ZONOLITE

BRAND

VERMICULITE

systems of

LIGHTWEIGHT CONSTRUCTION

ZONOLITE COMPANY • 135 South La Salle Street • Chicago 3, Illinois

A.I.A. 3-D-3

ZONOLITE

BRAND

VERMICULITE

what it is

Zonolite brand vermiculite may be simply defined as a form of mica that expands when heated. Strip-mined in Montana and South Carolina, it is shipped to over 40 processing plants in the U.S., Canada and other countries, where the expansion process takes place. The material emerging from the expanding furnace is light in weight, fireproof, and relatively inert. It is comprised of many dead air cells which give the product inherent insulating properties. Being mineral, Zonolite vermiculite will not rot, mildew, or deteriorate.



Magnified view of vermiculite granule after expansion.

what it is used for

In the building industry, vermiculite's chief uses are as lightweight aggregates in plaster and concrete; in acoustical material; as a loose-fill insulation; for refrigeration insulation; in pre-cast roof tile; for high-temperature cement; and as an insulating material around underground heated piping.

aggregate requirements for lightweight construction

The tremendous growth of lightweight construction calls for study of the basic materials used in this type building. Vermiculite is one of these.

1 **light weight** Structural steel requirements are greatly reduced when a light weight material replaces concrete or plaster made from heavy aggregate.

2 **insulation value** One inch of insulating concrete has a "U" value equal to 12 to 16 inches of structural concrete. This permits sizeable reduction of thicknesses in many types of construction.

3 **durability** The chief precaution in the selection of a lightweight aggregate with respect to durability should be the relative inertness of the material and its lack of chemical reaction to binders with which it will be used.

4 **gradation** Maintenance of proper gradation and quality control is one of the single most important attributes of good lightweight aggregate.

5 **economy** Initial cost of light weight aggregate, as with most building materials, should be taken into consideration. However, the more important economy factor is the record of performance of the aggregate, its adherence to quality standards, and the integrity and service of the manufacturer behind the product.

6 **flexibility** Recent research developments in connection with lightweight aggregates reveal that densities, insulation value, and strengths of lightweight materials can be controlled and varied over a wide range of design requirements. A lightweight aggregate should provide this flexibility.

7 **incombustibility** Most aggregates are inherently incombustible. Variations in fire resistive ratings may occur, however, when aggregates are combined with portland cement, gypsum, or other materials. A good lightweight aggregate should meet the highest possible standards for fire-safe construction of walls, ceilings, floors, etc.

how Zonolite Vermiculite meets these requirements

Zonolite aggregates have earned the name, "Light-weight Champion", through 20 years of reliable performance. Recent outstanding structures employing Zonolite products include Lever House in New York City, which won the AIA Gold Medal Award; the Prudential Insurance Company building in Chicago; and Denver's highest building, the new Denver Club.

Zonolite Stabilized Vermiculite Concrete Aggregate makes concrete weighing 25 to 45 pounds per cubic foot. Mixes and physical properties may be varied according to the requirements of the job.

Typical "U" values for various thicknesses and mixes of Zonolite Concrete are shown in the tables elsewhere in this folder. A roof deck consisting of a 1:4 mix of Zonolite Concrete, (one bag of portland cement and one bag of Zonolite Concrete Aggregate), over paper-backed welded wire lath, has a "U" value of 0.15 for a 3 inch thickness, as an example.

Zonolite Plaster provides a hard, durable wall and ceiling surface, tough but resilient. Zonolite Concrete is impervious to attack from vermin or rodents, and is highly resistant to deterioration from water leakage or chemical fumes.

Zonolite aggregates conform to ASTM Specification for Aggregates — C35-52T for plaster and C33-49 for concrete. Zonolite aggregate is regularly subjected to the re-examination service of Underwriters' Laboratories.

In addition to its competitive initial price, Zonolite aggregate delivers a plus value to users, which should not be overlooked in the initial choice of an aggregate. Zonolite Plaster and Concrete Aggregates provide uniformly high yield, whether placed by hand methods or through machine placement methods. The long-term record performance of Zonolite in big and small jobs is the final measure of economy.

The possible variations of systems of construction offered by the combination of a cementing material and Zonolite cannot be equaled by any other material offered to the architect, engineer, and builder.

Zonolite vermiculite has been accorded the highest attainable fire ratings in tests by many outstanding laboratories. A complete summary of fire tests on various systems of construction is contained on pages 10 and 11. Vermiculite itself has a fusion point in excess of 2500 degrees.

index

PAGE

Aggregate Requirements 2, 3

Lightweight Roof Construction 4, 5

Lightweight Ceiling-Wall Construction 6, 7

Lightweight Floor-Wall-Partition Construction 8, 9

Lightweight Fireproofing Construction 10, 11

Product Specifications 12, 13

Application Specifications 14, 15

Available Technical Bulletins 16

List of Sales Offices 16

ZONOLITE

ZONOLITE POURED CONCRETE ROOF DECKS

The possible combinations of materials in lightweight Zonolite roof construction are innumerable. Zonolite Concrete roof decks may be used in conjunction with many existing forming materials to provide roof decks with many benefits.

advantages

- Roof systems involving Zonolite Concrete are extremely light in weight as shown in the table of weights with the various systems on the right.
- Good "U" values are obtainable with these systems, as shown in the tables. A 4 inch thickness of 1:4 Zonolite Concrete over form board (see Fig. 4) has a "U" factor of .12.
- These roof systems are designed to cover a range of from two to four hour fire protection.
- Zonolite roof decks are designed to carry a 50 pound load with a safety factor of 5.
- These decks consist of portland cement and Zonolite aggregate, which will not burn, rot or decay.
- Systems involving decks without form boards usually have an underside appearance which is entirely acceptable. Form boards, where used, offer a variety of finishes to meet the demands of the architect.
- Cost of in-place Zonolite roof decks is low. Savings in steel often are possible, adding to the economy.
- The variety of possible systems employing Zonolite is limitless. Any type of ceiling construction and finish can be used in conjunction with the roof designs at the right.

ZONOLITE POURED CONCRETE ROOF INSULATION

The permanent insulating benefits of a Zonolite Concrete fill-type roof have been provided on many of the best known large structures built in recent years. In addition, many small commercial, industrial, and institutional buildings employ Zonolite for roof insulation.

Zonolite Concrete may be used as roof fill over a variety of surfaces including concrete, steel, corrugated iron, wood, or other materials.

advantages

- Zonolite fill-type roofs combine good insulating properties with suitable strength.
- Cants, crickets, and saddles are easily formed with Zonolite Concrete and may be poured monolithically with the roof itself.
- Zonolite Concrete forms a highly suitable base on which to lay built-up roofing.
- Zonolite Concrete roofs are monolithic, providing a uniform, joint-free surface.
- Zonolite Concrete is fireproof and cannot rot or decay.

ZONATILE PRECAST CONCRETE ROOF DECKS

Zonatile is a reinforced lightweight roof slab developed for installation over bar joists and bulb tees. It combines insulation and structural strength. Each Zonatile measures 18 inches wide, 36 inches long, and 3 inches in thickness. The approximate weight is 10½ pounds per square foot. Zonatile has an insulation "U" value of .22, and consists of mineral or inorganic materials. It is permanent, rotproof, and fireproof.

The underside of each Zonatile is finished with an attractive swirl effect so the tile may be left exposed if desired.

details

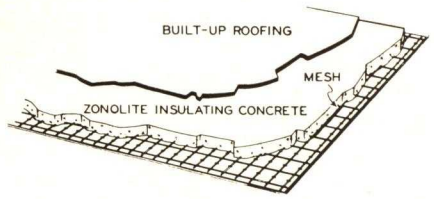


Fig. 1 — Zonolite Concrete over paper-backed welded wire lath.

Paper-backed lath should be stretched taut over steel members before placement of Zonolite. When concrete is poured, paper-backing falls away from lath, embedding wire in Zonolite Concrete.

ZONOLITE THICKNESS	RECOMMENDED SPAN	"U" VALUE*	WT. LBS./ SQ. FT.
2"	32"	.28	6.21
2½"	32"	.25	7.67
3"	36"	.22	9.13
3½"	36"	.20	10.59
4"	36"	.18	12.05

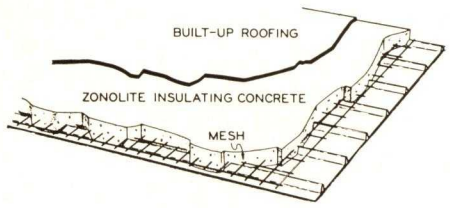


Fig. 5 — Zonolite Concrete over metal deck.

Metal decking, as produced by a number of manufacturers, forms another suitable base for light-weight insulating Zonolite Concrete.

