

approved underlayment over an approved substrate, to be used as the temporary roof. This temporary roof can serve to protect the interior of the building during the early stages of construction. It may then be removed or repaired, if necessary, and can be left as an underlayment prior to the installation of the finished Firestone roof system. The maximum allowable time a Firestone approved underlayment can be exposed without application of metal roof system is 42 days.

3. If roof insulation is installed under the temporary roof, the insulation shall be inspected for wet or damaged areas, so that such areas may be removed and replaced prior to installation of the Firestone metal roof system.
4. When a temporary roof is specified as using an underlayment, precaution shall be exercised in protecting the temporary roof from other construction trades. Damage to the temporary roof may impair its effectiveness as an underlayment. If the underlayment is installed as a temporary roof during construction, the underlayment shall be examined, and if necessary, repaired to ensure watertight integrity prior to installation of the remainder of the roof system.

1.03 UNDERLAYMENTS



The determination of the necessity and location for a vapor retarder in addition to an underlayment or an air barrier are project specific requirements, which is the responsibility building owner or his design professional. The proper assessment of the building, the need for and the proper design of the air barrier, vapor retarder and may be critical to the long-term operation of the roof system.



Firestone does not review or calculate dew point analyses and therefore does not accept responsibility for damage due to recurrence rate or location of the dew point.

The inclusion of an air barrier or vapor barrier may affect the Underwriter overriding code rating of the roof system.

The inclusion of an air barrier or vapor barrier may affect the Firestone system requirements and consequently the Firestone warranty. Contact the Roof System Solutions Group at Firestone Building Products prior to application of the proposed system.

1. Underlayment Design:
 - a) The roof system designer is generally responsible for the design requirements of the roof deck, underlayment, vapor retarder and rigid insulation. The need for a vapor retarder underlayment, as well as the type, placement and location of any vapor retarder should be determined by a professional architect or engineer. The list below, are examples of common Firestone approved underlayments for applications.

TABLE 1.03-1
APPROVED UNDERLAYMENTS
ALL SLOPES ≥ 3:12

Self-adhering Type	Cetco StrongSeal HT	Grace Ultra	Tamko TW Metal & Tile Underlayment	Tarco Leak Barrier PS 200 HT
TENSILE STRENGTH	25 lbF/in. ASTM D 2523	250 psi ASTM D 3767	35 lbF/in. ASTM D 1970	MD 32-38 lbF/in. CD 26-30 lbF/in.
ELONGATION	>80% ASTM D 2523	250% ASTM D 41	40% ASTM D 1970	N/A
LOW TEMP-FLEXIBILITY	Unaffected @ -20° ASTM D 1970	Unaffected @ -20°F ASTM D 1970	Pass @ -15°F ASTM D 1970	Pass @ -20°F ASTM D 1970
ADHESION TO PLYWOOD	5 lbs./in. @ 75°F 4 lbs./in. @ 40°F	3.0 lb./in. width ASTM D903	15 lb/ft width ASTM D 1970	30 lbs./in. @ 75°F 18 lbs./in. @ 40°F
PERMEANCE	0.01 Perm ASTM E 96	0.05 Perms (max.) ASTM E 96	0.05 Perms (max.) ASTM E 96	0.1 Perms. Or less
HIGH TEMP. RESISTANCE	300°F	240°F	250°F	260°F
NAIL	YES	YES	YES	YES

SEALABILITY				
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**TABLE 1.03-1
APPROVED UNDERLAYMENTS
ALL SLOPES ≥ 3:12
(CONTINUED)**

Self-adhering Type	Bakor Blueskin PE 200 HT	InterWrap Titanium - PSU	PolyGlass Polystick MU	Protecto Wrap Rain Proof 40-60
TENSILE STRENGTH	600 psi min. ASTM D 412	147 lbs. ASTM B 226	25 lbF/in. ASTM D2523	1400 psi
ELONGATION	250% ASTM D 412	25% composite 300%+ asphalt	10% ASTM D2523	500% min.
LOW TEMP-FLEXIBILITY	Pass @ -43°F ASTM D 1970	Pass @ -32°F	Pass @ -32°F	N/A
ADHESION TO PLYWOOD	850N/m ASTM D 903	5.7 lbsf/in. ASTM D903	18 lbs./in. @ 75°F 5 lbs./in. @ 40°F	YES
PERMEANCE	0.05 Perms (max.) ASTM E 96	0.05 Perms ASTM E 96	0.01 Perm (max) ASTM E 96	N/A
HIGH TEMP. RESISTANCE	230°F	230°F	260°F	N/A
NAIL SEALABILITY	YES	YES	YES	N/A

