

From the desk of:

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April 08, 2015

White Paper on Control Joints submitted to the ASTM C-11 Committee

Introduction:

This white paper is being prepared by the author addressing the current provisions for the installation of control joints. The author has included the relevant sections from the current ASTM standards that apply during the installation of control joints and subsequent plaster embedment. Age has few benefits, but one is the ability to witness proven field techniques and policies of numerous plasterers over many decades. The author has spent his entire life in the plastering trade, from hands on installation to application design. The statements and contentions made by the author herein are of his best belief and are offered with 40 years of personal experience along with the expert training and vast experience of those plastering tradesmen who initially taught me – to them, I am forever grateful. May all of them whom have passed on rest in peace...

Cited Standards:

From ASTM 1063:

Authors note: Provisions *italicized* are subject to issues of this white paper, non-italicized text sections were included for contextual continuity and inclusion in later discussions.

7.10.1.5 Lath shall not be continuous through control joints but shall be stopped and tied at each side.

7.11.1 General—All metal accessories shall be installed in such a manner that flanges and clips provided for their attachment are completely embedded in the plaster.

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7.11.4 Control Joints-General —Control joints shall be formed by using a single prefabricated member or fabricated by installing casing beads back to back with a flexible barrier membrane behind the casing beads. The separation spacing shall be not less than 1/8 in. (3.2 mm) or as required by the anticipated thermal exposure range and shall be in conformance with 7.10.1.5.

7.11.4.1 Control Joints—Control (expansion and contraction) joints shall be installed in walls to delineate areas not more than 144 ft² (13.4 m²) and to delineate areas not more than 100 ft² (9.30 m²) for all horizontal applications, that is, ceilings, curves, or angle type structures.

7.11.4.2 The distance between control joints shall not exceed 18 ft (5.5 m) in either direction or a length-to-width ratio of 2 1/2 to 1. A control joint shall be installed where the ceiling framing or furring changes direction.

7.11.4.3 An expansion joint shall be installed where an expansion joint occurs in the base exterior wall.

7.11.4.4 Wall or partition height door frames shall be considered as control joints.

From ASTM 926:

5.1 Metal bases and accessories used to receive plaster shall be installed in conformance with Specification C 1063, except as otherwise specified.

Executive Summary:

It is the position of the author that the current ASTM control joint standards (*italicized, supra*):

1. Were never developed from any scientific, engineering or tested standard – rather they were arbitrarily decided on a “best guess” or “seems-a-reasonable” basis.
2. Were regionally applicable when developed and never intended to replace proven methodologies that had evolved in differing climate zones.
3. When applied to installations in hot and humid climates with high winds zones, create far more damage than they avert.

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4. That when applying Portland cement Plaster for Wind or Seismic Shear Resistance (per Table 2306.3(3); 180 plf) or Fire Resistance (per Table 722.2.1.4(2); 25 minute)^a as a code compliant design consideration, control joints must be specified out of the plane of the plaster since the testing modules that promulgated tabulated code data did not contain the component.

5. It is the position of this author that the current standards for control joints contained at 7.11 be moved to a newly created non-mandatory Annex section of the ASTM C-1063 standard. This would allow professionals to apply regionally proven methodologies, which may result in the elimination of control joints altogether or the use of different; joint control devices, joint methodologies or components that serve the stucco installation specifically for the wall system, wall covering, cladding or decorative cementitious finish selected.

Current Modification Provision and Need for Non-Mandatory Annex:

The ASTM C-926 standard provision found as 5.1; (Metal bases and accessories used to receive plaster shall be installed in conformance with Specification C 1063, **except as otherwise specified.**) has served as a saving grace in elimination of the control joints by allowing them to be specified out or altering their installation methodologies. Relying on this exception, however, remains problematic since subsequent home inspectors and others who claim to be “knowledgeable” in the application of metal lath and stucco cite their omission or alterations as a “violation” of the standard and thereby a violation of the “Code”.

Florida Statute 553.84 states in part: ... “Notwithstanding any other remedies available, any person or party, in an individual capacity or on behalf of a class of persons or parties, damaged as a result of a violation of this part or the **Florida Building Code**, has a cause of action in any court of competent jurisdiction against the person or party who committed the violation; however....

^a The values shown are typical for 7/8 cement plaster over expanded wire lath and taken from the 2012 International Building Code. Similar information is found in the International Residential Code but was not shown for brevity.

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Since deviations from the standards (allowed pursuant to 5.1 *supra*) are being cited as de facto violations of the Florida Building Code, moving these provisions to a non-mandatory section will not only serve for a better product installation, it will prevent such de facto claims made by those strictly reading the text without background or understanding.

