

# DRIFT JOINTS PROVIDE AN AVENUE FOR WATER INTRUSION INTO WALL CAVITIES

BY ROBERT CRAIG, RRO, CDT

Any “break” in the continuity of a weather-exposed, three-coat cement plaster exterior wall system increases the opportunity for uncontrolled moisture to penetrate the exterior plane and enter through the cladding. “Uncontrolled rainwater penetration and moisture ingress remain two of the most common threats to the structural integrity and performance of the building enclosure.”<sup>1</sup>

Commonly referred to as “accessories,” these components serve multiple purposes: as design elements to add visual enhancements to the surface (such as reveals), as a place for minor cement plaster movement such as crack control joints, or as a component for structural movement in order to minimize the damage that could affect the cladding.

This article focuses on the use (or misuse) of the common #40 horizontal two-piece drift/seismic joints (see *Illustration 1*) in stucco, the significant concern with water that is captured by the joint’s lower pocket, and subsequent leakage at the ends and joints of each piece. Further, the need for the horizontal upper metal accessory to provide weepage is discussed.



*Photo 1 – Note the exposed termination of the lower pocket of the #40 drift joint against the window jamb metal flange. It is unsealed and will drain water that is trapped in the lower pocket into and down the jamb WRB. Water was leaking into the building at the window perimeters during significant rain and leaked from spray testing.*

## Two-piece slip joint that accommodates movement in two directions.

- Allows for wall movement in multiple directions.
- Adjusts from 1/4" to 5/8".
- Provides effective plaster bond.
- Available with numerous modifications.



*Caution: Additional weather shields should be installed behind the joint to enhance the weather resistance of this system.*

*Illustration 1 — A vendor’s illustration of a drift joint (from Dietrich Metal Framing).*



*Photo 2 – This photo shows the typical drift joints (along the top of the windows in the lower portion of the photo) terminating at the window jambs and forcing moisture into the WRB, leading to uncontrolled ingress of moisture behind the stucco and leakage into the interior during heavy rain.*

*Photo 3 – Horizontal #40 drift joint intercepts water running down the stucco, which then flows back into the joint and into the pocket of the lower accessory. Note that stucco against the metal jamb flange is actually trapping moisture, which is behind it in the drift joint lower pocket. Problems also exist with the upper stucco being able to weep effectively.*



## DESCRIPTION

The most common three-coat stucco cladding system can be described as an “internal drainage plane wall” system. As such, three-coat stucco is designed as a first line of defense to deflect most, if not all, of the moisture that contacts the surface to the outside – the first line of defense. Behind the stucco system is a “weather-resistant barrier,” generally a code-approved building paper, intended to manage small amounts of incidental moisture that may have penetrated past the stucco system, allowing it to drain out at exit points (screeds and other flashings) or absorb the moisture, then dry back out through the plaster surface or inward, depending on permeability.

Codes require a minimum of two layers of Grade D (60-minute) paper or approved equivalent over solid sheathing, and a single layer over open framing. Grade D is a water-vapor-permeable paper. Grade D paper with a water resistance of 60 minutes (or more) is intended for stucco applications and is often preferred to Grade D paper that has only the minimum 10-minute resistance required by UU-B-790a. When the paper is subjected to excessive, uncontrolled amounts of moisture, water can seep past laps and penetrate through fasteners. In addition, excessive wetting of the paper will overwhelm its ability to shed moisture, leading to saturation and transfer of moisture through the paper, eventually into the wall and cavity.

Horizontal, two-piece-type expansion

joints, such as the accessory #40 joint, available in 10-ft lengths, have a male / female design. The female part, which has a receiver groove or pocket, is placed at the lower configuration.

This layout, very common in the field, will intercept and collect large amounts of water running down the stucco into the groove, where it travels horizontally to the ends of each piece and either joins the next piece or terminates at corners, edges, and jambs. Excessive amounts of moisture tend to leak out at these locations and enter into the wall system. Also, stucco that terminates at the bottom of the upper accessories that does not allow drainage causes moisture to accumulate, back up, and travel horizontally uncontrolled. The subsequent moisture intrusion can then overwhelm the weather-resistant barrier by excessive wetting and through-fastener holes and other voids.