1:6 MIX

ZONOLITE THICKNESS	"U" VALUE*	WT. LBS./ SQ. FT.
2"	.26	10.29
2½"	.22	11.32
3"	.19	12.37

1:4 MIX

ZONOLITE THICKNESS	"U" VALUE*	WT. LBS./ SQ. FT.
2"	.30	11.83
2½"	.26	13.29
3"	.23	14.75

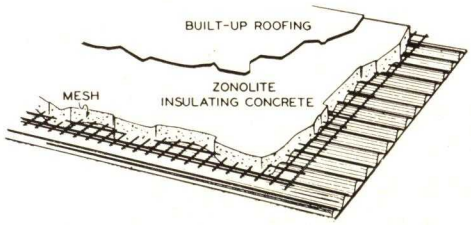


Fig. 2 — Zonolite Concrete over corrugated metal deck.

Clips are frequently employed with corrugated metal decks which provide an air space between the sections of corrugated metal, this air space serving as a vent after the concrete and built-up roofing have been installed.

ZONOLITE THICKNESS	RECOMMENDED SPAN	"U" VALUE*	WT. LBS./ SQ. FT.
2"	36"	.29	7.02
2½"	36"	.25	8.48
3"	36"	.22	9.94
3½"	36"	.20	11.40
4"	36"	.18	12.85

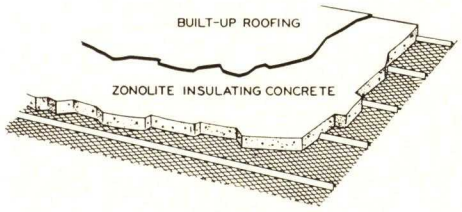


Fig. 3 — Zonolite Concrete over ribbed metal lath.

High-ribbed lath, is another type structural frame over which thousands of square feet of Zonolite concrete have been applied. Standard built-up roofing is employed over any Zonolite deck.

ZONOLITE THICKNESS	RECOMMENDED SPAN	"U" VALUE*	WT. LBS./ SQ. FT.
2"	24"	.30	6.23
2½"	24"	.26	7.69
3"	24"	.23	9.15
3½"	24"	.20	10.61
4"	24"	.18	12.07

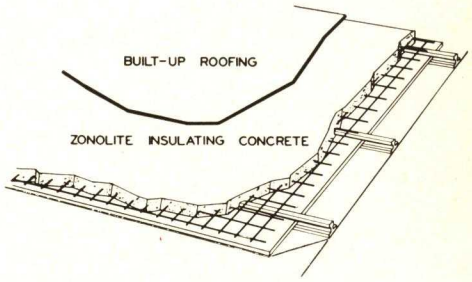


Fig. 4 — Zonolite Concrete over board forms.

Zonolite Concrete may be poured over a variety of board forms such as ¼ inch cement asbestos board, ½ inch gypsum board, or 1 inch rigid insulating form board. Three tables below show properties for various supporting forms.

ZONOLITE THICKNESS	RECOMMENDED SPAN	"U" VALUE*	WT. LBS./ SQ. FT.
2"	32¾"	.29	9.53
2½"	32¾"	.25	10.99
3"	32¾"	.23	12.45
3½"	32¾"	.20	13.91
4"	32¾"	.18	15.37

Over ¼" Cement Asbestos Board

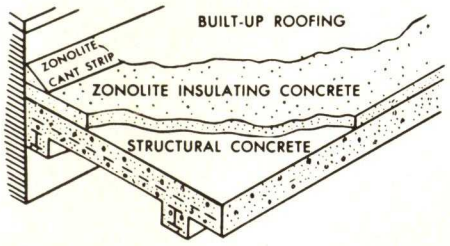


Fig. 6 — Zonolite Insulating Roof Fill over structural concrete.

Where Zonolite is poured over existing structural decks for insulation a 1:6 mix* may be employed for higher insulating value. In addition to concrete, Zonolite Roof Fill Insulation has been used over steel, corrugated iron, and wood. Where poured over materials subject to excessive expansion or contraction, such as wood decks, a slip-sheet of treated paper is first laid down to prevent bond of the insulating concrete to the deck.

*NOTE: In Southern states and other areas where the temperature during the pouring and curing period is 50 degrees F. or above, a 1:8 mix may be employed (1 cubic foot of portland cement to 8 cubic feet of Zonolite Stabilized Concrete Aggregate).

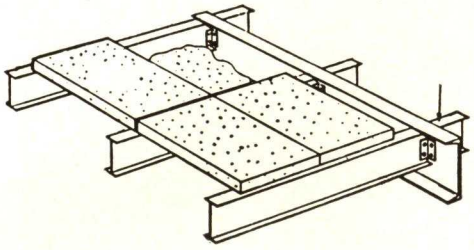


Fig. 7 — Zonatile Precast Concrete Roof Tile over bulb tees.

Zonatile, described in the column at the far left, may be applied over sub-purlins and rail sections, or over standard structural members. Over joists or purlins, the tile are anchored with a special clip. Joists spacing is 3 feet on centers.



Fig. 8

ZONOLITE THICKNESS	RECOMMENDED SPAN	"U" VALUE*	WT. LBS./ SQ. FT.
2"	32¾"	.27	7.83
2½"	32¾"	.24	9.29
3"	32¾"	.21	10.75
3½"	32¾"	.19	12.22
4"	32¾"	.17	13.66

Over ½" Gypsum Form Board

ZONOLITE THICKNESS	RECOMMENDED SPAN	"U" VALUE*	WT. LBS./ SQ. FT.
2"	32¾"	.16	8.52
2½"	32¾"	.15	9.92
3"	32¾"	.14	11.44
3½"	32¾"	.13	12.90
4"	32¾"	.12	14.36

Over 1" Rigid Insulating Formboard

*NOTE: "U" values based on the following densities of Zonolite Concrete:

1:4 mix	35 p.c.f
1:6 mix	25 p.c.f
1:8 mix	20 p.c.f.

ZONOLITE

ZONOLITE PLASTER FOR CEILINGS AND WALLS

In plaster, Zonolite aggregate replaces sand or other aggregates, and is combined with gypsum and water. Zonolite Plaster Aggregate is packaged in lightweight four cubic foot bags. Complete data and specifications are contained on pages 13 and 15.

advantages

- Zonolite aggregate for plaster is a standard uniform material that meets rigid ASTM Specifications. The product is uniform wherever purchased.
- Zonolite aggregate weighs less than one-tenth as much as sand, which it replaces. In plaster, Zonolite aggregate eliminates tons of dead weight in a building. Lightness results in easier application.
- Fire tests involving over 30 different types of construction with Zonolite aggregate have been conducted by recognized national laboratories. Zonolite Plaster regularly provides highest attainable fire ratings.
- Zonolite Plaster has a "K" value of .95, giving it about 3½ times more insulating value than ordinary plaster. It supplies additional insulation to walls and ceilings, to minimize the possibility of condensation.
- Zonolite Plaster is easily applied by hand or machine methods. It is non-abrasive — won't damage machines.
- Zonolite Plaster is backed by over 20 years of successful application in major buildings. It was the first lightweight aggregate material and is the largest selling brand of lightweight aggregate in use today.

ZONOLITE ACOUSTICAL PLASTIC FINISH CEILING

Zonolite Acoustical Plastic combines high sound absorption with maximum fire protection. Available in two colors, natural buff or off-white, Zonolite Acoustical Plastic is conveniently packaged in two-and one-half cubic foot bags, which require only the addition of water to prepare the material for use.

advantages

- Zonolite Acoustical Plastic sticks to any clean, firm surface such as brown coat plaster, exposed concrete ceilings, oil painted surfaces, etc.
- Various textures are easily obtained with Zonolite Acoustical Plastic, through trowelling or stippling, or through the use of plaster placing equipment.
- Irregular surfaces are easily sound treated with Zonolite Acoustical Plastic.
- Hand applied Zonolite Acoustical Plastic has a noise reduction coefficient of 0.65 for ½" finished thickness, as tested by a nationally known laboratory, placing it among the best sound-absorbing materials.
- Zonolite Acoustical Plastic is proved by Underwriters' Laboratories to be incombustible. In addition, it protects underlying combustible materials.
- In many cases, Zonolite Acoustical Plastic has proved to be the most economical noise reducing material that can be applied. It often permits sound-conditioning to be used where other materials would be prohibitive in cost.
- This sound-conditioner is easily applied by hand or machine application methods. Zonolite Acoustical Plastic does not set chemically so unused mix may be left standing overnight.

details

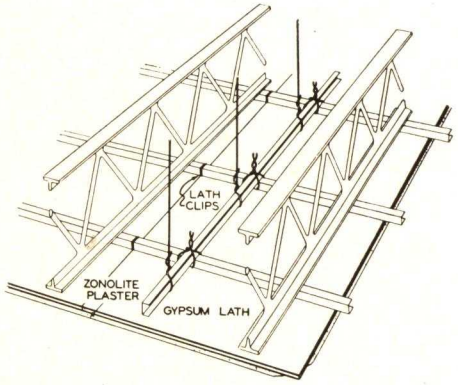


Fig. 9 — Hung ceiling Zonolite Plaster on Gypsum Lath.