Historical Standard Discussion:

The ASTM Standards C-926 and C-1063 evolved from initial regional methodologies performed largely in a previous era. This of course is not entirely negative in that the standard mostly served its region (and some other regions) well. The initial standard did not factor long-established practices that were regionally specific (specifically in hot and humid climates). Additionally (and correct for most construction during initial development) the standard was written based upon open framing configurations where the stucco served not only as a cladding - but the wall system itself; resisting lateral wind forces and providing shear and sometimes fire resistivity to the final product making it a self-sufficient wall system assembly unto itself.

The standard, however, has failed to adapt to the quickly changing construction market and the application of new (or revamped) product lines. Florida, like most other regions, used open framing (with “let-in” 1x4 diagonal strips) and some type of solid backing as a base for the installation of metal lath for years. However in 1993, the Southern Building Code Congress International published the first edition of the SS TD 10 – 93 (Standard for Hurricane - Resistance Residential Construction) which governed construction in high wind regions such as Florida. Virtually all subsequent wall construction in Florida became Type II restrained shear wall assemblies (whereby the shear wall is constructed entirely of structural wood panels from top plate to soleplate as opposed to Type I which is segmented shear wall sections).

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The then current ASTM C-26 and C-1063 standard did contain provisions for “solid backing” (and did use the term “sheathing” in one paragraph). However, structural wood panels are different. Structural wood panels are specifically defined in the code as plywood or similar wood panel material that are rated (listed and labeled) to assure specific qualities (such as withdrawal values) as published in the National Design Standards (NDS) and other specific requirements. In other words, structural wood panels are, in fact, solid backing; but solid backing is not structural wood panels - the gate only swings one way.

This is important because it brought about some modifications of the methodologies for attachment of metal lath and accessories not contemplated in the original standard for open framing or solid backing (which has no attachment nor structural value whatsoever). Specific mention of control joints and structural wood panels will occur later in this writing.

The standard was also developed using the application process whereby the stucco not only provides the wall covering system itself, but additionally provides the finished color coat to the wall. The cement plaster could: remain its natural color (using either gray or white Portland cement); be tinted with dyes to obtain different color bases or hues such as tan, buff, brown, green, white etc.; or simply painted to provide the desired aesthetic appearance. Such painting would not be considered a component of the assembly or factored for any specific property since its application was (and remains so today) entirely optional and unnecessary.

There was no provision in the ASTM Standard (then or now) that factor(s) an exterior face barrier system. Rightfully so, the standard was not written for inclusion of such separate system at the time of its development and, rightfully so, remains devoid of such considerations or provisions today.

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The standard, with its installation methodologies was written largely prior to the widespread acceptance and use of any specific “mortar or stucco mixes”. The established plaster mix (up until the mid-and late 1970s) was the jobsite mixing of Portland cement with lime or other type of plasticizer to give the cement workability. Premixes for stucco-specific applications were relatively new to the market. Many plasterers today still prefer to mix their own stucco mix using the traditional method of Portland cement and plasticizer placed over metal lath installed by plasterers / lathers with regional knowledge using selective regional deviations from the C-926 and C-1063 provisions. These plasterers consistently produce a product that performs with tremendous success, usually avoiding the common pitfalls we see in today’s litigation based upon misapplication, misunderstanding or strict compliance with the ASTM provisions - especially those involving control joints.

Discussion by Individual ASTM C-1063 Section:

7.10.1.5 Lath shall not be continuous through control joints but shall be stopped and tied at each side.

This provision was founded upon the belief that the lath would need to be discontinuous behind the installation of a control joint. The theory is that breaking the lath is necessary in order to allow the control joint to independently contract on each side of its vertical axis. This application might serve for specific installations such as suspended ceilings installed on channels and runners where the ceiling independently floats, but has no applicability in a vertically plastered wall assembly having its base metal lath restrained by vertical fasteners at each stud.

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Consider the application of this theory to a vertical wall application whereby the studs are spaced 16 inches horizontally on center. The metal lath is vertically attached to the studs, placed 16 inches horizontally, 7 inches vertically, on-center. Assuming the control joints are spaced 18 feet on center, the tributary area served by a control joint would be 9 feet horizontally on each side. One side of the tributary area would yield vertical attachment into at least six studs on each side. Using an 8 foot high wall, this will yield 84 fasteners per side affixing the lath to the vertical framing ($96 \div 7$)x6 studs = 84).

We therefore must assume (at minimum) that sufficient contraction forces will be generated to horizontally break the fastener attachment of 84 fasteners before the forces would transmit to the control joint to begin accumulation in order to initiate joint movement. If such force exists, the continuous expanded metal lath behind the joint would not remain un-deformed. It would itself stretch or deform by contorting its pockets. The result would be readily seen from the back side. We will see, however, that this is not the case at all. (later photograph)

Of course, we know the aforementioned force does not exist - the relatively weak tension force of a cement stucco plaster is insufficient to shear the attachment at 84 fasteners. That is why breaking the lath behind the control joint is not only a provision without any scientific or established merit, it is one whereby thousands of plasterers in the field have refused to do without any adverse effect whatsoever.

