

## **Von Hagens Plastination Specimen Care Guidelines**

### **FOR THE MAINTENANCE, CARE, PRESERVATION AND DISPOSAL OF PLASTINATED SPECIMENS**

#### **WARRANTY STATEMENT**

Statement of quality and composition of specimens from von Hagens Plastination/ Gubener Plastinate GmbH Under the direct supervision of Prof. Dr. med. Gunther von Hagens and final review by of Dr. Vladimir Chereminskiy, all Plastinates from von Hagens Plastination / Gubener Plastinate GmbH have been developed using state-of-the-art technology to guarantee the highest quality possible.

Plastination is the scientific process invented by Dr. med. Gunther von Hagens for preserving human tissue, organs and whole bodies by removing water and fat from the tissues and replacing them with certain polymers and resins, thus preventing decay.

The absence of liquid in the specimens prevents decomposition or bacterial growth. Unlike other anatomical specimens, Plastinates will never need to be re-treated and will never have a risk of drying out or attracting pests. Our plastinated specimens are therefore permanently preserved and if properly cared for they can be utilized for anatomical teaching for an extensive period of time.

Please review the information below to learn more about how your plastinated specimens were produced and to know how to best care for your plastinated specimens for generations of future use. This statement identifies some important facts about the curing, preserving and coloring of plastinated specimens.

#### **Curing**

The final stage of Plastination for your plastinated specimen was created using specialized Plastination products from Biodur Products®, a German based company founded by Dr. Gunther von Hagens. Biodur Products® offers top of the line Plastination polymers, silicones, equipment and auxiliaries.

As part of the Plastination process, the specimens are saturated, i.e. evenly impregnated, with a special silicone rubber. A vaporized, dry gas atmosphere of a gas (S6-Gas Biodur®), curing and hardening (S3-Hardener Biodur®) cross-links or bonds the prolonged silicone chains into a rubberlike consistency. This process takes place inside a curing chamber over a three to five day period. The gas links

the silicone molecules inside the specimen, three-dimensionally and irreversibly, rendering it dry and hard. This 3-D crosslinking using a special gas (S6-Gas Biodur®) can be compared to the method of vulcanizing rubber with sulfur.

During and after the curing process, the gas slowly penetrates throughout the specimen. The difference in tissue density (i.e. lung tissue versus tendons) causes uneven infiltration. For that reason it is important to introduce the gas slowly. The gas enters from the outside surface, causing the gas-cure concentration in the outer layers to be higher compared to deeper layers. After two to three days of administering the gas, it is normal that the outer layers become sufficiently hardened, and may even contain a surplus of curing gas. Consequently, the innermost layers, or the more dense areas (such as the prostate, which is covered with a “shield” of connective tissue) will not yet have been exposed to an adequate amount of curing gas.

Naturally, the unhardened silicone may “sweat” or ooze from the artificial holes, or natural orifices and vessels after some time, usually starting two to three weeks after gas curing takes place. However, extending the gas curing process for a longer period is not a viable option as over time, an excess of case curing agent (S6-Gas Hardener Biodur®) tends to combine with moisture from the air, forming a white silicate on the surface of the Plastinate. This silica salt cannot be easily removed without damage to the Plastinate.

In order to complete the curing process, specimens shall be allowed to rest in order for all the uncured silicone to naturally expel from the specimens. Once specimens are tested and confirmed to be cured, they are ready to be used for teaching. While rare, in the first months of use, some small amounts of excess silicone may still appear on the surface of the specimen, which should simply be wiped away with paper tissue. Should this phenomena occur, it will stop after some months.

### **Specimen Delivery**

Your specimens will arrive in an anti-moisture bag. When opening this bag for the first time, open the bag in a well aired place or outside and let the specimen air for some minutes. While rare, oozing of silicone from massive muscle specimens, or internal organs may also arise due to extended temperatures above + 30 °C during transport. Should this occur, please let us know and we will react accordingly.

