



**PRACTICAL DOCUMENT**

**COP**  
CREATIVE & RESPONSIBLE CHEMISTRY



# **HOW TO SELECT THE MOST APPROPRIATE BONDING SOLUTION?**

## **- ORTHOPEDICS -**

This document has been designed to provide comprehensive information on our various bonding solutions intended for O&P professionals. It includes an overview of the different types of adhesives, their technical characteristics, as well as usage recommendations based on specific applications





Bonding plays a crucial role in ensuring the strength, durability, and comfort of custom-made orthotic devices. A better understanding of the different types of adhesives available, their mechanisms, the mechanical stresses they are subjected to, and the selection criteria will enable an appropriate choice for each specific situation



## TYPES OF ADHESIVES

Not all adhesives react in the same way: some operate solely through physical effects (such as evaporation or fusion), while others trigger a chemical reaction. The choice depends on the type of assembly, the time available, and the required level of strength.

### PHYSICALLY CURING ADHESIVES

These are adhesives in which the polymer is already formed. They are activated through a physical process, such as solvent evaporation or cooling after thermal fusion.

- Based on physical mechanisms such as solvent evaporation or thermal fusion.
- Suitable for quick bonding and frequently employed in temporary applications.

Examples: contact glue, hot melt adhesives, repositionable adhesives (e.g., Post-it notes).

### CHEMICALLY CURING ADHESIVES

The polymer is created through a chemical reaction initiated by various factors, including humidity, temperature, UV radiation, or interaction with another component, such as a hardener.

- These adhesives involve a chemical reaction that forms strong bonds, ensuring long-lasting and durable adhesion.
- Appropriate for structural applications that require elevated mechanical strength.

Examples: epoxy adhesives, polyurethane adhesives, cyanoacrylate adhesives.

Some formulations may release by-products during curing, requiring the use of personal protective equipment (PPE).



## KEY TIMES

The success of a bonding process also depends on adherence to the time requirements associated with each step. Below are the key terms to be familiar with:

- **Open time:** the period during which parts can be adjusted without degrading the adhesive's effectiveness.
- **Setting time:** the moment at which the adhesive begins to harden irreversibly.
- **Clamping time:** the duration during which constant pressure must be applied to maximize adhesion.
- **Full cure time:** the time needed to reach maximum strength, both on the surface and at the core.

An efficient organization of the workspace is crucial to adhere to these time constraints



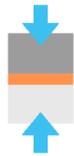
## MECHANICAL STRESSES

Orthopedic devices are subjected to various mechanical stresses. Therefore, the bonding must be sized according to the nature and intensity of the forces involved.

Mechanical strength refers to a material or bonded assembly's ability to withstand loads and stresses without failing. It is measured in megapascals (MPa) through tensile, compressive, shear, cleavage, or peel tests.



Tensile strength



Compressive strength



Shear strength



Cleavage strength



Peel strength

In orthopedics, this characteristic is crucial to ensure the reliability and safety of medical devices. The analysis of foreseeable stresses must guide the choice of bonding technology.



## SELECTION CRITERIA

To ensure durable and effective bonding, it is essential to select the appropriate adhesive based on the following:

- 1** Nature, geometry, and surface condition of the materials,
- 2** Constraints of manufacturing processes (available time, application method),
- 3** End-use specifications (mechanical, thermal, chemical stresses, and exposure to humidity and ultraviolet light).



# TECHNICAL SPECIFICATIONS

Adhesive	BLACKGLUE 01	COPHANE MB-85	SAFEPOXY® MASTIC	SAFEPOXY® GAP FILLER	COPACRYL GLUE	COPACRYL GLUE GEL	CONTACT GLUE	SILICONE GLUE
Type of Bonding	Chemical						Physical	Chemical
Chemical composition	Polyurethane		Epoxy		Acrylic		Neoprene®	Silicone
Physical Form	Two-component adhesive in paste form	Two-component liquid adhesive	Two-component mastic	Two-component filler	Liquid + powder hardener	Gel in container + powder hardener	Solvent-based liquid adhesive in aerosol spray	Gel
Application Method	Application with two-component gun	Spatula	Spatula	Spatula	Brush	Spatula	Spraying	Manual application / Spatula
<b>Characteristics</b>								
Odorous	-	+	+	+	+++	+++	+	++
Appearance (Mix)	Black	Amber	Opaque	Transparent	Transparent	Opaque	-	Translucent
Adhesive strength	+++	++	+++	+++	++ (With fiber impregnation)	+	+	+
Working time (setting time)	+++ (90 s)	++ (3 min)	+ (14 min/70g)	+ (13 min/70g)	+ (10 min)	++ (7 min)	+++ (30 s)	+ (10min)
Packaging	50 ml / 220 ml cartridge	4 kg	1.4 kg	1.4 kg	900 g / 4.9 kg / 25 kg + 150 g packet	750 g + 150 g packet	500 mL aerosol container	310 ml
Reference	BG01	MB-85V + DMS	SPM RC + SPM D	SPE R + SPE D	CAC C + SYD	CAC G750 + SYD	CPA 001	COL A02
Applications	Anchor bonding and repair	Permanent bonding of polyurethane foam blocks	Refill, hole filling	Pore filler	Use with fiber impregnation / Reinforcement of anchor bonding	Anchor positioning bonding	Assemblage	Sealing joint Silicone-to-silicone bonding
<b>Compatible Substrates</b>								
Carbon	+	+	+	+	+	+	+	
Metal	+	+	+	+	+	+		
Plastic	+	+	+	+	+	+	+	
Wood	+	+	+	+	+	+	+	
Silicone bonding:								+
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# BONDING PROCESS

## Surface preparation

### Stripping (if required):

**Abrasive:** Use sandpaper or a wire brush to remove existing coatings and create a slightly rough surface, improving adhesion.

**Chemical:** Apply a suitable chemical stripper based on the material. Make sure the product is compatible with the surface to avoid unwanted alterations.

Prior to any comprehensive application, conduct a test on a discreet area to confirm effectiveness and ensure there is no potential for damage.

### Cleaning:

#### Dust removal:

Use a dry cloth or air blower to thoroughly eliminate any dirt, dust, or residue that may hinder adhesion.

#### Degreasing:

Apply a solvent such as isopropyl alcohol to remove stains and grease. For heavy contamination, acetone can be used with caution. *Note: Acetone is not suitable for all materials. Always check its compatibility with the surface before applying.*

👉 Wipe afterward with a clean, lint-free cloth to avoid any residual deposits.



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COP assists you in identifying the most suitable adhesive for your needs, taking into account your technical, regulatory, and economic constraints.

Contact our technical teams :



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