



Formica®

Brand Laminate

T E C H N I C A L B R I E F

Stress Crack Avoidance

CAUSES OF STRESS CRACKING

Stress cracking of high pressure laminate is caused by the concentration or buildup of stresses in a particular area of a laminated assembly. When this stress becomes greater than that which the laminate can withstand, a stress crack will occur. If such stresses are allowed to concentrate around a cutout or other such fabrication detail, one or more cracks can characteristically radiate from the sharper corners of the cutout, where, for mechanical reasons, the laminate is weakest.

These stresses can be caused by external mechanical forces, but are generally caused by the normal dimensional movements of the laminated assembly as it reacts to the surrounding environment. As with all wood-based products, high pressure laminates and their substrates react to humidity changes. Under moist conditions, laminated assemblies gain moisture and expand dimensionally. When this same assembly is subjected to dry conditions, however, this moisture is lost and shrinkage results. If the laminate shrinks more than the substrate, stress cracking of the laminate surface can occur in certain areas.

TECHNIQUES FOR CONTROLLING STRESS CRACKING

The occurrence of stress cracking can be greatly minimized by using fabrication techniques and practices which recognize and moderate the dimensional movement and associated stresses that can develop within a laminated assembly.

These techniques and practices consist of:

- Preconditioning
- Proper substrate selection
- Obtaining a good adhesive bond
- Proper inside corner fabrication
- Proper seam placement
- Good installation practices

PRECONDITIONING

Prior to the fabrication, allow the laminate and substrate to acclimate for at least 48 hours to the same ambient conditions. Optimum conditions are approximately 75°F (24°C) and a relative humidity of 45% to 55%. Provision should be made for the circulation of air around the components.

SUBSTRATE SELECTION

Formica® brand laminate and ColorCore® surfacing material should be bonded to either Medium Density Fiberboard (MDF) or a 45# density industrial grade particleboard (CS 236-66: Type 1, Grade B, Class 2). The dimensional change properties of these substrates, being similar to that of high pressure laminate, greatly reduce the potential for stress cracking when the assembly is subjected to low humidity conditions.

Plywood substrates should be avoided, whenever possible, for use with Formica brand laminate, and should never be used as a substrate for ColorCore surfacing material. Because of its cross-ply construction, plywood expands and shrinks less than either of these laminate grades. This results in greater stress built up within the laminate, and thereby increases the chance of stress cracking.

ADHESIVE BOND

The quality and nature of the bond between the laminate and the substrate is also an important factor to consider when trying to minimize stress cracking. Basically, the stronger and more rigid the bond, the less are the chances for stress cracking. Contact adhesives, by their nature, are elastomeric and, therefore, transfer less of the stress to the substrate. Assemblies made with contact adhesives, therefore, are less crack resistant than those fabricated with rigid or semi-rigid adhesives. If contact adhesives are used, they should be properly applied and fused to obtain the strongest possible bond.

Rigid and semi-rigid adhesives such as resorcinol, ureas and PVAc (white glue) transfer stresses directly to the substrate. Assemblies fabricated with these adhesives are more crack resistant.

The stress crack performance of assemblies using contact adhesive can be greatly improved if a PVAc (white glue) is used at all inside corners. **Note:** If the assembly is to be water resistant, a catalyzed PVAc glue should be used.

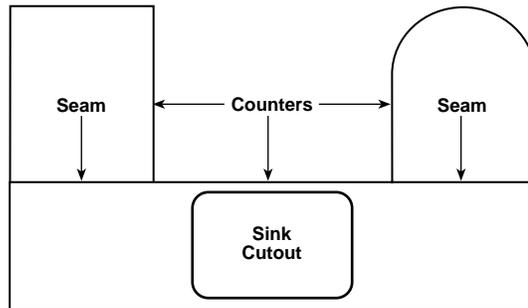
1. The cutout area of the laminate and substrate assembly is masked prior to applying the contact adhesive.
2. Once the contact adhesive has been applied and dried, the masking is removed and a PVAc glue is applied.
3. The laminate and substrate are then joined and nip rolled together to fuse the contact adhesive. The masked-off area is then clamped until the adhesive sets. This usually takes about one hour.

INSIDE CORNER FABRICATION

The inside corners of all cutouts must be radiused as large as possible (1/8" (3.18mm) minimum) to minimize stress cracking. A radiused corner created by a 1/4" (6.36mm) diameter router bit is normally used. All edges and inside corners should be filed smooth and free of any chips or nicks.

SEAM PLACEMENT

Another effective means of minimizing the chances of stress cracking is to plan the placement of seams to reduce the number of inside corners. An example of proper seam position is shown in the following illustration.



INSTALLATION

Install the laminated assembly with sufficient clearance at pipes, electrical boxes, panel edges, etc., to allow for normal dimensional movement. Sinks, louvers, drop-in ranges, etc., should fit easily into openings without binding. Do not install a panel or laminated assembly by force fitting. Panels should be installed in a flat plane by shimming, as necessary, to avoid mechanical stresses caused by bending or twisting.

SUMMARY

1. Precondition laminate and substrate for a minimum of 48 hours prior to fabrication. Optimum conditions are approximately 75°F (24°C) and 45% to 55% relative humidity.
2. Select the proper substrate: MDF or 45# density particleboard. Plywood should not be used with ColorCore surfacing material.
3. Obtain a good bond. Assemblies bonded with rigid or semi-rigid adhesives are more crack resistant than those assembled with contact adhesives.
4. Radius inside corners as large as possible, 1/8" (3.18mm) minimum.
5. Plan the placement of seams to minimize inside corners.
6. Provide sufficient clearance at sinks, electrical boxes, range cutouts, etc., to allow for dimensional movement. Do not force fit. Do not induce mechanical stresses.

TECHNICAL SERVICES

Technical assistance may be obtained through your local Formica brand products distributor or from Formica Corporation trained representatives in sales offices throughout the country. To assist these representatives, Formica Corporation maintains a sales technical services staff in Cincinnati, Ohio. For technical assistance, contact your distributor or sales representative; write the company directly at Formica Corporation Technical Services Department, 10155 Reading Road, Cincinnati, OH 45241; call (513) 786-3048 or 1-800-FORMICA™; or fax (513) 786-3195. In Canada, call 1-800-363-1405. In Mexico, call (525) 530-3135.

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