

| PROCESSING DATA FOR CFP COMPOSITES 360 TOOLING | | | | | | REVISION |
|--|-----------------------|-----------|-----------|---------------------|---------|---------------------------|
| | | | | | | A |
| Product Info | Blocking up / Bonding | Machining | Post-cure | Surface Preparation | Release | Process Chemical Supplier |
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| Product Info. | <p>This technical document should be read in conjunction with the current 360 material data sheet (MSDS), which is available at www.cfpcomposites.com It is also advised that users familiarise themselves with the current regulatory regulations, Health and Safety policies and operating guidelines for the required machinery and tools to be used.</p> <p>Cost effective alternative to conventional tooling solutions with unique performance capabilities. Materials are available with thicknesses from 5 mm to 20 mm and come in a sheet size of 1.3m x 0.8m. 360 is lightweight, easy to machine, bond or mechanically fasten enabling fast block-up to produce large net surface areas. Suitable for high precision direct-to-part tooling, assembly fixtures, jigs or backing structures. The materials can be used either in or out of autoclave. Available in volume on 7-day lead-times</p> |
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| Technical Info | Typical Value | Value | Test Method |
|----------------|--|---------------------|---|
| | Colour | Black | Visual |
| | Hardness, Shore D | 84 | according to ISO 868: 2003 |
| | Density, g/cm ³ | 1.290 | according to BS EN ISO 1183-1: 2012, Method A |
| | Flexural Strength MPa | 186 | according to ISO 178: 2010 |
| | Flexural Modulus GPa | 21.0 | according to ISO 178: 2010 |
| | Tensile Strength MPa | 153 | according to BS EN ISO 527-2: 2012 |
| | Compressive Strength MPa | 285 | according to BS EN ISO 604: 2003 |
| | Compressive Modulus GPa | 19.6 | according to BS EN ISO 604: 2003 |
| | The full Interek report containing these mean test results is available upon request | Test data from 2019 | |

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| Blocking Up & Bonding | <p><u>Prior to Blocking up</u></p> <p>Precautions should be taken to ensure all local health and safety guidelines have been met. Personal Protective Equipment (PPE) should consist of a minimum of P3 rated breathing apparatus, safety overalls or disposable overalls, suitable gloves and safety glasses/goggles to meet the requirements of the materials/chemicals you will be using.</p> <p>Each mating surface to be bonded should be abraded using a very coarse sanding paper (i.e. 60 Grit) this is to ensure that the surface is suitably keyed.</p> <p>Prior to adhesive application, all surfaces to be bonded must be grease and contaminant free.</p> <p>To clean the surfaces to be bonded, ONLY use Isopropyl alcohol (IPA) and lint free cloths to wipe clean. Take care not to re-contaminate the surfaces prior to bonding.</p> <p>Using alternative products may cause bonding issues or deformation in the to be bonded surfaces.</p> | <p><u>Bonding</u></p> <p>When selecting an adhesive, it should be taken into consideration the gel time needed to completely cover all areas, ensuring enough time is left to clamp up.</p> <p>Both surfaces should be wet out with the adhesive and placed loosely in position.</p> <p>Once all required blocks have been positioned lightly tighten the clamps. Ensuring that equal pressure is applied to all the boards. Overtightening will cause the adhesive to spread unevenly, this may lead to stress build up in the boards and cause micro cracking and/or warping.</p> | <p><u>Care Notes</u></p> <p>If there is a bond gap required, the use of solid microspheres or bond wire can be used. The users own preferred method &/or specification can also be used.</p> <p>CFP Composites recommend Hysol EA 9394 for bonding.</p> <p>If you choose to use alternatives, you must conduct your own trials and no responsibility will be accepted by CFP Composites if reactions or failure occur.</p> <p>It is advised that the adhesive manufactures “air” cure times are met.</p> <p>Force curing the adhesive is not recommended and may cause the adhesive to flow out of the bond joints.</p> <p>CFP Composites only recommend using Isopropyl alcohol (IPA) and lint free cloths to wipe clean our 360 product. If you choose to use alternatives, you must conduct your own trials and no responsibility will be accepted by CFP Composites if reactions occur.</p> |