Accordingly, the thought process used to rationalize the unnecessary provision for breaking the lath behind the control joint also exposes the non-necessity of the control joints themselves within the stucco assembly. Many plasterers have routinely specified these control joints completely out of their installation by using the provision found at ASTM C-926 - *5.1 Metal bases and accessories used to receive plaster shall be installed in conformance with Specification C 1063, except as otherwise specified.*

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This “*except as otherwise specified*” exception has allowed plasterers, such as myself, to specify the control joints out of the wall assembly; thereby preventing the numerous potential problems associated with their installation. Additionally, it allows the designer who is using code-published shear or fire wall assembly data to preserve the integrity of that data ensuring a safe structure.

John J. Bucholtz (sadly who we lost in November 2008) was an Engineer who specialized in stucco applications. His publications “Techniques and Comments” remain a wealth of information, practical knowledge and research data for the plastering profession. His writings contained several control joint articles, but his Publication Number 227 summarized most of the important the topical contents of his other articles. The following information has been extracted from Publication 227:

“CONTROL JOINTS - THE TRUE STORY (Bucholtz – Volume 227)

A lot of people involved in the business of building are nuts about control joints in stucco installations. "Ya gotta have 'em." If they ain't there, it's a "construction defect." Really? What is the purpose of control joints? There are several valid ones like aesthetically dividing large areas into smaller panels. Or creating an artificial plane of weakness in the plaster so that any stresses will dissipate at the control joint and not somewhere else.

They can also serve as screeds to help make a large wall plumb and level using a straight-edge (a magnesium rod 10~feet long that is scraped across the plaster brown coat). These control joints are often referred to as "expansion joints." This they are not. Take a #15 control joint and just try to "expand" it. No way. The words "control joint" mean "control" of the application as it proceeds. Not after the plaster has set and hardened.

Control joints are installed by the lather. They should always be expanded flange, wire-tied to the lath itself. Control joints are a function of the lath/plaster assembly - not a function of structure. Fastened to framing, to form stipulated areas, what happens when framing moves? Control joints move with the framing and can jeopardize integrity of plaster.

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But out of a hundred KIA's, 99 will say this is a lot of bull; that everyone knows control joints prevent cracking in stucco. How so? Or could it be wishful thinking on their part?

First, CONTROL JOINTS DO NOT PREVENT CRACKS IN STUCCO.

Second, CONTROL JOINTS CREATE REAL SOURCES OF WATER INTRUSION.

Third, CONTROL JOINTS ARE A SHEER WASTE OF MONEY WHEN INSTALLED TO CONFORM TO SOME MYTHICAL DIMENSION THAT HAS NO BASIS IN FACT.

There has been not one nickel's worth of research or scientific investigation of the need for control joints to prescribe given areas. Today the formula is that they should be placed to form panels of 100 or 144 square feet.

And lath is to be "cut" at control joints. If an expanded flange control joint is used, what is the purpose of cutting the lath? Plaster thickness will be uniform since it has no solid flange to limit thickness of plaster at that point.

What's the source of this information? While serving as technical director of CPLIA (Contracting Plasterers and Lathers International Association), at an executive board meeting in Mexico City many years ago, I had a conversation with the gentleman who originated the dimension fetish.

I asked him where he got the measurements of 144 sf for panels proscribed for control joints. He replied that the figures he published in the MLA specifications "seemed reasonable."

I asked what testing or research had been done to arrive at the measurements. He responded, "none." I diplomatically commented, "that's kind of dumb, isn't it?" He haughtily said no. It should work. Based on what? Just a great notion?

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Well, over the 30 plus years since, the control joint issue has become almost "legend." There is agreement today because it's the least course of resistance and very few people want to "rock the boat." It even went so far as to be included in an ASTM standard. All based on speculation and the original "it seems reasonable" theory with no scientific proof or support. I still think it's "dumb."

All the foregoing will get the trees shaking simply because logical fallacies have a life of their own and supporters of the fallacies. But it's about time to think about these things more deliberately than has been so far demonstrated. What is so puzzling is the response of those who know little about stucco resorting to ill comments to prove their logical fallacies.

"Control joint abuse" is the only name that can be given to the way these devices are used in stucco applications. Particularly a source of potential trouble is terminating control joints at window corners."

