

Conklin Company Inc.

TECHNICAL BULLETIN

B-10-23-73
Roof Loads

Designed Roof Loads

Follow the design parameters outlined in sections 15 and 16 of the International Building Code when re-roofing or retrofitting a building. Several sections of these codes are over looked and this negligence is the cause of many issues. Roof system failure, structural deflection and roof collapse are a few of these issues. Two of the most common factors that can affect a roof's structural integrity are: Ponding Water and Excess Roof Layers. Ponding Water adds weight to a roof and can cause deflection, freeze thaw damage and catastrophic roof failure. Exceeding two layers of roofing can add 50 – 70 Lbs. per 100 square feet and this extra weight adds stress to the original dead load design. Conklin Roofing Systems require ICC, IBC, NRCA and SPFA regulations to be followed at all times.

Ponding Water

One pint of water weighs one pound (1.04 Lbs./pint). One gallon of water weighs 8.34 pounds and cubic foot of water contains 7.48 gallons. The weight of one cubic foot of water is 7.48 gallons times 8.34 pounds, which equals 62.42 pounds of water per cubic foot.

International Building Code

Section 1604 Live Loads

1604.6.2 Rain loads shall be designed for in accordance with the following:

1. Roof drainage systems shall be designed in accordance with the International Building Code.
2. Roofs shall be designed to preclude instability from ponding loads.
3. Each portion of a roof shall be designed to sustain the load of all rainwater that could accumulate on it if the primary drainage system for that portion is blocked. In determining the load that could result should the primary drainage system be blocked, the load caused by the depth of water (i.e., head) needed to cause the water to flow out of the secondary drainage system at the rate required by chapter 11 of the Florida Building Code, plumbing shall be included. Ponding instability shall be considered in this situation. If the overflow drainage provisions contain drain lines, such lines shall be independent of any primary drain lines.
4. Roofs equipped with controlled drainage provisions shall be equipped with a secondary drainage system at a higher elevation which prevents ponding on the roof above the design water depth. Such roofs shall be designed to sustain all rainwater loads on them to the elevation of the secondary drainage system, plus the load caused by the depth of water (i.e., head) needed to cause the water to flow out of the secondary drainage system. Ponding instability shall be considered in this situation.

Conklin Company Inc.

TECHNICAL BULLETIN

B-10-23-73
Roof Loads

Slope and Drainage Requirements

NRCA recommends built-up, polymer-modified bitumen, single-ply and liquid-applied roof membrane assemblies be designed to provide positive drainage. The NRCA Roofing Manual: Membrane Roof Systems—2011 states: “The criterion for judging proper slope for drainage is that there be no ponding water on the roof 48 hours after a rain during conditions conducive to drying.” Many building codes have a slope requirement for membrane roof systems. International Building Code,[®] 2012 Edition (IBC 2012) Section 1507—Requirements for Roof Coverings states all membrane roof covering systems except coal-tar built-up roofs have a design slope minimum of one-fourth unit vertical in 12 units horizontal (2 percent slope) for drainage. Previous IBC editions have the same requirement. For reroofing, though IBC 2012 requires materials and the application method used for re-covering or replacing an existing roof covering meet the same requirements for new construction, there is an exception in Section 1510—Reroofing that states reroofing shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2 percent slope) in Section 1507 for roof systems providing positive roof drainage. Previous IBC editions have the same requirement.

Re-Roofing

International Building Code

Section 1511 Reroofing

1511.1 General

Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15.

Exceptions:

1. Roof replacement or roof recover of existing low slope roof coverings shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 for roofs that provide positive roof drainage.
2. Recovering or replacing an existing roof covering shall not be required to meet the requirement for secondary (emergency overflow) drains or scuppers in Section 1503.4 for roofs that provide for positive roof drainage. For the purposes of this exception, existing secondary drainage or scupper systems required in accordance with this code shall not be removed unless they are replaced by secondary drains or scuppers designed and installed in accordance with Section 1503.4.

1511.2 Structural and Construction Loads

Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system. (See table #1)

Conklin Company Inc.

TECHNICAL BULLETIN

B-10-23-73
Roof Loads

1511.3 Roof Replacement

Roof replacement shall include the removal of all existing layers of roof coverings down to the roof deck.