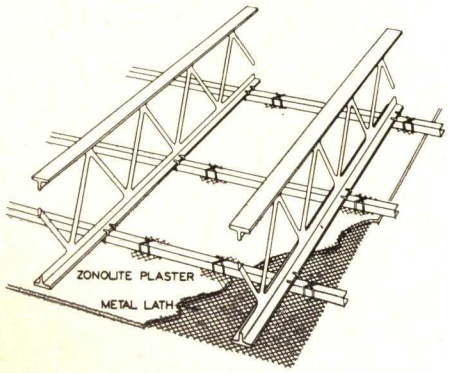


Fig. 11 — Furred ceiling Zonolite Plaster on Metal Lath.

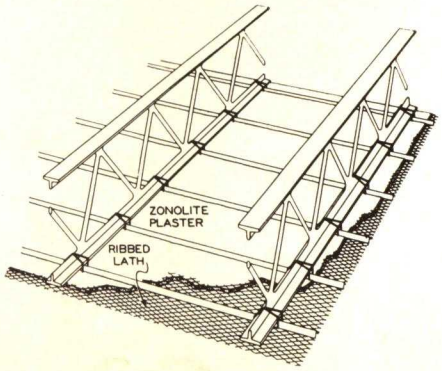


Fig. 13—Attached ceiling Zonolite Plaster on Ribbed Metal Lath.

COMPLETE VERSATILITY OF DESIGN AND CONSTRUCTION

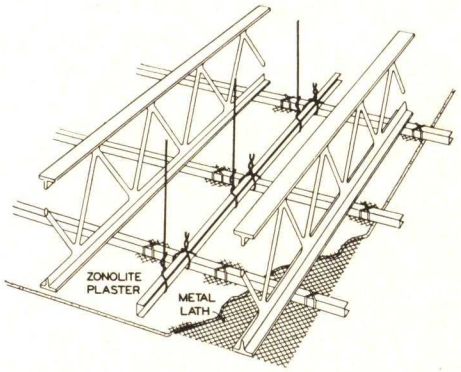


Fig. 10 — Hung ceiling Zonolite Plaster on Metal Lath.

At the left are six representative types of ceiling construction, which provide the fire safe advantages to be found in Zonolite Plaster. These are only representative, of course. Zonolite Plaster may be applied over any acceptable lath base under any type of framing member.

The architect has at his disposal an endless variety of systems of construction with Zonolite Plaster and Concrete Aggregates. Any of the ceiling constructions shown here may be used together with any of the roof assemblies shown on pages 4 and 5. The choice is left to the preference of the architect and designer. With Zonolite Plaster in the ceiling construction and Zonolite Concrete in the roof, all of the advantages previously discussed are realized in one assembly.

The addition of Zonolite Acoustical Plastic as shown in Figure 14 affords maximum sound conditioning at very little additional cost. Many of these systems of construction have been fire tested by leading laboratories and accorded outstanding fire ratings. Representative fire tests are shown on pages 10 and 11.

PLASTER FINISH COATS

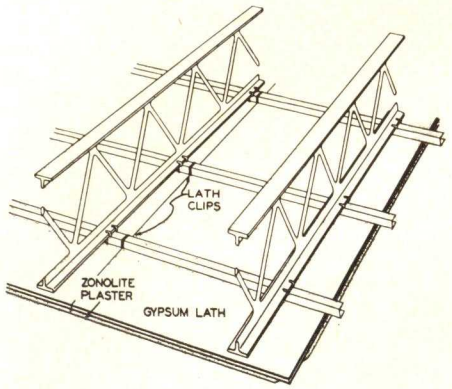


Fig. 12 — Furred ceiling Zonolite Plaster on Gypsum Lath.

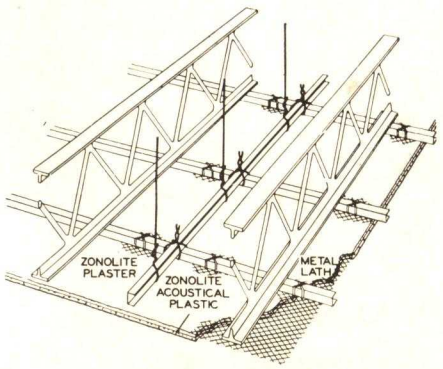


Fig. 14 — Hung ceiling Zonolite Plaster and Zonolite Acoustical Plastic on Metal Lath.

Zonolite base coat plaster as used in walls and ceilings may be covered with a wide variety of finishes. For complete instructions consult, "Standard Specifications for Vermiculite Plastering", Vermiculite Institute, March 1954.

Finishes include: *Gypsum Lime Putty Trowel Finish* MIXED in the proportions of one (1) part of gauging plaster (calcined gypsum) to not more than three (3) parts of lime putty by volume.

Keene's Cement-Lime Putty Finish may be medium hard or hard finish.

*Medium Hard Finish shall be mixed in the proportion of 100 pounds of Keene's cement to not more than 50 pounds of dry hydrated lime. When mixed mechanically the water shall be put in the mixer first; then the lime, the sand, if used, and finally the Keene's cement.

*Hard Finish shall be mixed in the proportions of 100 pounds of Keene's cement to not more than 25 pounds of dry hydrated lime. When mixed mechanically the water shall be put in the mixer first; then the lime, the sand, if used, and finally the Keene's cement.

Keene's Cement — Lime-Sand Float Finish shall be mixed in the proportions of 2 parts of lime putty, 1½ parts of Keene's cement, and 4½ parts of sand by volume.

Prepared Finishes shall be mixed with water to the proper consistency in accordance with the manufacturer's directions.

Zonolite Vermiculite Finish Coat shall be mixed in the proportions of 100 pounds of unfibered gypsum plaster or gypsum gauging plaster to one (1) cubic foot of Zonolite vermiculite Finish Aggregate. The plaster shall be placed in water and mixed. Zonolite vermiculite Finish Aggregate shall then be added and the material *thoroughly mixed*. More water should be added to obtain workable consistency.

Note–For best results, the mixed plaster should have a setting time of 1 to 3 hours.

Zonolite Acoustical Plastic may be applied over any Zonolite Plaster base coat. Specifications are shown on page 15.

*Note–To either of the above proportions may be added 10 pounds of fine white sand for each 100 pounds of Keene's cement.

ZONOLITE

ZONOLITE POURED CONCRETE FLOOR SLABS AND FILL

Zonolite vermiculite Concrete Aggregate may be used two ways in insulating floor construction. In one case, this aggregate completely replaces sand and gravel in the concrete mix, resulting in an extremely lightweight product called, Zonolite vermiculite Insulating Concrete. In its other application, called Zonolite Vermiculite-Sand Concrete, Zonolite aggregate is used *together with sand* to form a light weight concrete floor or fill over structural metal or concrete floors.

advantages

1. ZONOLITE VERMICULITE INSULATING CONCRETE:
- High insulation value, one inch being equal to twelve to sixteen inches of ordinary concrete.
- Lightweight, only 25-50 pounds per cubic foot, depending on the mix.
- Consistently high yields.
- Easy mixing and application
- Permanence. Zonolite Insulating Concrete is rotproof, verminproof, lasts the life of the building.

2. ZONOLITE VERMICULITE-SAND CONCRETE:
- Approximately 4½ times the insulating value of ordinary concrete.
- ½ the weight of ordinary concrete.
- Elimination of necessity for topping. Asphalt, ceramic tile, carpeting, etc., can be laid directly on surface.
- Resilience approaching wood floors.
- Approximately ½ the thermal capacity of regular sand concrete —temperature of floor ordinarily assumes room temperature.

ZONOLITE INSULATING FILL FOR WALLS AND CEILINGS

Zonolite Insulating Fill is a granular form of vermiculite extensively used in home insulation, commercial and farm buildings, cold storage structures, etc. It pours freely from the bag into attic and sidewall sections, and is extensively used for filling cores of concrete blocks.

advantages

- Zonolite Insulation is completely fireproof.
- Zonolite flows readily around pipes, wiring, braces, or other obstructions. It leaves no voids to leak heat.
- Zonolite Insulation greatly increases insulating efficiency of wall and ceiling sections as shown in figures 19 through 26.
- Zonolite settles to a uniform, tamper-proof density on installation, cannot be fluffed up and will not mat down.
- All mineral Zonolite is rotproof and verminproof.
- Zonolite's extreme light weight contributes to its ease of handling and rapid installation.