Cracking of Control Joints - Installation Maladies:

The chronic statements proffered when cracks are found along the control joints are usually as follows; the metal lath was not discontinuous behind the control joint leading to such cracking; the control joint was not tied to the metal lath leading to such cracking; the control joint was incorrectly placed over the metal lath leading to such cracking; the control joint was placed behind the metal lath and attached to the substructure leading to such cracking; etc...

There are common denominators in all of the accurate diagnoses of the conditions leading to such cracking alongside a control joint. They differ somewhat from standard expanded flange metal control joints and short flange plastic control joints. The author will attempt to demonstrate these differences by way of the following examples.

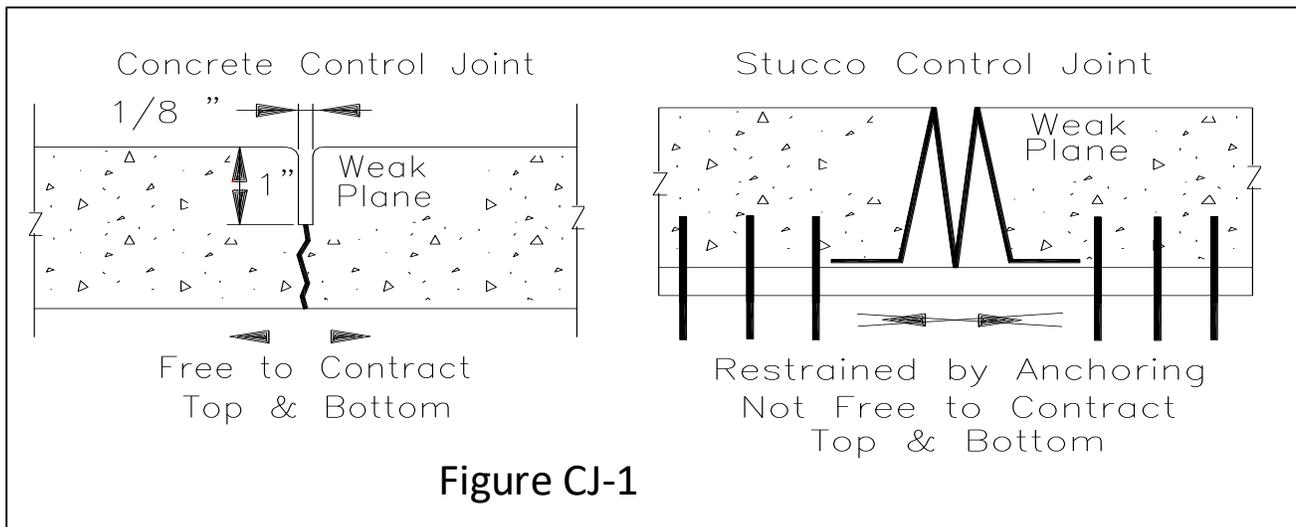
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Metal Lath Not Discontinuous Behind Control Joint:

The premise for this requirement is founded in the belief that if the metal lath remains continuous, it will restrain the body of the stucco preventing its contraction from initial shrinkage. In other words, the stress forces generated by initial setting (and subsequent cycles) are collected and transmitted to the control joint where there is a “weak plane” through the body of the stucco which will concentrate at the control joint which will contract or expand. Furthermore the continuous lath will prevent (or inhibit) the contraction or expansion ability of the joint.

The relatively weak tensile forces of contracting stucco are simply not capable of such collective forces on a restrained lath and stucco assembly. Additionally, they do not expand to any appreciable value that would cause compression of the joint.

Those who maintain this position generally analogize this shrinkage with the control joints cut in concrete sidewalks. There is an important distinction between these two comparatives; a concrete sidewalk is not restrained along its bottom (base) plane allowing it to shrink or contract through its entire mass thus allowing the control joint to become the “weak link.” The planar mass of the plaster panel however is not free to “slip” along its base. Please refer to figure CJ-1 below.