## RECOMMENDATIONS

### Review the Need for the Accessory Drift/Seismic Joints

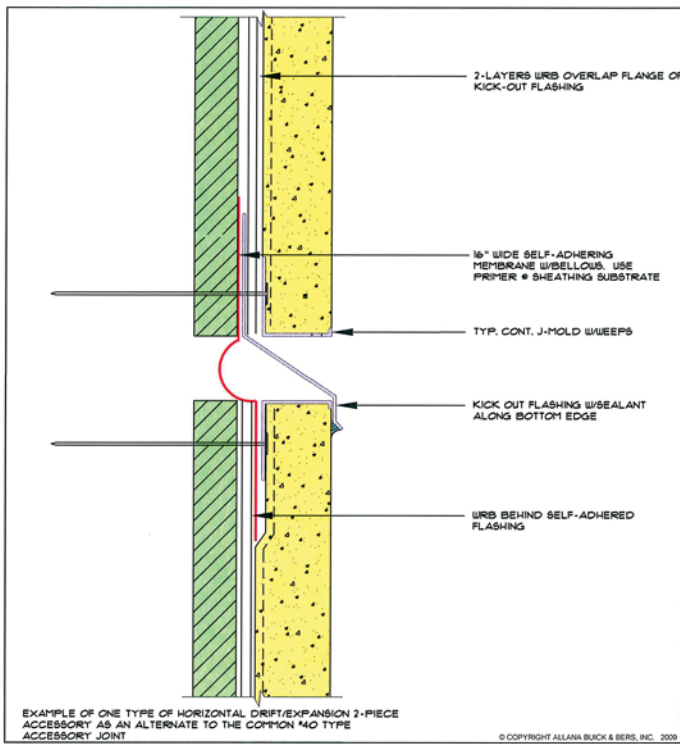
A careful analysis of the structural design (governed by the requirements of the

seismic sections of the most current building codes) should be performed to determine the necessity and possible elimination of the horizontal cladding drift joints.

In the case of shear walls, for example, the floor-to-floor drift or deformation should be negligible and elements attached to the wall should be subject only to acceleration forces. Commonly used methods of the attachment of additional facing materials to the building structure, if correctly designed and installed, should ensure safe seismic performance under design accelerations.<sup>2</sup>

### Design, Specify, and Install Drift Joint Accessories That Do Not Have a Lower Pocket and Are Designed to Weep

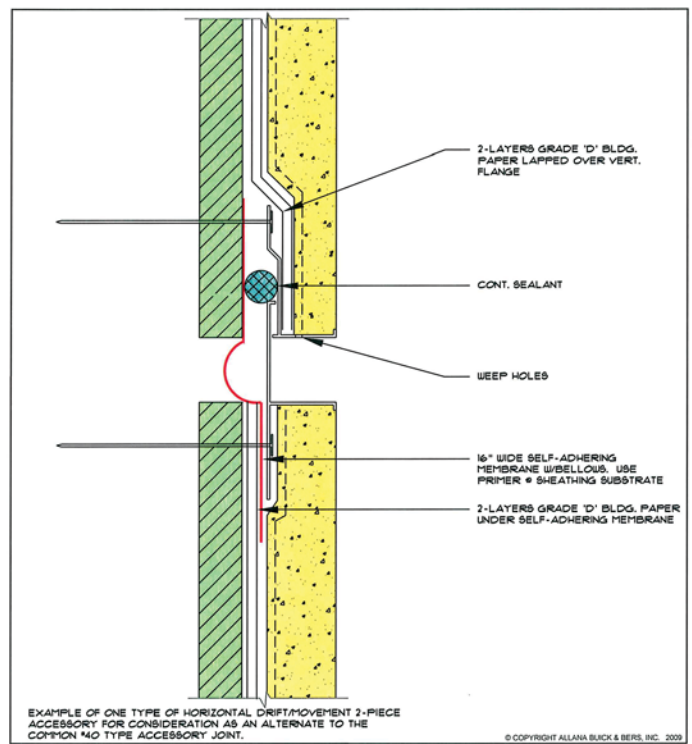
If it is determined that horizontal drift joints cannot be eliminated in a stucco sys-



EXAMPLE OF ONE TYPE OF HORIZONTAL DRIFT/EXPANSION 2-PIECE ACCESSORY AS AN ALTERNATE TO THE COMMON #40 TYPE ACCESSORY JOINT

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PROJECT NO:	DRAWN:	CHECKED:	SCALE:	ISSUE:	DATE:
	DDOBSON		FULL SCALE	DRAFT	12 JAN. 2011
				DRAWING NO:	
				<b>SD-3</b>	
				REF:	REFNO



EXAMPLE OF ONE TYPE OF HORIZONTAL DRIFT/MOVEMENT 2-PIECE ACCESSORY FOR CONSIDERATION AS AN ALTERNATE TO THE COMMON #40 TYPE ACCESSORY JOINT.

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				<b>SD-2</b>	
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Detail 1

Detail 2

tem, design the joint to shed moisture (see *Detail 1*). Another type of horizontal drift-expansion joint that provides a different look similar to a reveal can be considered (see *Detail 2*).

mounted behind the joint move in two planes, and when caulked utilizing a backer rod and a quality silicone-caulking material, are generally much more water-resistant than the standard mechanical two-piece.<sup>3</sup>

tributing to leakage, apply a backer rod or backer tape into the joint to block ingress of moisture into the pocket. Make sure to seal off the ends and butt joints (see *Detail 3*).