ZONOLITE PLASTER PARTITIONS

Zonolite vermiculite plaster partitions may be constructed on either gypsum or metal lath bases, and offer many advantages to architects and owners alike.

advantages

- In every five lineal feet, a two-inch Zonolite partition provides one extra square foot of usable space over conventional partitions.
- Zonolite 2½ inch partitions earn a two-hour fire retardant rating, as compared to one-hour for sand plaster partitions.
- Zonolite plaster partitions provide good sound reduction.
- Zonolite partitions are strong, yet weigh only ½ as much as sand plaster partitions.
- Cost is comparable to conventional partitions plastered on both sides.

details

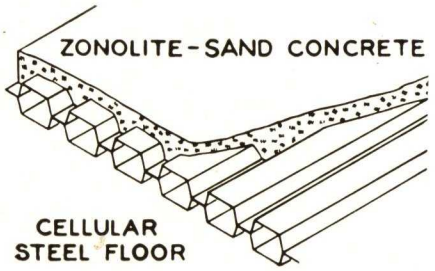


Fig. 15 — Zonolite-Sand Concrete Fill over structural floors.

The proper proportioning of Zonolite-Sand Concrete for all floor applications is 1:3:2 (one cubic foot cement; three cubic feet Zonolite Stabilized Concrete Aggregate; two cubic feet sand). Over steel flooring or reinforced concrete floors, Zonolite-Sand Concrete provides a highly suitable floor fill material. A table of physical properties is shown on page 12, and specifications on page 14.

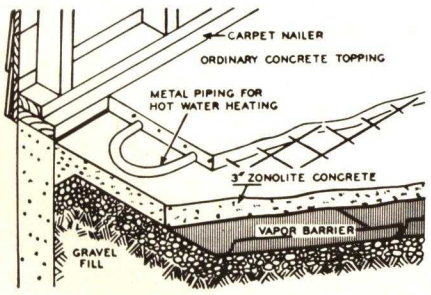


Fig. 18 — Zonolite Insulating Concrete as base for radiant heating coils.

This method of construction provides maximum insulating value essential to economical operation of radiant heating systems. The hard concrete topping is applied to a minimum thickness of 1 inch over the tops of the heating coils. Zonolite floors permit rapid response to thermostatic control, eliminating undesirable "heat lag." Lower water temperatures are needed to bring desired heating results, thus saving fuel. This system is equally adaptable for electric heating systems.

Send for booklet CA-4 "Floor-Slabs and Floor-Fill" which gives complete information on Zonolite vermiculite floor construction.

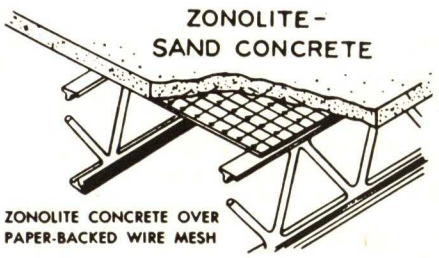


Fig. 16 — Zonolite-Sand Concrete Floor Slabs over closely-spaced joists.

Where joists do not exceed 24 inches on centers, Zonolite-Sand Concrete can be employed as a floor slab over steel, concrete or timber joists. Minimum recommended thickness is 3 inches. Zonolite-Sand Concrete should be used with suitable floor covering. Zonolite-Sand Concrete develops sufficient compressive and indentation strengths to withstand normal traffic loads of light industry or commercial use.

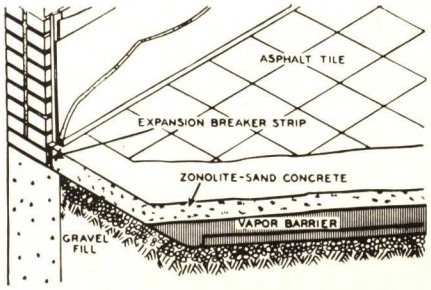


Fig. 17 — Zonolite-Sand Concrete Floors on ground.

The construction above provides a concrete floor with 4½ times the insulating properties of structural concrete. It serves as a suitable base for asphalt tile, ceramic tile, carpeting, or other type floor coverings. It is not recommended that Zonolite-Sand Concrete be left exposed to wear. When required, because of ground water conditions, membrane waterproofing should be applied over the gravel fill base as shown in diagram.

The addition of Zonolite Insulating Fill in typical wall and ceiling sections provides outstanding benefits. "U" values of uninsulated versus insulated sections are shown in the diagrams below.

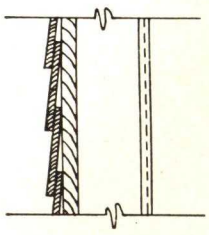


Fig. 19 U = .25
Siding
Building Paper
25/32" Fir Sheathing
Air Space
½" Gypsum Wallboard

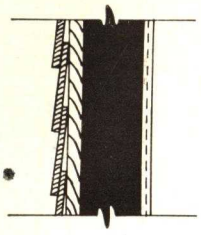


Fig. 20 U = .087
Siding
Building Paper
25/32" Fir Sheathing
3 5/8" Zonolite Insulating Fill
½" Gypsum Wallboard

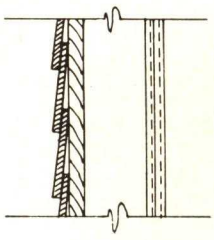


Fig. 21 U = .25
Lapsiding
Building Paper
25/32" Fir Sheathing
Air Space
½" Plaster on 3/8" Gypsum Lath

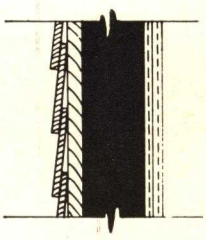


Fig. 22 U = .086
Lapsiding
Building Paper
25/32" Fir Sheathing
3 5/8" Zonolite Insulating Fill
½" Plaster on 3/8" Gypsum Lath

Fig. 23 U = .60
½" Gypsum Wallboard to ceiling joists
Attic Space

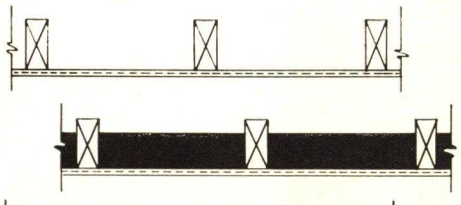


Fig. 24 U = .13
½" Gypsum Wallboard to ceiling joists
3" Zonolite Insulating Fill
Attic Space

Fig. 25 U = .61
½" Plaster on 3/8" Gypsum Lath to ceiling joists
Attic Space

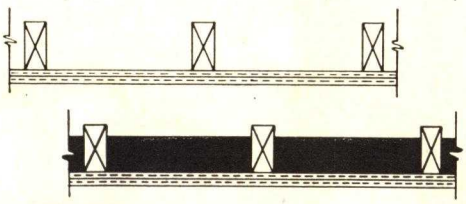


Fig. 26 U = .13
½" Plaster on 3/8" Gypsum Lath to ceiling joists
3" Zonolite Insulating Fill
Attic Space

ZONOLITE CONCRETE SPANDREL WALL CONSTRUCTION

In tests recently completed at Underwriters' Laboratories in Chicago, Zonolite Concrete for spandrel back-up was awarded a five-hour fire rating.

In the tests, Zonolite Concrete was machine-applied to a thickness of 4 inches, with suitable reinforcing as shown in the illustration.

advantages

- Underwriters' Laboratories Retardant No. 3653, Aug. 18, 1954 rates this construction 5 hours.
- 35 pounds per square foot wind loading, more than adequate for multi-story building construction. Compressive strength rated at 700 pounds per square inch.
- The Zonolite wall weighed only 21 pounds per square foot, including steel. Conventional construction weighs 80 to 90 pounds.
- Great savings in structural steel are possible due to weight reduction of Zonolite spandrel construction.
- Zonolite spandrel walls occupy only 50% of the space of ordinary masonry construction. Rentable floor space in commercial buildings greatly increased.
- Up to 3 cubic yards of Zonolite Concrete per hour can be applied by machine methods.
- Construction can be completed from the inside reducing scaffolding costs and providing added safety for workers.
- Construction is monolithic, free of joining, providing added strength and durability, and better interior appearance.
- Zonolite spandrel walls lend themselves to the use of modern facing materials, such as steel and aluminum.
- Interior concrete walls can be plastered, painted, tiled, or finished in any desired manner.
- Where normal masonry spandrel walls have a "U" value of .35, a four inch Zonolite spandrel has a .20 value. An air space in the construction can reduce this value to .17, and plaster reduces it further to .15.

Further details are available on request.