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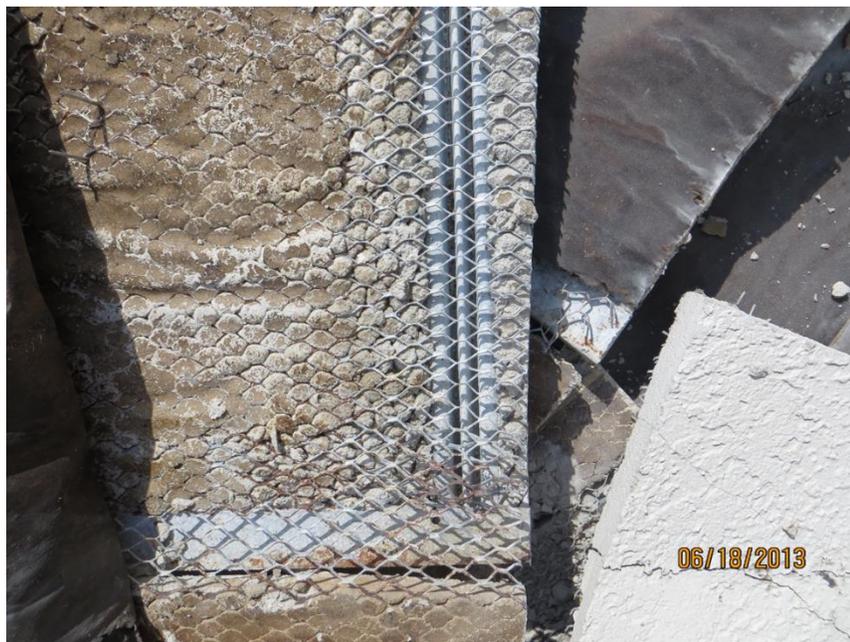
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Note the left hand graphic in Figure CJ-1 represents a concrete control joint; it is free to contract entirely through its mass, sliding on its bottom over its stone or sand bed. The figure on the right is more representative of a cement plaster control joint. The vertical bars represent the restraining points of the lath attachments. Although not to scale, perspective you can see that the body of the cement plaster mass is not free to slide along its bottom. In order for it to contract it would literally have to hinge along the bottom becoming wider at the top. The author is not aware of any such behavior properties of cement or cement plaster.

Accordingly, what difference would it make if the lath was discontinuous behind the control joint or not? The plane of the stucco is firmly anchored to the framing studs. If stucco contracts it cannot "slide" along its base - it would have to contort, which we know is not plausible. As for stresses collecting and causing a fracture along the expansion joint, the author is not necessarily taking issue with that possibility. That collection of stresses, however, has nothing to do with whether the lath is discontinuous or not.



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The photo above shows a cutout section of continuous lath behind a control joint. The section is 10 years old. Note there are no stress deformities or anomalies behind the joint. It performed perfectly, even though it lacked complete embedment along its flanges. The author possesses hundreds of photos like-in-kind from his files and has never seen an actual photo depicting any abnormalities from continuous lath in the southern United States.

Cracking along Metal Control Joints (expanded flange)

The photographs below will demonstrate the author's previous position that it is the installation maladies that result in joint failure.



The above photos show the classic example of placing the expanded flange behind the metal lath without removal of the paper backing. The lathers informed us that this was the required methodology since the inspector had told them that the lath must be discontinuous, i.e., that the expanded flange must go on first and the lath be abutted against it. This is somewhat understandable given the ambiguous nature of the Standards provisions regarding control joints, but would NEVER get by an experienced lather.

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Plastic Control Joints (short flange):

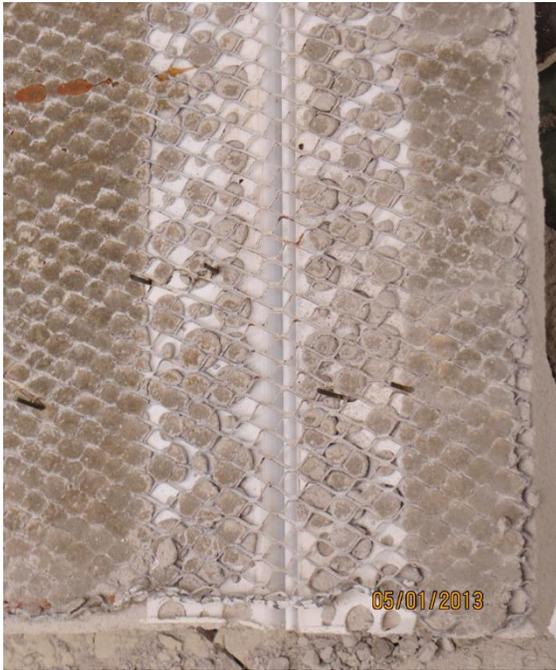
Plastic (used here in the generic term for PVC or vinyl) control joints create their own unique set of problems. By nature they need to be short flange and are extremely difficult to be made to comply with 7.11.1 of the C-1063 standard; "... that flanges and clips provided for their attachment are completely embedded in the plaster." The photos below depict this difficulty (and others) along with subsequent cracking of the control joint lines which are now admitting water to the substrate'



The photos above show the plastic control joint suffering the same fate as the expansion control joint - in order to make the lath discontinuous, the control joint was installed first and the paper lapped over.

The next photos depict the inability to completely embed a plastic control joint with a short flange control joint fully into the plane of the plaster. This problem manifests itself whether the flange is over or under the metal lath. Oftentimes the plaster will just fall away from the flange when cut along its edges.

