



THE GLIDING FEDERATION OF AUSTRALIA

# GFA AN 140

(ISSUE 1)

## AIRWORTHINESS ADVICE NOTICE

**TYPES AFFECTED:** All Fibre Composite Sailplanes.

**SUBJECT:** Epoxy Resin Systems for Manufacturing and Repair of Sailplanes.

**BACKGROUND:** Since the first glass fibre reinforced plastics (GRP) sailplanes came into Australia and today the resin systems used in these aircraft have changed over the years. Unfortunately this is not reflected in most of the Maintenance Manuals of the sailplanes and with respect to the resin systems most repair manuals are very much outdated. This situation is not very helpful to anybody who performs repairs on sailplanes, particularly since many of the recommended systems in the repair manuals are no longer available.

This AN reflects the state of the art of epoxy resin systems that are currently approved by the German Federal Aviation Authority LBA. Approval is based on tests performed to a test standard that was developed over many years by the LBA, different research organisations, fibre composite sailplane and aircraft manufacturers, material suppliers and Akasfliegs. Thus, sufficient proof for the use of these materials was made to accept these systems for the repair of all fibre composite sailplanes in Australia.

### APPROVED RESIN SYSTEMS:

All epoxy resin systems in Table 1 are acceptable for the repair of sailplanes and powered sailplanes in Australia. They are all compatible to each other when used on fully cured composite structures made of another system. Some of the systems are no longer available or won't be available much longer in Europe and are marked here with an asterisk. However, left overs or material of other production lines may still be used as long as the manufacturer's expiry date has not been exceeded and the same consistency and quality as the original systems from Europe is guaranteed (supplier's certificate).

In the table GRP stands for Glass Fibre Reinforced Plastics. CRP stands for Carbon Fibre Reinforced Plastics and ARP stands for Aramid Fibre Reinforced Plastics.

**SIGNED:**

CHIEF TECHNICAL OFFICER AIRWORTHINESS

For and on behalf of:

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OF AUSTRALIA

Manufacturer	Resin	Hardener
Deutsche Shell AG	GE 162 * only GRP	E 113
	GE 162 * only GRP	C 260
	GE 163 * ARP and CRP	E 113
	GE 163 * ARP and CRP	C 260
Bakelite AG	Rutapox L 20	H 91 GRP and CRP
	L 20	SL 50 GRP, CRP, ARP
	L 20	SL 75 GRP and CRP
	L 20	SL GRP, CRP, ARP
	L 20	VE 2896 GRP and CRP
	L 20	VE 3261 GRP and CRP
	L 20	VE 2723 only GRP
Ciba - Geigy	XB 2878 A	XB 2878 B GRP and CRP
	XW 966	XW 970 GRP and CRP
	XW 477 A	XW 477 B only GRP
	XB 3052 A* = LY 5052	XB 3052 B* = HY 5052 G, C, A
Martin Scheufler	L 160 GRP, CRP, ARP	H 160 and H 160 A
	L 160 GRP, CRP, ARP	H 163
	L 160 GRP, CRP, ARP	H 260 S
	L 285 GRP, CRP, ARP	H 285
	L 285 GRP, CRP, ARP	H 286
	L 285 GRP, CRP, ARP	H 287
	L 418 GRP, CRP, ARP	H 418
	L 335 GRP and CRP	H 335
	L 335 GRP and CRP	H 335-340
	L 335 GRP and CRP	H 340

Table 1: Survey of LBA and GFA approved epoxy resin systems. Systems not rated for ARP may be suitable for ARP but approval by the CTOA or sailplane manufacturer is required.

**GENERAL:**

Epoxy resins and particularly the amino hardeners have to be stored according to the manufacturer's recommendations. If they are not stored appropriately they may not last up to their expiry date. For any major repair it is strongly recommended to make separate resin samples beforehand and also with the resin used during repair. Then you have proof that the mixing ratio is correct and that a proper chemical reaction of the components takes place.

In no case shall the hardeners of one system be used for a resin other than specified in the table. Before any spar cap repair the sailplane manufacturer or the CTOA must be asked if a resin system other than specified in the M/M shall be used. However, since the old Shell systems (GE 162, 163) are no longer available all other systems can be used for any repair on sailplanes where these Shell systems are recommended.

The choice of an approved fibre reinforcement according to the aircraft manufacturer's requirements is at least as important as the right resin system. Always use the original lay-up unless otherwise agreed with the sailplane manufacturer. If you are in doubt always seek for competent advice prior to a repair.

Post curing procedures are necessary for two main reasons. Without heat treatment the material will not have the required heat resistance for a safe operation. And the material is usually much more brittle as further chemical reactions take place during post curing.

Whenever a repair to a fully cured component is performed it is essential that there is no release agent on any surface which shall be bonded, that the surface has been prepared appropriately (sanding or peel ply) and that all surfaces are clean and fat free.

Please read the safety data sheets of the resin system you are using and follow the manufacturer's recommendations on safety precautions.

Further information can be found in the Inspectors Handbook - Sailplane Repair and Modification (section 2 of Basic Sailplane Engineering). However, with respect to resin data this AN is more up to date than the handbook.