ZONOLITE

PLASTER FIREPROOFING

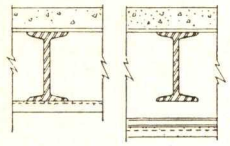
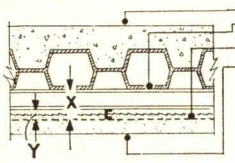
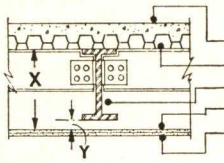
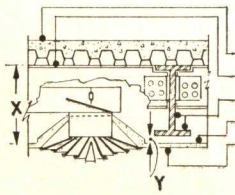
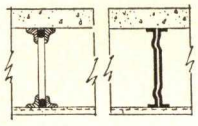
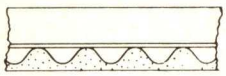
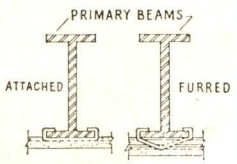
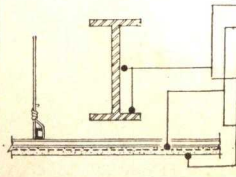
The Mercantile National Bank Building in Dallas, Texas, completed in the early 1940's, was the first major commercial building fireproofed with lightweight aggregates in place of conventional, heavy fireproofing materials. The tremendous savings in structural steel made possible by these lighter weight materials has revolutionized fireproofing practices. Since this first building, innumerable other structures have been fireproofed in this manner. The range of lightweight fireproofing applications extends from columns and beams, to floors, ceilings, trusses, walls, etc. Fireproofing is used to protect structural members from direct attack by fire and to keep the temperature of the members below the critical temperature at which failure is likely to occur, for the duration of the fire.

advantages

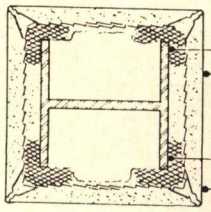
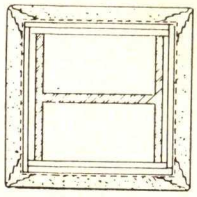
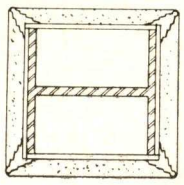
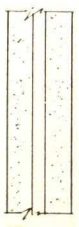
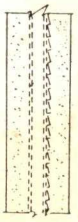
- Protection — The Summary of Fire Tests shown at the right indicates that Zonolite fireproofing has been accorded the highest attainable fire ratings for a wide variety of systems of construction.
- Lightweight—Where structural concrete is used to obtain a four-hour rating as protection for steel beams, the concrete weighs approximately 190 lbs. per linear foot for a 15 inch "I" beam. This same beam protected with lath and Zonolite Plaster weighs about 19 lbs., or 90% less. In the Mercantile Bank Building, weight reduction in the fireproofing materials amounted to over 14,000,000 lbs. (94%), and a saving of 1880 tons (30%) of structural steel in the entire building. Similar weight reductions occur in all types of lightweight fireproofing.
- Space Saving — Because over-all thicknesses of fireproofing materials are reduced, rentable floor space is often increased through Zonolite fireproofing.
- Lower Cost—Fireproofing with Zonolite vermiculite eliminates the cost of the concrete, reinforcing, labor of placing, dismantling forms and providing an additional plaster finish — all of which must frequently be done with conventional fireproofing methods.
- Acceptance — Leading buildings like the AIA Gold Medal Award winning Lever House in New York City, the General Petroleum Building in Los Angeles, and the new Mile-High Center in Denver, are fireproofed with Zonolite Plaster. Building code acceptance of the systems of constructions shown at the right is virtually universal.

partial summary of fire tests

SUMMARY OF FLOOR AND CEILING FIRE TESTS

		CONSTRUCTION	AVERAGE TEMPERATURE AT RATING INDICATED	DESCRIPTION	RATING
FLOOR AND ROOF ASSEMBLIES	STEEL PLATE CONSTRUCTION			2½" sand concrete topping. Attached or suspended ceiling of vermiculite plaster on metal lath. 1" ..... ¾"	4 hrs. 3 hrs.
	CELLULAR STEEL CONSTRUCTION		239°F 796 1009 2000	Minimum of 2" cinder concrete fill. Furred ceiling of ⅞ inch vermiculite plaster over face of metal lath. Distance x = 2¼" or more.	4 hrs.
				Minimum of 2" sand concrete fill. Furred ceiling of 1" vermiculite plaster on metal lath. Distance x = 2" or more.	4 hrs.
			233°F 656 853 913 2000	Minimum of 2½" sand concrete fill. Suspended ceiling of ⅜" vermiculite plaster plus ½" of vermiculite acoustical plastic over the face of metal lath. Distance x = 7¼" or more. Distance y = 2½" or more.	4 hrs.
			266°F 720 837 878 1925	Minimum of 2" sand concrete fill. Suspended ceiling of ⅞" vermiculite plaster over the face of metal lath. Distance x = 15⅜" or more. Distance y = 3½" or more. Ceiling had openings for two duct outlets as shown and for two electrical outlet boxes; aggregate area of openings did not exceed 100 square inches in each 100 square feet of ceiling area. Duct openings protected by fire dampers as shown.	3 hrs.
	STEEL JOIST AND LIGHT STEEL CONSTRUCTION			2½" sand concrete fill. 1" vermiculite plaster on metal lath.	4 hrs.
				2½" sand concrete fill. ¾" vermiculite plaster on metal lath.	3 hrs.
				2" sand concrete fill. ¾" vermiculite plaster on metal lath.	2½ hrs.
	CORRUGATED METAL			Corrugated Steel floor (Cofar) protected by undercoating of Zonolite Acoustical Plastic applied to thickness of ½" below depth of corrugation, and thickness of 2¼" on beams.	4 hrs.
CEILING FIREPROOFING WITH INCOMBUSTIBLE MATERIALS ABOVE	ATTACHED or FURRED			Ceiling of 1" of vermiculite plaster on metal lath attached to or furred from the lower flange of supporting primary beams.	4 hrs.
				Ceiling of ¾" of vermiculite plaster on metal lath attached to or furred from the lower flange of supporting primary beams.	3 hrs.
				Ceiling of ¾" of vermiculite plaster on metal lath attached to or furred from the lower flange of supporting primary beams.	2½ hrs.
	SUSPENDED		975°F 1142 2000	Ceiling of 1" of vermiculite plaster over the face of metal lath. At least 2½" air space between structural members and back of metal lath.	4 hrs.
			853°F 913 2000	Ceiling of ⅝" of vermiculite plaster plus ½" of vermiculite acoustical plastic over the face of metal lath. At least 2½" air space between structural members and back of metal lath.	4 hrs.

SUMMARY OF COLUMN, PARTITION, AND SPANDREL WALL FIRE TESTS

		AUTHORITY	CONSTRUCTION	AVERAGE TEMPERATURE AT RATING INDICATED	DESCRIPTION	RATING	AUTHORITY
COLUMNS	METAL LATH	National Bureau of Standards BMS92—Table 44		785°F 2000	Column protected with 1½" vermiculite plaster over the face of metal lath. Lath spaced 1¼" from column flanges. Space behind lath on flange faces filled with plaster, as shown.	4 hrs.	Underwriters' Laboratories, Inc. Ret. 2851—5/10/49
		Underwriters' Laboratories, Inc. Ret. 2689—12/18/39		802°F 1925	Same protection as above except 1" vermiculite plaster over face of metal lath.	3 hrs.	
		National Bureau of Standards BMS92—Table 45			Same as above, for self-furring lath.		
	GYPSUM LATH	Underwriters' Laboratories, Inc. Ret 2773—11/29/50			Column protected with 1½" vermiculite plaster applied over two layers of ½" thick long length plain gypsum lath wrapped with one layer of hexagonal mesh poultry netting.	4 hrs.	National Bureau of Standards Test 294
		Underwriters' Laboratories, Inc. Ret. 2689—12/13/49 Submitter (floor manufacturer) stopped test at 3 hours. In test of similar floor construction without openings in ceiling (see item No. 3 above) average temperatures at 3 hours were: unexposed surface 190°F cellular floor 700° unexposed side of lath 920° exposed plaster surface 1925°			Same protection as above except 1" vermiculite plaster applied over gypsum lath.	3½ hrs.	
					Column protected with 1" vermiculite plaster applied over one layer of ⅜" thick perforated gypsum lath.	2 hrs.	National Bureau of Standards Test 294
SPANDREL WALL	SPANDREL WALL	National Bureau of Standards BMS92—Table 43			Zonolite Concrete Spandrel Wall back-up machine-applied to 4¼" thickness.	5 hrs.	Underwriters' Laboratories, Inc. 4/8/54
PARTITIONS	GYPSUM LATH	Underwriters' Laboratories, Inc. 5/24/54			1" of vermiculite plaster applied to each face of ½" thick long length plain gypsum lath. No studs. Overall thickness of partition 2½".	2 hrs.	National Bureau of Standards Tests 300 & 301
		National Bureau of Standards BMS92—Tables 43 & 44 and Para. 1, Page 41 & Para. 4, Page 42			¾" of vermiculite plaster applied to each face of ½" thick long length plain gypsum lath. No studs. Overall thickness of partition 2".	1 hr.	
	METAL LATH	Underwriters' Laboratories, Inc. Ret. 2773—1/20/47			Vermiculite plaster applied on metal lath fastened to incombustible studs spaced 16" on centers. Overall thickness of partition 2½".	2 hrs.	National Bureau of Standards Tests 298 & 299
		Underwriters' Laboratories, Inc. Ret. 2773—11/29/50			Vermiculite plaster applied on metal lath fastened to incombustible studs spaced 16" on centers. Overall thickness of partition 2".	1 hr.	