Two-piece expansion joints formed with back-to-back double casing beads with flexible membranes

If using a type #40 drift (expansion) joint, or if one is in place and it is con-

In any expansion-drift joint accessory, it is important to pay attention to the treatment of the butt joints between pieces and the ends. In addition, the weather-resistant barrier and peel-and-stick membranes need to be effectively integrated and terminated.



Photo 4 — Field water testing of #40 drift joints caused leaks. After remediation by installing sealant, subsequent field water testing did not result in leaks.

### Change From the Conventional Internal Drainage Plane System to a Drainage Cavity Wall System

Another consideration is to design the stucco system as a drainage cavity wall system rather than a conventional internal drainage plane system. Separating the cement plaster cladding from the weather-resistant barrier enhances the wall system's ability to resist the infiltration of moisture that gets past the cladding, should an accessory joint fail.

### SUMMARY

Conventional three-coat plaster wall cladding systems with the common #40 two-piece horizontal seismic/drift/expansion joints are prone to leakage due to

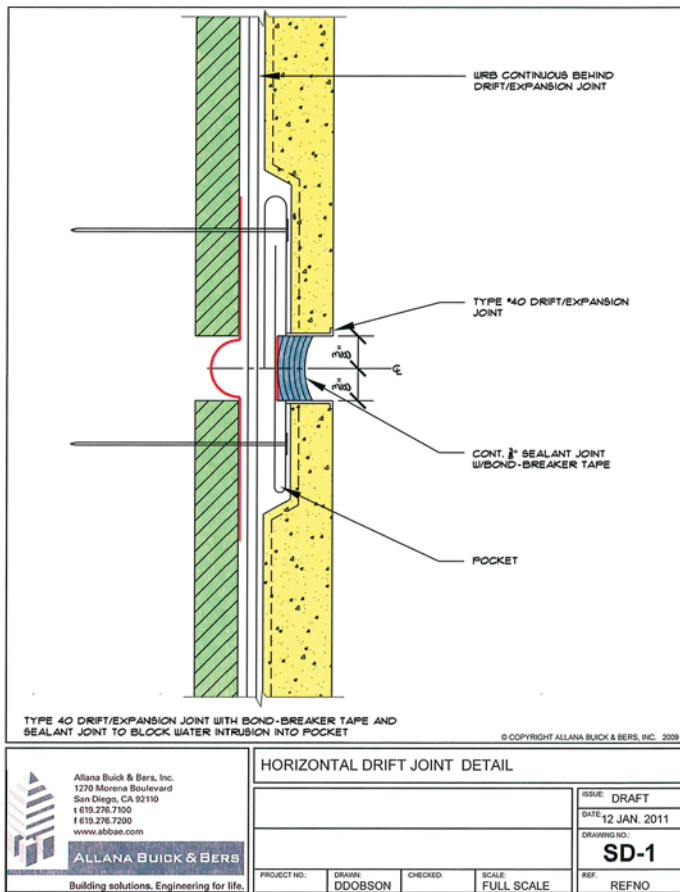



Photo 5 – Excessive uncontrolled water leaking out of the ends of the lower pockets at window jambs resulted in moisture intrusion through fasteners and into the interior of the building.



Photo 6 – Water leakage was occurring universally at the building interiors at the outside corners. This view shows the painted joint and stucco. The paint did not effectively seal the joint from water accumulating in the lower joint pocket and leaking out at the butt edges—first onto the WRB and eventually into the interior.

### Detail 3

uncontrolled moisture intrusion from water that is intercepted by the joint, collected in the lower pocket, and which then travels horizontally to leak at ends and corners. Also, upper metal accessories that do not provide continuous weepage contribute to the failures by collecting moisture and exacerbating the condition by trapping moisture in the wall system, which travels horizontally to leakage points.

Existing installations utilizing the #40 two-piece expansion joint should be remediated by the application of a backer material and sealant along the entire length of the expansion joint to prevent moisture from penetrating into the lower pocket and into the wall (Detail 3). 

### REFERENCES

- 1 Daniel Lemieux and Paul Totten, "Building Envelope Design Guide — Wall Systems," *Whole Building Design Guide*, Wiss, Janney, Elstner, Associates, Inc., updated 10/08/10, www.wje.com.
- 2 Chris Arnold, "Seismic Safety of the Building Envelope," *Whole Building Design Guide*, Building Systems Development, Inc., updated 11/18/09.
- 3 Gary Maylon, "Expansion/Control Joints: The Most Controversial Metal Lath Accessory," *Walls and Ceilings*, 12/1/03, www.wconline.com.

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