**APPROVED UNDERLAYMENTS
ALL SLOPES ≥ 5:12 (SEE NOTE BELOW)**

Not Self-adhering Underlayments only	Sharkskin Ultra (Min slope of 5/12)	Cetco Duck's Back (Min slope of 5/12)	Grace Tri-Flex 30 Slip Sheet Only (Min slope of 5/12)	Titanium Wrap-UDL (Min slope of 5/12)
TENSILE STRENGTH	MD 122 lbs. CD 106 lbs.	20 lbs./in. ASTM D2523	20 lbs. ASTM D 1938	MD 143 lbs. CD 80 lbs.
ELONGATION	N/A	>100% ASTN D2523	45% ASTM D 828	MD 23% CD 20%
LOW TEMP-FLEXIBILITY	Pass @ -32°F	Unaffected @ -20°F ASTM D 1970	Pass @ -60°F ASTM D1970	Pass @ -70°F
ADHESION TO PLYWOOD	Not Self-adhering	Not Self-adhering	Not Self-adhering	Not Self-adhering
PERMEANCE	0.059 perms. ASTM E 96-00	0.04 perm ASTM E 96	0.54 perms ASTM E 96	0.06 perms. ASTM E 96-00
HIGH TEMP. RESISTANCE	230°F	230°F	N/A	212°F
NAIL SEALABILITY	YES	YES	NO	YES

Note: Synthetic underlayments noted above are acceptable for greater than 5" per foot slope with a self-adhering underlayment at all edges, ridges, hips, baseflashings, valleys and penetrations. Refer to the NRCA Roofing and Waterproofing Manual for specific requirements for self-adhering underlayment location requirements.

b) The roof system designer must:

- Assure that the methods of attachment of the selected underlayment to the roof system substrate is acceptable to the underlayment selected. Sometimes primers are required.

- Assure that the underlayment is compatible with the metal of the roof system selected.
- Assure that the underlayment will extend continuously and evenly throughout the roof plane to provide a complete seal against the intrusion of moist air from the building interior. Integration and compatibility of the wall and roof air retarder systems is essential
- Consider the effect of construction moisture on a new roof system, particularly during winter, when temporary gas heat is required

B. MOISTURE CONTROL:

1. The roofing contractor is responsible for ensuring that the substrate is suitable to receive a Firestone Metal roof system. All damaged and/or wet substrate must be dried, removed and replaced prior to the application of the Firestone metal roof system.
2. A moisture survey should be conducted to determine the moisture content of any roof system component prior to starting in anticipation of wet areas.
3. Three techniques are currently available to evaluate the roof by indirect / non-invasive means. Results of these studies must still be correlated with roof cores. These techniques provide measurements of factors that can be associated with the presence of moisture.
 - Nuclear moisture detection
 - Infrared thermography
 - Electric capacitance

1.04 SUBSTRATE AND SUBSTRATE REQUIREMENTS

A. GENERAL:

1. The Firestone Metal roof system depends on a suitable substrate to perform its intended function of weatherproofing the building.



It is the roofing contractor's responsibility for ensuring that the substrate is acceptable for the Firestone metal roof system.

2. The substrate to which the Firestone roof system is installed must:
 - Be continuous and monolithic
 - Be structurally sound
 - Be dry, smooth, flat and clean
 - Be free of sharp fins, or foreign materials that could damage the roof system
 - Meet the minimum requirements for the system performance being installed
 - Not be out of plane more than 1/4" (6.35mm) in 10' (3048mm) in any direction

B. FASTENER/ PULLOUT REQUIREMENTS:

1. Substrates for insulation attachment are required to provide sufficient pullout resistance for the fasteners and roof system.
2. In the case where the structural deck does not meet the minimum fastener pullout requirements contact the Roof System Solutions Group at Firestone Building Products

**Table 1.04-1
The Minimum Fastener Pullout Resistances For Insulation Attachment**

System	Minimum Fastener Resistance
Metal Roof Systems with mechanically attached insulation	300 LBS. (136.1 KG) Minimum Pullout Contact the Roof System Solutions Group at