ZONOLITE

ZONOLITE INSULATING CONCRETE

use. Lightweight concrete fill for floor and roof construction, insulating roof deck systems, and floor slabs on-the-ground, cavity wall insulation.

materials. Zonolite vermiculite Concrete mix shall consist of Zonolite vermiculite Stabilized Concrete Aggregate, portland cement and water.

Vermiculite shall be Zonolite brand vermiculite Stabilized Concrete Aggregate.

Portland cement shall conform to ASTM Designation C-150 (Standard Specifications for Portland Cement) and shall be type I, II and III.

Water shall be clean and free from deleterious acids, alkalies and organic materials.

mixing. Mixing of Zonolite vermiculite Concrete shall be accomplished in a mechanical mixer. The water, then all the cement, then all the aggregate shall be added in turn. Additional water shall be added if necessary to obtain the desired slump. Period of mixing shall be limited to the minimum time which will accomplish complete uniformity and a flowable mixture and this time shall be closely adhered to throughout the job.

Do not over mix. Note: Observe the following sequence when transit-mixed Zonolite vermiculite Concrete is used:

1. Place all aggregate, cement and water for required batch in the mixer.
2. Only turn at plant sufficient to obtain uniform mix.
3. *Do not turn drum while driving from plant to job.*
4. At job, turn drum for 1 minute, add reserve water from mixer tank if necessary to obtain required slump.

MIXING PROPORTIONS

MIX	CEMENT SX	ZONOLITE VERMICULITE (CU. FT.)	Water U. S. GAL.
1:4(A*)	1	4	11-13‡
1:6(B*)	1	6	17-19‡
1:8(C*)	1	8	23-25

Note: British Imperial Gallons required for above mixes: 1:4 9-11 gals. 1:6 14-15 gals

MATERIALS REQUIRED PER YD.

MIX	CEMENT SX	ZONOLITE VERMICULITE 4 CU. FT. BAGS	WATER U. S. GAL.
1:4(A*)	7.5	7.5	85-95‡
1:6(B*)	5.	7.5	85-95‡
1:8(C*)	3.75	7.5	85-95‡

‡71-79—British Imperial Gallons

PROPERTIES

MIX	UNIT WEIGHT LBS. CU. FT.	APPROX. COMPRESSIVE STRENGTH 28 DAYS	INDENTATION STRENGTH 1 SQ. IN. 28 DAYS
1:4(A*)	35-45	500	620
1:6(B*)	25-35	250	295
1:8(C*)	20-25	125	150

A*—Roof Decks B & C*—Roof Insulation
B*—Floors on-the-ground

ZONOLITE-SAND CONCRETE

use. Fill over structural floors, floor slabs over closely spaced joists, or for floor slabs on-the-ground.

materials. Mix shall consist of Zonolite Stabilized Concrete Aggregate, *sand,* portland cement and water. All ingredients shall have properties as shown in materials section above. Sand shall be clean, well graded and free from organic material. It shall conform to ASTM Designation C-33.

mixing. Mixing of Zonolite-Sand Concrete shall be accomplished in a mechanical mixer. Sand, cement and approximately 10 gallons of water per sack of cement shall be mixed for about ½ minute before adding the Zonolite Concrete Aggregate. After adding the Zonolite Aggregate, the concrete shall be mixed for an additional two minutes, adding more water if necessary to obtain the desired slump. NOTE: Observe the following sequence when transit mixing Zonolite-Sand Concrete:

1. Place sand aggregate, water, and cement, and finally Zonolite for required batch in the mixer.
2. Only turn drum at plant sufficient to obtain uniform mix.
3. *Do not turn drum while driving from plant to job.*
4. At job, turn drum for 2-3 minutes, add reserve water from mixer tank if necessary to obtain 3-inch to 5-inch slump.

MIXING PROPORTIONS

MIX	CEMENT SX	ZONOLITE VERMICULITE 4 CU. FT. BAGS	SAND CU. FT.	WATER U. S. GALS.
1:3:2*	1	3	2	10

MATERIALS REQUIRED PER YD.

MIX	CEMENT SX	ZONOLITE VERMICULITE 4 CU. FT. BAGS	SAND CU. FT.	WATER U. S. GALS.
1:3:2*	6.2	4.65	12.5	62

PROPERTIES

MIX	UNIT WEIGHT LBS. CU. FT.	COMPRESSIVE STRENGTH 28 DAYS	INDENTATION STRENGTH 1 SQ. IN. 28 DAYS	THERMAL CONDUCTIVITY
1:3:2*	80	620	1412	2.50

*Floors above grade — Floor fill

ZONOLITE INSULATING FILL

use. Insulation of flat ceiling and sidewall areas in homes; ceiling, wall and floor insulation of commercial and institutional buildings, fill for cores of cement block construction, and cold storage insulation (for low temperature work, a special grade, Zonolite Refrigeration Fill is employed).

APPROXIMATE COVERAGE ZONOLITE INSULATING FILL

Thickness	2"	3"	3⅝"	4"	5⅝"
Coverage per bag in square feet	26	17	14	13	9

ZONOLITE PLASTER AGGREGATE

Note: For complete specifications on vermiculite plastering, write us for the Vermiculite Institute publication, "Standard Specifications for Vermiculite Plastering and Vermiculite Acoustical Plastic."

These specifications are based on the ASA Specifications for Gypsum Plastering No. A42.1-1954, departing only in respects where particular reference to vermiculite is necessary.

Zonolite Plaster provides a suitable base for any standard finish coat, as shown in the schedule of finishes on page 7.

Materials required per hundred square yards over Gypsum Lath are approximately six bags of Zonolite vermiculite to nine 100 lb. bags of Gypsum.

BASE COAT PROPORTIONS

	Maximum Number of Cubic Feet of Zonolite Aggregate per 100# Bag of Gypsum Neat Plaster
Two-Coat Work	
Over Gypsum Lath	2½
Over Masonry	3
Three-Coat Work	
Scratch Coat over Laths	2*
Scratch Coat over Masonry	3
All Brown Coats	3*

*In lieu of above, proportions may be 100 pounds of gypsum neat plaster to not more than 2½ cubic feet of aggregate, if used for both scratch and brown coats.

ZONOLITE ACOUSTICAL PLASTIC

The base for Zonolite Acoustical Plastic on new work shall be a standard thickness of Zonolite Plaster or Sand-Plaster, or clean concrete slabs. Any exposed metal, such as chairs and reinforced concrete slabs and tie-wires shall be covered to prevent rust from such material coming through the plastic.

mixing. Pour water into a clean mixing box or mechanical mixer. Add Zonolite Acoustical Plastic and mix, adding enough additional water to obtain soft consistency. (Note 1)

When waterproofing admix is to be employed, it shall be added to the mixing water before adding the plastic in the proportion of two quarts of admix to each bag of plastic. (Note 2).

application. Zonolite Acoustical Plastic shall be applied in two coats. Grounds shall be ⅝ inches. The first coat shall be applied ⅜ inches thick, and the second coat shall be applied flush to the grounds.

The first coat shall be dry before applying the second coat. Darby in one direction only. Desired textures may be obtained by floating or stippling, after which the plastic shall be allowed to dry without any further manipulation, except that any loose material shall be pressed back in place by troweling lightly.

Note 1 — One bag of Zonolite Acoustical Plastic will cover approximately 4 square yards ½ inch thick when mixed with 10 gallons of water when trowel applied, and 3½ square yards per bag when machine applied.

Note 2 — The inclusion of water-proofing admix is recommended when acoustical plastic is used above swimming pools, when applied directly to cold surfaces where condensation may occur, and for other places where damp conditions exist. The ad mix may be obtained from the manufacturer of the acoustical material.

Note 3 — To avoid joinings, use sufficient plasterers to complete entire room or area in one operation. If dry joinings are unavoidable, thoroughly wet previous application three feet back from end of joint and join as though application were continuous.

Note 4 — Zonolite Acoustical Plastic may be painted to obtain any desired color without loss of sound absorption. A non-bridging, water-thinned resin emulsion or casein paint may be used. Paint may be brushed on but spray painting is preferable.

ZONATILE PRECAST CONCRETE ROOF TILE

Zonatile is a lightweight roof slab developed for installation over standard structural members, sub-purlins, and rail sections.

material. Tile shall be furnished by Zonolite Company or one of its licensee affiliates. Tile shall be 18 inches wide by 36 inches long by 3 inches thick. All tile shall be as nearly perfect as good workmanship will permit. The completed deck must present a plain surface for the application of the roofing. For complete specifications, send for Zonatile folder No. G-50.

