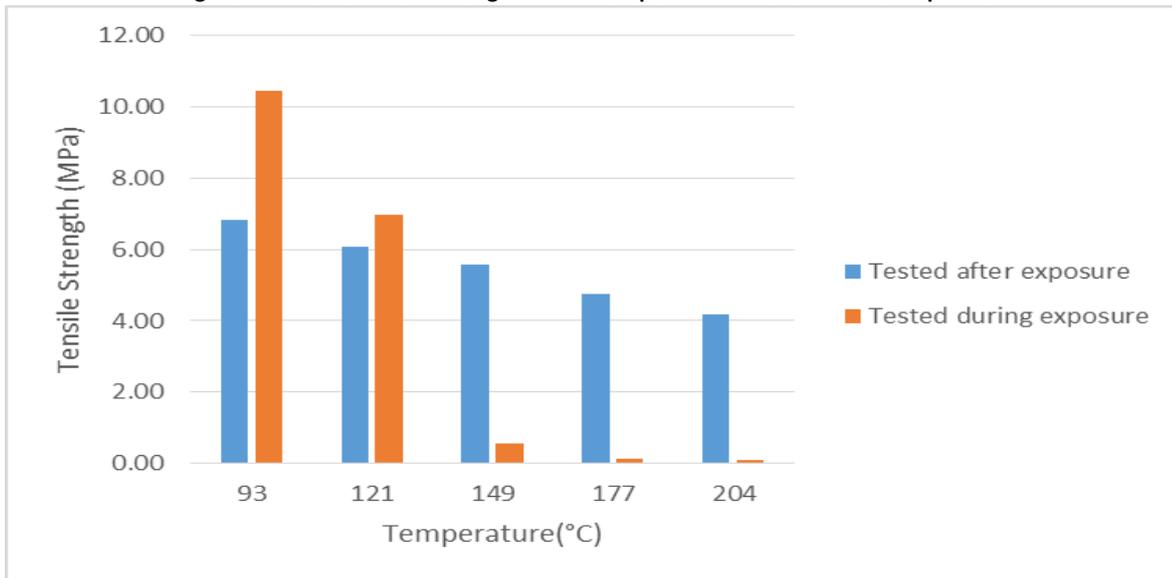


Table 2: MK 50-03 Shear Strength after Exposure to Elevated Temperatures

Temperature (°C)	Tensile Stress (MPa)	Failure Mode (adhesive/cohesive/substrate)
93	6.85	0/100/0
121	6.07	0/100/0
149	5.58	20/80/0
177	4.74	20/80/0
204	4.19	20/80/0

Whilst MK50-03 was the specific grade tested during this project, MK 50-06 and MK 50-13 have equivalent performance characteristics with regards to MK 50-3. This is based on a series of side by side tests conducted in our laboratories. The only difference between the products is the rates of polymerisation represented by the working time difference.

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## MK 50 Series Temperature Performance

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### *Disclaimer*

*While all Information contained herein are to the best of our knowledge accurate as of the date of this publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE. We suggest that the end user evaluate and validate the information prior to use. In all cases it is the responsibility of the user and NOT of SCIGRIP to determine the suitability of the adhesive and dispensing systems for its own particular purpose and use environment.*

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