PLASKOLITE

# "OUTGASSING"

# &

# VINYL APPLICATION to TUFFAK® POLYCARBONATE MONOLITHIC SHEET

Tuffak® polycarbonate monolithic sheets are not known to "outgas" in the traditional sense of the term. For example, new car odors are attributed to plastics, adhesives and sealers found in the interior of automobiles. As these materials continue to cure, they release fumes of Volatile Organic Compounds (VOCs) into the air. Odors may also come from phthalates and other plastic softening chemicals that outgas over time.

Conversely, polycarbonate's "outgassing" is primarily due to water moisture trapped in an undried sheet. Polycarbonate readily absorbs moisture soon after manufacturing. To remove this moisture, which often interferes with vinyl adhesion resulting in bubbles under the vinyl film, polycarbonate should be dried prior to film application.

Suggestions for successful vinyl application:

- Remove protective masking from the surface which is to receive vinyl film.
- Pre-drying the sheet for a minimum of one hour at 250°F (flash drying) promotes surface dryness conducive to good film adhesion.
- Polycarbonate begins to reabsorb moisture upon cooling. It is imperative that the vinyl application process begins immediately once the sheet has reached room temperature.
- Wipe the sheet with an antistatic rag or blow deionized compressed air over the sheet to remove any built up electric charge and particles of dust.
- Vinyl is best applied as free film immediately after being stripped away from the release liner.
- The squeegee should be dragged at a shallow angle for effective and stretch free work. Keep the vinyl unattached to the sheet surface for as long as practical by lifting it; this keeps trapped fluid to a minimum and helps avoid wrinkling along the edges.
- When applying graphics, always start in the center of the sheet. Apply enough squeegee pressure to force any application fluid out from under the vinyl and always use overlapping strokes. Lay down and make substrate contact with the area of film to which you can apply high-squeegee pressure. While squeegeeing, work from the center outwards toward the edge and from the top down, in overlapping strokes.
- Re-squeegee the film after 15 minutes from the initial film application. Use the release liner that's been removed previously and overlay it on top of the applied film. This protects the film from scuffing and scratches by the applicator. Re-squeegee the surface as though it were for the first time. This helps promote adhesion.

Always confirm with the film's manufacturer their product works well on polycarbonate. Once validated, review and verify the film manufacturer's application procedures. If instructions are unclear, ask for guidance from the manufacturer on ways to avoid their film from bubbling up – vinyl film manufacturers may have additional application ideas on how this application may be completed successfully.

**Summary:**

Outgassing from water vapor is predictable due to the hygroscopic nature of polycarbonate. Trapped moisture within the sheet often results in bubbling of vinyl film. Pre-drying sheet leads to a surface dryness conducive to good film adhesion.

Failure to properly dry the plastic may cause bubbling within the plastic sheet and under the applied film during the heating stage of the forming process.

Outgassing/VOC Test Results:

Plaskolite

Material: TUFFAK® GP 20 mm (0.787") thickness

| Testing Parameters | 3 Days | 28 Days | Emission Class Class A+ |
|---|---|---|---|
| | µg/m³ | µg/m³ | µg/m3 |
| Formaldehyde | <3 (ND) | <3 (ND) | <10 |
| Acetaldehyde | <3 (ND) | <3 (ND) | <200 |
| Toluene | <2 (ND) | <2 (ND) | <300 |
| Tetrachloroethylene | <2 (ND) | <2 (ND) | <250 |
| Xylene Isomers | <2 (ND) | <2 (ND) | <200 |
| 1,2,4Trimethylbenzene | <2 (ND) | <2 (ND) | <1000 |
| Dichlorobenzene | <2 (ND) | <2 (ND) | <60 |
| Ethylbenzene | <2 (ND) | <2 (ND) | <750 |
| 2-Butoxyethanol | <2 (ND) | <2 (ND) | <1000 |
| Styrene | <2 (ND) | <2 (ND) | <250 |
| Total VOCs | <3 (ND) | <3 (ND) | <1000 |

ND = non-detect

- C6-C16 expressed in Toluene equivalent ISO 16000-6
- The test stopped (3) days after test loading, since Class A+ rating has been reached. Results after 28 days is a prevision.
- Air sampling was done (3) days after introduction of test specimen in the emission test chamber.
- Markes sorbent tubes (Carbopack C 60/80, Carbopack B 60/80, Carbosieve SIII 60/80) for VOC analysis by GC-MS and using tubes containing silica gel coated with 2,4-dinitrophenylhydrazine (DNPH) for aldehyde analysis by HPLC-UV.
- The test was carried out according to standard UNI EN ISO 16000-9:2006 dated 06/07/2006 “Indoor air - Part 9: Determina the emission of volatile organic compounds from building products and furnishing - Emission test chamber method”.
- TEST REPORT No. 310180, 10/29/2013