DESIGN INFORMATION

Weight: Approximately 10½ pounds per square foot.

Strength: Capable of supporting a total load of 50 pounds per square foot with safety factor of 4.

Insulation: "U" value for Zonatile roof construction is .26.

DESIGN INFORMATION FOR SUB-PURLINS AND RAIL SECTIONS

	Trussed Tee	#178 Bulb Tee Section	#214 Bulb Tee Section
WL 8 Maximum Span for #40 Total Load	7'	5'8"	7'6"
WL 8 Maximum Span for #50 Total Load	7'	5'0"	6'8"
WL 10 Maximum Span for #40 Total Load	7'	6'4"	8'6"
WL 10 Maximum Span for #50 Total Load	7'	5'8"	7'6"

For spans in excess of 8'6", use Standard A.S.C.E. Rails of size required. The center spacing is dependent upon size of A.S.C.E. Rails used.

ZONOLITE

INSULATING SPECIFICATIONS

ROOFS

Zonolite concrete roof decks

The use, materials, and mixing shall be as noted on page 12. The construction shall consist of a structural frame over which is to be placed a reinforced monolithic slab of Zonolite Concrete, to provide a roof deck, and a final weather-proofed membrane of built-up roofing. The thickness and slope shall be as shown on the plans.

Reinforcement and forms—Reinforcing shall be placed over the supporting members as called for in the plans.

Proportioning — The proportions shall be 1:4, as shown in the table on page 12.

Placing and Finishing — The Zonolite Concrete shall be transported and placed immediately after mixing is completed. No mixtures which have been delayed in placing until the consistency has changed shall be allowed. The Zonolite Concrete shall be poured in panels of a width capable of being screeded and finished to desired sections.

Concrete shall be set to the level of the surface desired, and the mix leveled by means of a straight edge of approved design.

Curing and Protection—The surface of the freshly finished Zonolite Concrete roof shall be prevented from drying out for not less than three days, or sufficiently long to allow the concrete to develop the desired strength. The Zonolite Concrete shall be protected from freezing during and after placing.

Application of Built-Up Roofing—The built-up roofing shall be laid according to manufacturers' directions.

Note: For complete specifications governing application of Zonolite Concrete roofs see the Vermiculite Institute "Specifications for Vermiculite Concrete Roof Decks and Roof Insulation"

Zonolite concrete roof fill

Materials and mixing shall be as noted on page 12.

Description — The construction shall consist of a roof deck over which is placed a monolithic slab of Zonolite Concrete for the purpose of insulation and/or drainage, and of final waterproof membrane of built-up roofing. The thickness and slope shall be as indicated on the plans.

Base Preparation — The roof deck shall be designed to carry the full superimposed load. The surface of the deck shall be clean and free from loose material, which would interfere with the placing of the vermiculite concrete.

Note: A lightweight wire mesh may be used for temperature reinforcement in Zonolite concrete roof fill jobs. When placed over materials subject to excessive expansion and contraction, a slip-sheet of treated paper should be used to prevent the concrete from bonding to the deck.

Proportioning — Proportions shall be 1:6 as noted in the table on page 12.

Note: For Southern States and other areas where the temperature during the pouring and curing period is 50°F., or above, the proportions shall be 1:8.

The same instructions on placing and finishing, curing and protection, and application of built-up roofing apply for concrete roof fills as are noted above under the section on concrete roof decks.

Zonatile precast concrete roof decks

Zonatile shall be applied according to manufacturer's directions contained in folder G-50, publication of Zonolite Company. The tile shall be erected in a workman-like manner and matched evenly at the joints.

FLOORS

For complete specifications on Zonolite Concrete Floor applications, refer to Vermiculite Institute "Specifications for Vermiculite Concrete Floors."

Zonolite-sand concrete fill over structural floors

The construction shall consist of steel flooring or reinforced concrete floor of required section and strength to carry the dead and live loads for the spans shown on the drawings. Over this structural floor shall be placed Zonolite-Sand Concrete, to provide a base for tile (ceramic or composition), linoleum, terrazzo finish, or carpeting. The thickness and slope of the Zonolite-Sand Concrete shall be as shown on the drawings.

Note to Architect: The *minimum* thickness of the Zonolite-Sand Concrete Fill shall be 2 inches.

A welded wire mesh is desirable for minimizing size of cracks due to temperature changes or shrinkage.

(See "General" for remainder of specification.)

Zonolite-sand concrete floor slabs over closely spaced joists

The construction shall consist of steel, concrete or timber joists of required section and strength to carry the dead and live loads for the spans shown on the drawings. Spacing of joists shall not exceed 24 inches O.C. Over these supports shall be placed suitable form work, reinforcing and a Zonolite-Sand Concrete floor slab to provide a base for tile, (ceramic or composition), linoleum, terrazzo finish, or carpeting.

The *minimum* thickness of the Zonolite-Sand slab shall be 3 inches and the maximum live load to be carried on it shall be 80 pounds per square foot. Consult Vermiculite Institute "Specifications" if the floor slab is to be placed in two separate operations.

Welded wire mesh reinforcing shall be placed in upper half of the slabs. (See "General" for remainder of specification).

Zonolite-sand concrete floors on ground

The construction shall consist of a stable, well-drained and properly graded earth base, a gravel fill, a membrane waterproofing when required, and a reinforced, Zonolite-Sand Concrete slab to provide a base for tile (ceramic or composition), linoleum, terrazzo finish, or carpeting. The concrete shall be reinforced with welded wire mesh placed 1 inch from the bottom of the slab.

The *minimum* thickness of Zonolite-Sand Concrete shall be 4 inches. (See "General" for remainder of specification).

Zonolite Vermiculite concrete floors on ground

(In Which Radiant Heating Units are Installed or, When an Exposed Concrete Floor is Desired)

The construction shall consist of a stable, well-drained and properly graded earth base, a gravel fill, a membrane waterproofing when required, and a vermiculite concrete slab with a sand-concrete topping. Heating units, when used, shall be placed on the Zonolite Concrete and covered with the sand concrete to the finished floor level.

The *minimum* thickness of the Zonolite Insulating Concrete shall be 3 inches.

GENERAL

The use, materials, mixing, and proportioning of Zonolite Concrete and Zonolite-Sand Concrete for floor construction shall be as noted on page 12.

Zonolite-sand concrete floor construction

Placing and Finishing — The Zonolite-Sand Concrete shall be transported and placed immediately after mixing. No concrete that has hardened or been contaminated by foreign materials shall be used, nor shall re-tempered concrete be used.

The Zonolite-Sand Concrete shall be placed in panels capable of being screeded and finished to desired sections.

After placing the concrete, it shall be screeded to required level or slope, and left without further working of the surface until the concrete is ready for finishing.

Finishing shall consist of steel troweling to exact level and smoothness to receive tile when specified; broom finish for terrazzo topping where specified.

Curing and protection in hot weather — In hot weather the finished surface of the Zonolite Sand Concrete shall be prevented from drying out for three days.

Cold weather protection — In cold weather, adequate protection shall be given the Zonolite-Sand Concrete to prevent its freezing while placing and setting. Whenever the temperature of the surrounding air is below 40°F., all concrete placed shall have a temperature between 70°F. and 80°F. Protection against freezing shall be maintained for three days after the concrete has been placed.

Protection from construction damage — General contractor shall exercise reasonable care to prevent gouging, scuffing or other damage to the Zonolite-Sand Concrete between the time it's placed and the floor covering is applied.

Concrete to be dry before covering — No floor covering shall be laid over the Zonolite-Sand Concrete base until the concrete is dry.

ZONOLITE INSULATING CONCRETE

Placing—Zonolite Concrete shall be transported and placed immediately after mixing. Retempered concrete shall not be used, nor any concrete that has hardened or been contaminated by foreign material.

The concrete shall be placed in panels of a width capable of being screeded and finished to desired sections.

After placing the concrete, it shall be screeded to required level or slope, and left without further working of the surface.

Cold weather protection—In cold weather, adequate protection shall be given the concrete to prevent its freezing while placing and setting. Whenever the temperature of the surrounding air is below 40°F., all concrete placed shall have a temperature of 70°F. or above.

The temperature of 40°F. or above shall be maintained for three days after the concrete has been placed.

Concrete to be dry before covering — The Zonolite Concrete shall be dry before the application of the topping.

Sand concrete topping — A sand concrete topping in the proportions of one cubic foot portland cement, three cubic feet of sand, and two cubic feet of pea gravel shall be applied over the surface of the Zonolite Insulating Concrete.

The *minimum* thickness of the sand concrete shall be two inches except when radiant heating units are used, when the minimum thickness over the top of the heating units shall be 1½ inches.

Adequate provision shall be made for expansion of the topping. The topping shall be troweled to a true and uniform surface. It shall be prevented from drying out for three days.

Adequate protection shall be provided against freezing in cold weather.

No floor covering shall be laid over the topping until the concrete is dry.