### **Color of Plastinated Specimens**

Deviation in color of plastinated specimens is normal. The intensity and shade are determined by:

- ❖ The amount of hemoglobin present in the body
- ❖ The amount of myoglobin content, which depends on genetics, age, gender, and on the amount of regular physical exercise
- ❖ The ratio of muscle tissue to connective tissue within the skeletal muscles, which

- ❖ depends mainly on gender (woman have more connective tissue than men), age (the relative amount of connective tissue increases with age), and on genetics (whether the person is of athletic, pyknic, or asthenic type)
- ❖ The length of time between death and fixation. For example, the longer the fixation process lasts, the darker the specimen will become.
- ❖ The density of injected vessels, and the amount of injected polymer
- ❖ The color and stability specifications of polymer

For these same reasons, no two specimens will display the exact same color.

In addition, the physical laws of bleaching, caused by breaking down double and triple bonds, apply to all types of color. Under the influence of light, whether it is a pigment or molecular soluble bonding, the color of a specimen will bleach out over time. If needed, after an estimated time period of five to ten years, an after-stain procedure might be found necessary. We are prepared to provide you, upon request an "After-stain Color-Kit," free of charge. Please contact us or your sales representative if necessary. Photographic proof of bleaching of specimen may be required.

### **Limited Warranty Statement**

The warranty period shall commence on the date of receipt of the specimens. The length of the warranty period shall be twelve (12) months. The specimens shall be used, stored and maintained in accordance with the guidelines given in this document.

When during the warranty period, any specimen is found to be:

- (a) of clear defects in quality, materials or workmanship; or
- (b) not in accordance with the contract or any specifications incorporated therein by reference or otherwise; or

Then unless it is shown that the foregoing is caused by improper use or mishandling by the user, von Hagens Plastination / Gubener Plastinate GmbH shall, at its own expense (including transportation costs) repair, rectify or completely replace, the damaged specimens.

### **Method of Disposal of Plastinated Specimens**

Ethical standards must be upheld while dealing with genuine human remains. If specimens are no longer needed, they should be cremated and buried.

Chemically silicone plastinated specimens contain about 70% polymerized siloxane. The remaining matter is dry organic matter of human material. The silicone rubber will only burn when in the flame and will disintegrate into a white-grey powder at a temperature above 350 °C (350 - 450 °C). If you have any questions, please contact your Sales Representative or Gubener Plastinate GmbH.

## Summary and Recommendations for Proper Care

1. Our high-quality plastinated specimens are, in principle, everlasting if treated with appropriate care. Silicone specimens are genuine, durable, lifelike, dry, odorless and flexible. They can be used for teaching purposes for a very long time, but it is important to handle complex nerve and muscle structures with great care.
2. Puncturing with hard materials / instruments should be avoided, including poking with fingernails. Puncturing and prodding can permanently damage specimens.
3. Fine dissection and dividing of structures (such as separate organs, complex of organs, or body parts) make the specimens very informative. Careful handling of the specimen is required. Do not try to bind, pull, move or divide the structures or the body parts with hands.
4. Use caution when packing and unpacking specimens. Proper supporting tools for carrying (e.g. stands, rings, etc.) are supplied with specimens.
5. During teaching courses we suggest the use of laser pointers or soft rubber pointers to illustrate the structures.
6. The structures can be labeled by adhering small paper tags with a water-based glue. Do not use pins or needles.
7. The Plastinates can be stored in free air, indefinitely, as long as the relative humidity of the air ranges below 50% and the temperature ranges between +5 °C to +35° C. Temperatures higher than +35° C can cause leakage of excess uncured silicone from the core of the specimen. If leakage occurs, please inform us.
8. Do not allow untrained staff to touch Plastinates. Plastinates can easily be broken by untrained individuals.
9. Extended exposure of the specimen under direct UV light should be avoided.
10. To remove dust from the surface of plastinated specimens, pressurized air may be used. Care should be taken with small nerves and arteries, as these are very fragile and can easily be broken. An alternative would be to gently wipe the surface with a typical all purpose liquid cleaner that has been diluted with water and a normal toothbrush (medium hardness) or a soft sponge.