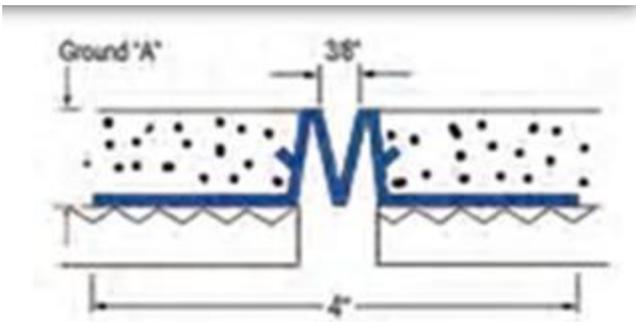
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The photographs on the next page were provided to me by a highly respected Florida home inspector and contractor. They depict the frustration of diagnoses; the photo on the left clearly shows cracking along the plastic control joint. Upon removal of the stucco, the condition revealed that paper had not been placed over its flange - yet it still cracked. I pointed out that the manufacturer's own instructions shows the control joint placed over the lath and completely embedded in the stucco body. We saw previously however, that that is not possible. This has led many to require (when plastic control joints are used) that the flange be attached to the structure first and the lath then abutted against it. This, of course, makes the control joint a function of the structure rather than a function of the stucco assembly and inhibits the embedment of the flange in the body of the plaster.

Additionally, plastics have a much higher coefficient of expansion than cement plaster; 0.000028 of an inch/inch/degree Fahrenheit vs. 0.0000070 of an inch/inch/degree Fahrenheit, respectively.^b

^b Master Wall, Inc. - MW# 148- -0 01 10104 Topic: Thermal Movement in Building Components
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This is the manufacturer's installation profile. Note that the flange is on top of the metal lath without any consideration of how to get the plaster through the flange hole and "completely encase" the flanges.

It is additionally contended that if these flanges are attached too "tightly" stresses will accumulate in the framing and transfer through, causing a crack along the control joint.

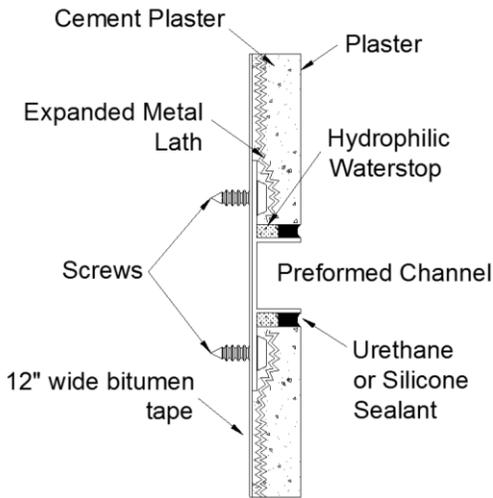
Attaching plastic short flange corner beads is therefore extremely problematic. They cannot effectively be attached to the face of the wire lath since they lack an expanded flange. They cannot be placed in back of the lath and attached to the wall since it violates the provisions of the standard. Regardless of their placement they cannot effectively be fully encased in the body of the stucco. Therefore, they remain one of the major sources of litigation. Therefore, many plasterers and specifiers in the southern region simply specify them out of the stucco assemblage without any negative effects or cracking in the plane of the plaster.

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Control Joints that Work:

The author has been using (or specifying out) control joints, especially on residential construction, for over 30 years without any difficulties either way. When specifically requested to include on residential construction, the author has always installed them over continuous lath, attaching them sparingly with pan head lath screws. These applications were in the Southeastern United States and have performed historically without problem.

On commercial applications, however, the detail shown below should be considered:



Using this control joint methodology the water intrusion line (usually where the stucco abuts the control joint flanges) is eliminated. This detail initially derived from repairing control joints by saw cutting kerfs along their edges, installing a backer rod and applying a urethane or similar sealant. The detail then evolved into the above shown configuration for new construction processes. The initial separation trough is accomplished by the plasterer using a 5/16 inch wide job-made cutting tool alongside the vertical leg, thereby eliminating the cement plaster, thus creating a void. A dampened soft bristled brush smoothes the edge and consolidates the stucco at its corners allowing for sealant to be later tooled to an even, blended transition. Done properly the sealant is not noticeable resulting in a most attractive and serviceable control joint.

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Structural Wood Panels:

In areas where the framing is covered with solid structural wood panel sheathing, some interesting and alternate methodologies become available and have been in use for many years regarding the application of metal lath, accessories and stucco. The author will limit his discussion to the application of control joints over such structural sheathing.

The conventional wisdom is that the control joint should be tied to the lath so that it remains independent of the structure, i.e., the control joint becomes a function of the plaster assembly and not the structural assembly. This certainly has merit when one considers the origin of the standard using open framing (or open framing covered with nonstructural backing). *If the flanges were to be attached to the structure*, additional stud work would have to be installed for flange attachment. This direct attachment could lead to a reasonable postulation that the additional framing members necessary to attach the flanges might transfer collected structural stresses, leading to excessive or unexpected cracking along the joint.