CEILINGS, WALLS, PARTITIONS

Zonolite plaster base coat

Three-coat work—Scratch coat of Zonolite Plaster shall be applied with sufficient material and pressure to form good full keys or bond on lath, then be scratched to rough surface.

Brown coat of Zonolite Plaster shall be applied after the scratch coat has set firm and hard, brought out to grounds and straightened to a true surface and left rough, ready to receive the finish coat.

For complete plaster specifications, refer to Vermiculite Institute folder, "Standard Specifications for Vermiculite Plastering and Vermiculite Acoustical Plastic", March, 1954.

Zonolite plaster partition base coat

See pages 6 and 7 of the above mentioned Vermiculite Institute publication.

Zonolite plaster finish coat

Zonolite Finish Coat shall be mixed in the proportions of 100 lbs. of unfibered gypsum plaster or gypsum gauging plaster to 1 cu. ft. of Zonolite Finish Aggregate. The plaster shall be placed in water and mixed. Zonolite Finish Aggregate shall then be added and material *thoroughly mixed*, (3 to 5 minutes). More water should be added as necessary to obtain workable consistency.

Note — For best results, the mixed plaster should have a setting time of 1 to 3 hours.

Application

The finish coat shall be applied to a partially dry base coat or to a thoroughly dry base coat which has been evenly wetted by brushing or spraying. The use of excessive water shall be avoided.

ZONOLITE INSULATING FILL

Attics

Unfloored—Zonolite vermiculite fill shall be poured into joists spaces and leveled off to the proper depth. **Note** — For floored attics, the same procedure of application may be used, after floor boards have been removed at convenient intervals.

Flat roofs

Zonolite vermiculite shall be applied between the joists to the thickness indicated in the plans and/or specifications. **Note** — If clearance under lowest portion does not allow sufficient working space from the inside of the building, openings may be made through the roof about 2 feet in width, at right angles to the joists. Roof openings should be carefully re-sealed.

Exterior walls

If stud spaces are open at the top, Zonolite may be easily poured down stud openings. For best results, walls should be vibrated with a mallet or short 2 x 4.

Existing walls may be checked for fire stops, headers, etc., by dropping a weight on a line into the stud spaces. If obstructions exist, the space below such members should be filled from outside after removing a portion of the exterior finish.

Acoustical specifications

The mixing and application of Zonolite Acoustical Plastic shall be as indicated on page 13.

Fireproofing specifications

The fireproofing of floor, ceiling, beam, truss, columns, or girders, shall be as indicated in the plans and/or specifications.

Note — For summary of typical fireproofing applications of Zonolite Plaster, refer to fire tests summaries on page 10 and 11.

ZONOLITE

TECHNICAL BULLETINS

Technical folders on the Zonolite product applications described in this folder are available, as well as circulars on other Zonolite products. Please order by form number.

CA-2 — Roof Decks and Room Insulation
CA-4 — Floor Slabs and Floor Fill
CA-10 — Blo-Crete Air Placed Vermiculite Concrete
Z-2 — Z-Crete Underground Pipe Insulation
G-18 — Zonolite High Temperature Cement
G-45 — "How to Do It" Manual
G-50 — Zonatile Short Span Insulating Roof Tile
G-55 — Insulpave Asphalt-Bound Vermiculite
G-81 — Chemical and Physical Properties Booklet
G-84 — Mixing and Coverage Data Sheets
G-87 — Firesafe Schools
HI-48 — Insulation Data Book
PA-2 — Zonolite Plaster
PA-5 — Zonolite Acoustical Plastic
PA-12 — Summary of Fire Tests
PA-15 — Zonolite Finish Aggregate
PA-19 — Zonolite Plaster Partitions

The following Vermiculite Institute publications may also be secured from your Zonolite office.

"Vermiculite Plaster Fireproofing"
"Standard Specifications for Vermiculite Plaster and Vermiculite Acoustical Plastic"
"Specifications for Vermiculite Concrete Roof Decks and Roof Insulation"
"Specifications for Vermiculite Concrete Floors"
"Recommended Building Code Requirements"

ZONOLITE SALES OFFICES

ALABAMA, Birmingham
Southern Zonolite Company
2800 Fifth Ave., S., Ave. "E"

ARIZONA, Glendale
Ari-Zonolite Company
1100 East Glendale Avenue

ARKANSAS, Little Rock
Zonolite Company
P. O. Box 2712

CALIFORNIA, Los Angeles
California Zonolite Company
5440 San Fernando Road, W.

CALIFORNIA, Sacramento
California Zonolite Company
208 Jibboon Street

CALIFORNIA, San Francisco
California Zonolite Company
666 Mission Street

COLORADO, Denver
Western Mineral Products Co.
111 South Navajo Street

DISTRICT OF COLUMBIA, Washington
Carolina Vermiculite Company
P. O. Box 5120, Benning Station

FLORIDA, Jacksonville
Southern Zonolite Company
1530 East Adams Street

FLORIDA, Tampa
Southern Zonolite Company
35th Street and Third Avenue

GEORGIA, Atlanta
Southern Zonolite Company
P. O. Box 3281 — Station F

ILLINOIS, Chicago
Zonolite Company
12300 South Ashland Avenue

KANSAS, Wichita
Dodson Manufacturing Co., Inc.
1463 Barwise Avenue

KENTUCKY, Wilder
Zonolite Company
P. O. Box 232

LOUISIANA, New Orleans
Zonolite Company
P. O. Box 3193

MASSACHUSETTS, North Billerica
Zonolite Company
P. O. Box 117

MICHIGAN, Dearborn
Zonolite Company
14300 Henn Avenue

MINNESOTA, Minneapolis
Western Mineral Products Co.
1720 Madison Street, N. E.

MISSOURI, Kansas City
Zonolite Company
515 Madison Street

MISSOURI, St. Louis
Zonolite Company
1705 Sulphur Avenue

MONTANA, Great Falls
Robinson Insulation Company
P. O. Box 1419

MONTANA, Libby
Zonolite Company

NEBRASKA, Omaha
Western Mineral Products Co.
36th and "I" Streets

NEW JERSEY, Trenton
Zonolite Company
P. O. Box 2124

NEW MEXICO, Albuquerque
Southwest Vermiculite Company
1822 North First Street

NEW YORK, Albany
Zonolite Company
North Ferry and Water Streets

NEW YORK, New York
Zonolite Company
122 East 42nd Street

NORTH CAROLINA, High Point
Carolina Vermiculite Company
P. O. Box 1308

NORTH DAKOTA, Minot
Robinson Insulation Company
P. O. Box 1782

OREGON, Portland
Vermiculite-Northwest, Inc.
2303 North Harding Avenue

PENNSYLVANIA, Ellwood City
Zonolite Company
12th and Factory Avenue

SOUTH CAROLINA, Travelers Rest
Zonolite Company
P. O. Box 217

TENNESSEE, Nashville
Zonolite Company
P. O. Box 601, Old Classification Center

TEXAS, Austin
Texas Vermiculite Company
813 Airport Blvd., P. O. Box 307

TEXAS, Dallas
Texas Vermiculite Company
2651 Manila Road

TEXAS, Houston
Vermiculite Products, Inc.
P. O. Box 7327

UTAH, Salt Lake City
Intermountain Insulation Company
P. O. Box 2398

WASHINGTON, Seattle
Vermiculite-Northwest, Inc.
2107 North 34th Street

WASHINGTON, Spokane
Vermiculite-Northwest, Inc.
1318 North Maple Street

WISCONSIN, Milwaukee
Western Mineral Products Co.
525 West Oregon Street

CANADIAN

Alberta, Calgary
Insulation Industries, Ltd.
1235 Tenth Avenue, W.

Alberta, Edmonton
Insulation Industries, Ltd.
8602 — 16a Avenue

British Columbia, Vancouver
Insulation Industries, Ltd.
475 Industrial Avenue

British Columbia Vancouver
Insulation Industries, Ltd.
1305 West Georgia Street

Manitoba, Winnipeg
Insulation Industries, Ltd.
760 Wall Street

Ontario, St. Thomas
F. Hyde & Company, Ltd.
94 Woodworth Street

Ontario, Toronto
F. Hyde & Company, Ltd.
3349A Bloor Street, W.

Ontario, Toronto
F. Hyde & Company, Ltd.
3540 Dundas Street

Quebec, Montreal
F. Hyde & Company, Ltd.
2315 Cote de Liesse Road
P. O. Box 119, Station 0

Saskatchewan, Regina
Insulation Industries, Ltd.
P. O. Box 548

Saskatchewan, Saskatoon
Insulation Industries, Ltd.
P. O. Box 553

ZONOLITE COMPANY • 135 South La Salle Street • Chicago 3, Illinois

G-66, Copyright 1954. Zonolite is a registered trademark of Zonolite Company, 135 S. La Salle St., Chicago 3, Ill.

Printed in U.S.A.