Exception: Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507.

1511.3.1 Roof existing roof coverings.

3. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 1511.4.

4. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear off of existing roof coverings.

1511.3.1.1 Exceptions

A roof recover shall not be permitted where any of the following conditions occur.

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

Recover

The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

1. Where the new roof covering is installed in accordance with the roof covering manufacturer's approved instructions.
2. Complete and separate roofing systems, such as standing-seam metal roof panel systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require removal. (See table #2)

Roof Loads

Dead loads are static forces that are relatively constant for an extended time. They can be in tension or compression. The term can refer to a laboratory test method or to the normal usage of a material or structure.

Live loads are usually unstable or moving loads. These dynamic loads may involve considerations such as impact, momentum, vibration, slosh dynamics of fluids, etc.

Conklin Company Inc. TECHNICAL BULLETIN

B-10-23-73
Roof Loads

Table #1

Load Types

Loads used in design load equations are given letters by type:

D = dead load

L = live load

L_r = live roof load

S = snow load

W = wind load

E = earthquake load

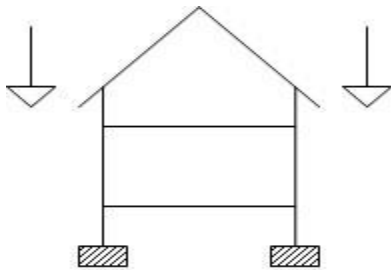
F = hydraulic loads from fluid

H = hydraulic loads from soil

T = effect of material & temperature

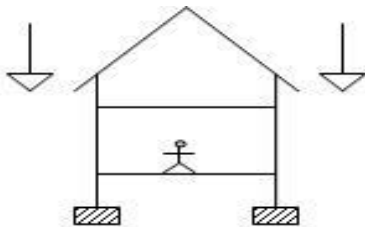
R = rainwater load or ice water load

Live and Dead Loads



Dead Loads - 1603.1

Weights of materials and construction: In estimating dead loads for purposes of design, the actual weights of materials and constructions shall be used, provided that in the absence of definite information, values satisfactory to the building official may be assumed. For information on dead loads, see Appendix A.



Roof Live Loads - 1604.6.1

The design roof live loads shall take into account the effects of occupancy and water but shall be not less than the minimum roof live loads as set forth in Table 1604.6.

Roof Live Loads - 1604.6

The building official is authorized to require an engineering analysis or a load test, or both, of any construction whenever there is reason to question the safety of the construction for the intended occupancy. Engineering analysis and load tests shall be conducted in accordance with Section 171

Conklin Company Inc. TECHNICAL BULLETIN

B-10-23-73
Roof Loads

Table #2

Typical Roof Weights			
Product	System	LBS. Per sq. ft.	LBS. Per Square
Tar and Gravel	3 Ply BUR Smooth	2 - 4	200 - 400
	3 Ply BUR Ballasted	6 - 12	600 - 1200
	4 Ply BUR Smooth	3 - 12	300 - 1200
Single Ply Membranes (Includes 1" Board stock)	45 Mil EPDM-Loose Laid Rock Ballasted	9 - 15	900 - 1500
	60 Mil EPDM-Loose Laid Rock Ballasted	10 - 15	1000 - 1500
	45 Mil EPDM Mech. Fastened	0.5 - 1.0	50 - 100
	60 Mil EPDM Mech. Fastened	0.5 - 1.0	50 - 100
	45-60 Mil CSPE/CPE Mech. Fastened	0.5 - 0.75	50 - 75
	45-60 Mil PVC/CPA Mech. Fastened	0.4 - 0.5	40 - 50
Liquid Coatings (Includes 1" of 2.7 LB. Foam)	Silicone w/ Granules	0.5 - 0.8	50 - 80
	Urethanes	0.3 - 0.5	30 - 50
	Acrylics	0.3 - 0.5	30 - 50
	Urethanes/Acrylics w/ Granules	0.8 - 1.5	80 - 150
Conklin Systems (Includes 1" Board Stock)	Benchmark	0.6	60
	Rapid Roof III	0.6	60
	PUMA XL	0.6	60
	Fabric Reinforced	0.7	70
	MR Systems	0.3	30
	Flexion	0.4 - 0.5	40 - 50