It has been a well-established practice in our region to apply expanded flange metal control joints over the expanded metal lath and attach them with pan head lathing screws. These screws are used sparingly and are only “snugged” up to the flange face. The idea is to place enough screws to hold the control joint in place during the application of the plastering process. On Type II shear wall construction stresses are distributed throughout the entire structural panel plane as part of the anticipated load path for the main wind force resisting system. Accordingly, direct attachment (if sparing and not over-torqued) will not transmit collective stresses since these stresses are being distributed throughout the structural panel assemblage and are distributed equally upon all metal lath attachment points. It is the opinion of the author that this is why we have had complete success with this methodology as described.

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This is not been the case with short flange plastic control joints. These joints lack expanded flange assembly and cannot be completely “keyed” into the body of the cement plaster. Additionally, the coefficient of expansion is much greater on plastic than surrounding components. I believe this is an inevitable weakness in plastic control joints being used as a successful component in exterior cement plaster applications.

Conclusion:

The proper use, application, and maintenance of control joints is a complicated issue that must factor: the region of installation; the location of the installation within that region; the type of construction materials; design attributes of the structure; coatings and sealants that will be used, and subsequent maintenance protocols. Oversimplifying this to a single set of text installation requirements is not possible. The proof lies in the fact that we have had this “single set” concept and it has caused countless thousands of dollars of litigation and has caused a smudge on the reputation of fine quality cement plaster installations as a whole.

I also understand the emotions and wrangling of opinions that will accompany any change in the installation of control joints. For this reason, I believe we should leave the current text standards and suggest that we create a non-mandatory annex (just as contained in the ASTM C – 926) and move the provisions to that section. This will accommodate all of those who have been using the methodology successfully to continue, while allowing others to design their own job and region-specific changes.

We are losing more and more stucco opportunities to Hardi-Plank and other types of siding simply because it is now being held that stucco just simply does not work anymore - that it is a guaranteed litigation source. I believe there’s a good deal of truth in this statement and that most of this is caused from having to adhere to standards that are not region-specific and that adoption of the standards by code has led to a gold mine for litigation generators and inspectors who do not understand plastering or plastering standards citing “violations” that oftentimes are causing no harm whatsoever.

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Respectfully submitted,

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Additional Information and Comments That Follow are Added for Informational Value:

Article from Jeff Bowsby, CCS, CCCA - Scratching the Surface with Stucco Control Joints

This is an excellent article and well thought out. However I would like to offer the following comments for consideration. Mr. Bowsby quotes Mr. Pruter from the Construction Specifier: "In the design of control and expansion joints the architect should consider Portland cement plaster in the same way as they would a pane of glass. Glass is never installed without relief in all directions and the same should apply to plaster." This author concurs in theory but not in practical application. A pane of glass remains free to expand in its gasketed receiver channel on all four sides. This is never going to be true with current stucco technologies which are restrained throughout its entire body.. So, it would be wonderful to be able to "panelize" stucco sections for unrestrained expansion - but this remains an elusive goal on conventional wall covering systems where the stucco is affixed across and throughout its field.

The results and conclusions of the study are well reasoned and thought out. The results regarding restriction of joint expandability, confirm what has been reasonably expected - that a continuous lath configuration would impose a greater restriction to the ability of a single component control joint's movement when compared to discontinuous lath by and of itself.

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One must be cognizant however that the test involved "jaws" attached to narrow sections of joint mockups - separating them and compiling resistance data and expandability. Two points are noteworthy; First, control joints in the field are attached to lath that is vertically affixed to horizontal studs across the entire panel section. The forces are therefore relieved by those inter-field attachments. Second, the actual tributary area of compiled force acting upon the field joint should be measured in situ. The author believes that the data will show that the force is far less than that required to initiate movement - without regard to any of the possible joint or installation configuration.

The article was accurate and made no conclusions other than reporting and posting the methodology and findings. I found it highly informative and accurate.

Additional Bucholtz Information and Comments: (Excerpts from Publication 236)

CONTROL JOINTS - One of our favorite topics.

This is covered in many back issues of Techniques and Comments.

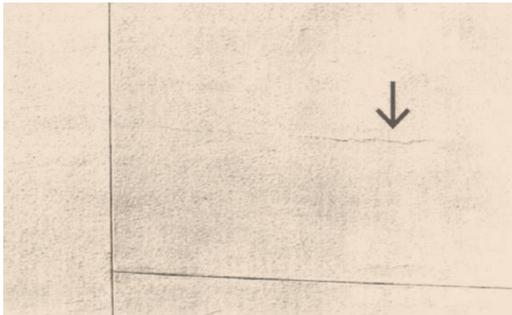
A recent one points out that no research, or testing, has ever been performed to establish parameters for control joints. They do NOT prevent stucco cracking, and this has been shown many, many times with photographs in the newsletter.

