

Processing CLEARPOR®

Expandable MMA/Styrene/ α -MS copolymer beads

PRODUCT DESCRIPTION

CLEARPOR products were developed for foamed patterns of lost foam casting process. CLEARPOR products consist of methyl methacrylate (MMA) unit, styrene unit and a small amount of α -methyl styrene unit. The foamed patterns made of CLEARPOR products have excellent surface appearance, dimension accuracy and pyrolysis properties in comparison with EPS products. CLEARPOR products are mainly used to produce valves, pipe fitting and machinery parts, which are made of casting iron and aluminum.

Grade:

| Grade | Average Particle Diameter | Preferable Density of Molded Articles |
|--------|---------------------------|---------------------------------------|
| CL500A | ca. 0.5 mm | 23-30 kg/m ³ |
| CL600A | ca. 0.4 mm | 25-30 kg/m ³ |

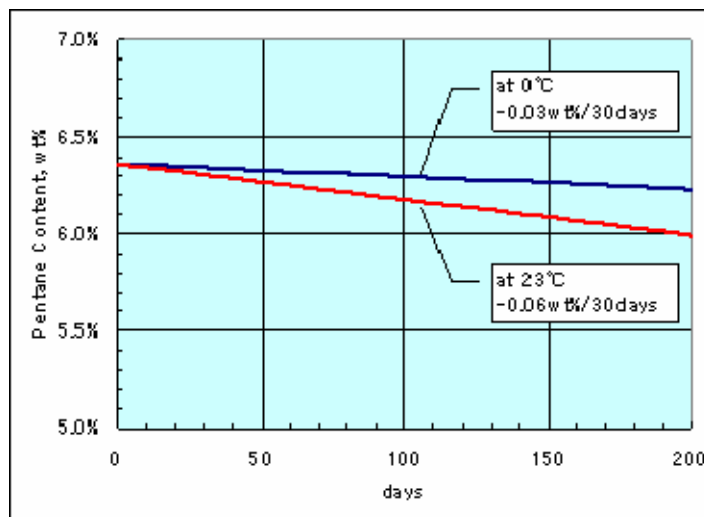
Safety: CLEARPOR products and the molded articles should not be exposed to ignition sources (including open flame, sparks, or electrostatic charges) during storage, processing, shipment and application. Adequate ventilation in all processing areas must be provided to prevent hazardous accumulations of hydrocarbon vapours.

Packaging and Storage: CLEARPOR products are packaged in 200L steel drums (net 125kg). Plastic liners are used to maintain product shelf life by retaining the blowing agent. The containers should be protected from rain, snow, frost, direct sunlight and mechanical damage.

CLEARPOR products should be kept in a chilled warehouse because the blowing agent escapes from the raw beads quickly during storage.

* Recommend storage condition; Within 3 months after arrival below 15°C, in unopened drums

Typical Decreasing Rate of Blowing Agent (Pentane) at 0C and 23C, in unopened drums



PROCESSING

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Pre-expansion: In properly batch-type pre-expanders CLEARPOR products can be expanded to a bulk density of about 25 kg/m³. Continuous pre-expanders are not suitable for CLEARPOR products because of difficulty to adjust the bulk density of prepuff. Indirect heating pre-expanders are also not suitable because of a possibility of prepuffs agglomerating during pre-expansion.

The typical conditions of pre-expansion are shown in Table 1.

| | Unit | CL600A |
|---------------------------------------|-------------------|---------|
| Target bulk density of prepuff | kg/m ³ | 25 |
| Amount of charged raw material beads | kg | 4.4 |
| Internal temperature of pre-expander | °C | 97-98 |
| Steaming time | sec. | 120-200 |
| Bulk density of prepuff (after 1 day) | kg/m ³ | 24.8 |

Non-pressurized pre-expander DYL300 produced by Daisen Industry of Japan

Intermediate aging: The recommended aging period for the prepuff range from 12 hours to 96 hours, depended on the ambient temperature. Because the emission rate of blowing agent out of the prepuff of CLEARPOR is slower than that of EPS, the aging period have a small influence on the molding.

Notice: the emission rate of blowing agent out of the raw material beads of CLEARPOR is faster than that of EPS.

Molding: CLEARPOR products are intended for molding on automatic molding machines. Relatively low steam pressure ranging from 0.07 to 0.08 MPa (0.7-0.8bar) is preferable to CLEARPOR products. The typical conditions of molding are shown in Table 2.

| | Unit | CL600A |
|-------------------|-------------------|------------------------|
| Density | kg/m ³ | 25 |
| Steaming pressure | MPa (bar) | 0.07-0.08 (0.7-0.8) |
| Steaming time | sec. | 10-20 |
| Cooling time | sec. | 10-20 |
| Vacuuming time | sec. | 70-90 |
| Fusion | % | 70-90 |
| Water uptake | % | 12-16 |

Aging condition of prepuff; 1day at 23°C after pre-expanding

Thickness of molded article; 20mm