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| Machining | <p><u>Health & Safety</u></p> <p>Every care should be taken by the local user of this material. Health & Safety precautions should be made prior to machining.</p> <p>Items to consider are –</p> <ul style="list-style-type: none"> • Appropriate extraction for composite machining • PPE for operator • Electrical Isolation rating on equipment (carbon fibre dust is conductive) <p>To conform with regulatory regulations & users H&S policy.</p> | <p><u>Speeds, feeds & cutters</u></p> <p>While every care has been taken in the suggested starting point for this information.</p> <p>Individual users should determine the appropriate speeds, feeds, cutters, and depths for their specific applications.</p> <p>Do not use cutting fluids.</p> | <p><u>Machining guidelines starting point</u></p> <p>Spindle Speed – 4000 Rpm</p> <p>Cutter – Suitable Coated Ball Cutter</p> <p>Feed – 1 Meter Per min</p> <p>Depth – 3mm</p> <p>The following settings are recommended by CFP Composites after extensive processing.</p> <p>Cutting conditions are dry – do not cut wet</p> |
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| <p>Post Curing</p> | <p><u>Process</u></p> <p>It is advised that a post cure process is actioned prior to any surface preparation.</p> <p>This is to ensure any expansion from the adhesive is removed prior to component manufacture.</p> <p>It is advised that the final post cure temperature should be 30 degrees centigrade higher than the component to be made from the tool. This is to take into account the air temperature of process oven / autoclave.</p> <p>Example – a standard epoxy-based carbon fibre pre-preg cure will have a maximum temperature of 135 degrees centigrade. This will mean the post cure maximum temp will be 165 degrees centigrade.</p> <p>Please make sure the adhesive used can operate at the elevated temperatures of the post cure.</p> <p>CFP Composites recommends Hysol EA 9394 or equivalent.</p> | <p><u>Post cure cycle (oven cure)</u></p> <p>Ensure there is enough air gap around the tool and thermocouples are attached at thickest parts of the tool.</p> <p>Ramp rates must not exceed 1.0°C per minute during post cure.</p> <p>Dwell for 4 hours at the elevated temperature.</p> <p>Cool a maximum of 2 degrees per min to ambient</p> <p>If you choose to use alternatives adhesives, you must conduct your own trials and no responsibility will be accepted by CFP Composites if reactions or failure occur.</p> |
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| Surface Preparation | <p><u>Process</u></p> <p>After the post cure process the tool can now be surface abraded.</p> <p>Depending on the machining finish it is advised to start by using a 400 grit paper up to the desired surface finish.</p> <p>A 600 grit finish has been shown to more favourable results.</p> | |
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| <p>Release</p> | <p><u>Release</u></p> <p>Prior to release ensure the tool surface is free from moisture, grease and other contaminants.</p> <p>To clean the surfaces prior to a release, ONLY use Isopropyl alcohol (IPA) and lint free cloths to wipe clean. Take care not to re-contaminate the surfaces prior to applying release agents.</p> <p><u>New Tools</u></p> <p>Apply 5 coats of Chemlease 2710 with a 100% cotton lint free cloth.</p> <p><u>Touch up coats between components</u></p> <p>Apply 2 coats of Chemlease 2710 with a 100% cotton lint free cloth.</p> | <p><u>Care Points</u></p> <p>If the tool has been cleaned using a mould cleaner / acetone / IPA in between part manufacturing, the tool will require a fresh 5 coats of Chemlease 2710.</p> <p>If the tool has been abraded / flattened or surface prepper in any way, the tool will require a fresh 5 coats of Chemlease 2710.</p> <p>Chemlease 2710 has been developed to be used with this 360 tooling material. If alternatives are used this may cause surface finish issues of the component.</p> <p>If an alternative release system is to be considered, CFP Composites should be contacted prior to trial to ensure no reactions.</p> <p>CFP Composites only recommend using Isopropyl alcohol (IPA) and lint free cloths to wipe clean our 360 product. If you choose to use alternatives, you must conduct your own trials and no responsibility will be accepted by CFP Composites if reactions occur.</p> |
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|  <p>Chem Trend Release Innovation™</p> <p>UK & IRE Supplier information Only for Sealer & Release Agents</p> | <p align="center"><u>DISTRIBUTOR</u></p> <p align="center">Magnum Venus Products Europe Ltd 22a Navigation Drive Brierley Hill DY5 1UT</p> <p align="center">Tel : +44 (0) 1384 486222</p> | <p align="center"><u>Technical supplier of Sealer & Release Agent</u></p> <p align="center">Chem-Trend UK Unit 10 Pennine Business Park Longbow Close Huddersfield, West Yorkshire HD2 1GQ Great Britain Tel: +44 (0) 8703 504708 email: uksales@chemtrend.de</p> <p align="center">MSDS available on request https://www.chemtrend.com/our_brands/chemlease</p> <p align="center"><u>EUROPE & REST OF WORLD CONTACT</u></p> <p align="center">https://www.chemtrend.com/contact_us</p> |
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