In our experience, we had the opportunity to recommend "no control joints" on a large three-story apartment building in central California. The architect and a major builder were astonished, but they omitted control joints. 18 months after construction, we met with the builder and architect who both expressed surprise and thanks. There wasn't a single crack in the huge three-story building despite absence of "control joints."

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Myths are created in lathing and plastering, often from offhand remarks by someone who “has a great notion.” Once the notion gets a measure of agreement, it becomes standard. We are always aware that there are those who disagree, but that's no crime. People have a right to disagree. We can only pray that they will one day recant their disagreement in favor of the real truth about “myths” that they may currently worship as icons.

Excerpts from Publication 209



**CONTROL JOINTS ARE NOT EXPANSION JOINTS -
THEY DON'T PREVENT CRACKS**

This photo taken at an actual job site presents an example of what we've constantly said: “Control joints are no assurance that cracking stucco will not occur.”

This particular job had control joints to prescribe areas no greater than 10 feet in either direction. The applicator was very meticulous and followed plans and specs. Control joints (often referred to by the benighted as “expansion” joints”) failed to prevent the significant crack that appeared. Was it the stucco that failed? NO! It was a concentration of stresses that in magnitude exceeded the strain capacity of the plaster causing a crack at an inherent weak plane, A similar weak plane can be at lath laps.

Inherent Weak Planes

For everyone's information, plaster membranes are replete with inherent weak planes. These are places where thickness of plaster varies. Building papers actually curl when wet plaster is applied, forming high and low areas.

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Each of these is an inherent weak plane in the stucco assembly. All structures generate stresses, more so during and for about six weeks after construction. At the same time, plaster has not developed its ultimate strength, so is very vulnerable to stresses that Would not affect the plaster once it has achieved a good strength level. It achieves this level through hydration of portland cement to a point where the strain capacity is equal to that of the stresses generated. Control joints will not save the day.

MORE ABOUT CONTROL JOINTS

Control joints are a function of the lath/plaster assembly - not of structure. They therefore belong in the lath/plaster assembly and should not be fastened to structural members. Doing so restrains them and plaster then acts independently of control joints. Control joints — sorry to say should be expanded flange joints wire tied to lath. Lath should NOT be broken at control joints. The only time this is necessary is when those solid flange control joints are used.

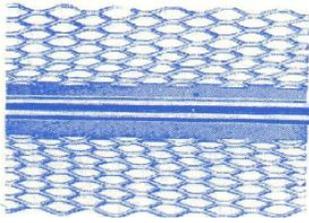
If lath is not placed over solid flanges, cracks are inevitable over the solid portion of the control joint. Expanded flange control joints, on the other hand, when wire tied to lath, permit plaster to pass through the flanges to form a monolithic membrane. Wire tied to lath, as the plaster goes, so does the control joint. The expanded flange was here first, anyway, and someone figured a solid flange that could be rolled would be just as good. This reflects un-familiarity with the nature of stucco, and once having gained a foothold it's like a lot of other notions - incurable.

Where lath and plaster are utilized for shear value, cutting lath nullifies any shear value afforded. It's the lath that provides shear, not the plaster.

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We can hear the dissenters to these ideas now. They can conjure up a hundred reasons why our information is faulty. But it reminds of the fact that if everyone thought the same, only one would be needed. But as always, there are those who will believe what they want to believe.

LITTLE DIAGRAMS AND STUFF



If you didn't know, this is an expanded flange CONTROL JOINT. You couldn't "expand" one of these things with brute force! Placed over lath, there's nothing to obstruct application of plaster through the keys. This contrasts with solid flange devices that require all sorts of machinations to place them. Goofy things, like cutting lath at all "expansion" joints (sic).



Now Look At This "Expansion Joint" This is what we call the "ostrich device." Why? Because people think that because its two pieces that move independently of each other, it is somehow going to achieve miracles in "expansion/contraction." Our question, as always, is "what moves, where does it move from, and where does it move to?" Ever since this device appeared many years ago we've had questions about its efficacy. If it is used, lath must be cut, because plaster over the metal will develop cracking.

TWO GREAT MYTHS ABOUT STUCCO ARE PERSISTENT AND INACCURATE

The second myth — control joints - is about as absurd as anything one can imagine. It is a matter of record and plenty of observations that many installations with control joints as close as 8-feet in both directions have resulted in excessive cracking, while on the other hand, large expanses of stucco (in some cases up to 4,000 square feet) have **no control joints and no cracking!**

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