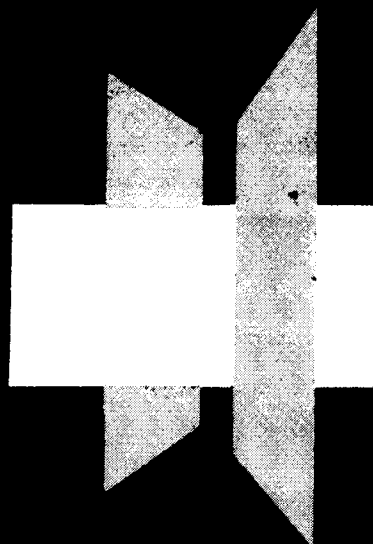


PLAINTIFF'S EXHIBIT

GP-1084

BESTWALL

GYPSUM PRODUCTS MANUAL



WALLBOARD

SGP 0025407

BESTWALL

WALLBOARD

SGP 0025408

BESTWALL GYPSUM COMPANY

GYPSUM WALLBOARD MANUAL

1965 EDITION

NOTE

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Receipt of Manual acknowledged.

Date

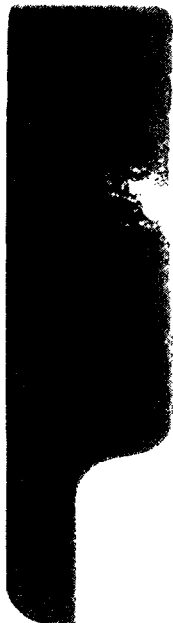
2/15/65

Signature of Salesman



January 1, 1965.

SGP 0025409



SGP 0025410



INTERDEPARTMENTAL COMMUNICATION

TO: Outside and Inside Salesmen

FROM: Gene S. Nelson

SUBJECT: GYPSUM: ITS NATURE AND USE

DATE: November 20, 1967

LOCATION:

LOCATION: Portland

The attached article reprinted from The Construction Specifier is an interesting synopsis of the history of the gypsum industry. It contains some good product information plus comments on what the future holds for the development of new products through research.

A handwritten signature in dark ink, appearing to be 'G. S. Nelson', with the initials 'G. S. N.' printed below it.

GSN:ljp

Attachment

cc: Branch Managers
Regional Managers
Gypsum Division Personnel
Distribution Division - Portland

SGP 0025411

BESTWALL GYPSUM COMPANY

GYPSUM WALLBOARD MANUAL

Section 1

1965 EDITION

P R E F A C E

GYPSUM WALLBOARD

All must realize the first place importance of gypsum wallboard in the long list of gypsum products on the market. A review of the statistics will show the tremendous growth of gypsum wallboard sales since World War II. A brief account of the development of this product from its beginning as relatively crude small panels suitable only for use as a substitute for wood lath to the present day high quality large size panels which have largely supplanted lath and plaster for interior walls and ceilings may be of interest.

The old timers say that the first product which might be called gypsum board to appear on the market was made up of four layers of coarse heavy paper similar to roofing felt made into a multilayer sandwich with thin layers of gypsum plaster. The panels were not made larger than 32" x 48". This product was called Sackett board and was available prior to 1900. It was not well suited for use as wall surfacing to receive paint.

The Bestwall Company (not the Bestwall Gypsum Company) was first in the field with large size 4'x 8' panels of gypsum board similar to the present day product. Of course the paper was not folded around the edges and the face paper surfacing was not the clean ivory color we know today. These were later developments.

At first, the Bestwall Company manufactured gypsum board only. They built their plants adjacent to plaster mills of the American Cement Plaster Company and purchased stucco from A. C. P. for use in board manufacture. The wet panels were hung from racks mounted on small wheeled cars and these loaded cars traveled through heated tunnel dryers on small steel rails requiring about 24 hours to dry the board.

The Beaver Company acquired the American Cement Plaster Company and the Bestwall Company and installed continuous dryers of the type used today for drying board.

Certain-teed got into the gypsum business by acquiring the Acme Cement Plaster Company. In 1926, soon after the Acme purchase, Certain-teed built its first gypsum board plant at Acme, Texas. Then in 1928 Certain-teed purchased the Beaver Company and thus acquired the Bestwall trade name.

SGP 0025418

The board manufactured at Acme during the first few years of operation of the plant had gray paper on both face and back. It was open edge board, that is, the paper was not folded around the edges. It was reversible since both faces were the same and if one face became damaged before erection, the panel could be applied with the damaged face on the inside toward the studs. It was made in 3/8" thickness only.

In those early days, there was no such thing as a reinforced joint system. Joints and nailheads were treated merely by filling them with a joint filler composed largely of plaster of Paris. The core of the board was composed of stucco and relatively coarse sawdust with some starch added to obtain a good bond of paper to core. This use of foam to lighten the core and fiber in the core to improve flexibility and nailing properties were to come later.

When Certain-teed acquired Beaver, they were making Bestwall with cream colored face paper and gray back paper as well as a so-called lower grade board with gray paper on both faces. The cream-faced Bestwall was priced \$5/MSF higher than the gray-faced board. Some few years later, U.S.G. and National started using cream face paper on all their wallboard and Certain-teed also made this change.

The first 1/2" board to appear was 4' x 8' sheets with tongue and groove edges and gray paper on both faces. It was manufactured by a competitor in Texas and was advertised as a Texas board for Texas people. It was promoted to replace shiplap lumber covered with canvas in the so-called box construction for walls and partitions commonly used in that part of the country in those earlier days. It has long since disappeared from the market. Recessed edge 1/2" board replaced it and now tapered edge board is the standard.

Tru-Grain board, vinyl covered board, foil surfaced board, Firestop - a fire-rated gypsum board, form board, gypsum sheathing and Hummer system panels are some of the board products which have been developed and introduced since Certain-teed, Bestwall's predecessor, first got into the gypsum business.

Certain-teed was the first company to twin mount gypsum board. From the very beginning, a machine process was used for twin mounting. This development received immediate acceptance by the trade and competitors were forced to follow along. At first they applied the tape by hand but later on they also installed machines for doing the job.

Other Bestwall firsts in gypsum board include nail marking (in the late 30's) which became obsolete when horizontal application came along, fire-rated board (Firestop) and glass fiber in board core. This latter development was a real forward step in board manufacture and from the reaction of competitors it appears to be causing them considerable concern. Some gypsum manufacturers have obtained licenses from Bestwall to use the patented features both of fire rated board and of fiberglas and others are negotiating for licenses. Some producers in foreign countries have recognized the value of glass fiber in board and other gypsum products and have signed patent license agreements.

It is difficult to look into the future and predict what the new developments in gypsum board in the next ten or twenty years will be, but it is certain that gypsum board is a dynamic part of the gypsum business which has grown at a tremendous rate and will continue to grow. New products will be developed just as they have been in the past.

BESTWALL GYPSUM COMPANY
GYPSUM MANUAL
PREFACE

GYPSUM WALLBOARD

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BESTWALL GYPSUM COMPANY
GYPSUM MANUAL

GYPSUM - GENERAL

Gypsum Rock

Gypsum is a naturally occurring mineral of a definite chemical composition. Its chemical composition is $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ and, when 100% pure, it contains 46.5% SO_3 , 32.6% CaO and 20.9% combined water of crystallization (by weight). However, no commercial deposits are 100% pure gypsum but the mineral as mined is mixed with varying amounts of limestone, sand, shale, anhydrite, and sometimes a minute amount of rock salt and organic matter.

Geologically, gypsum is classified as a stratified or sedimentary or a secondary rock -- that is, it has been formed under water either by evaporation of sea water, or by the concentration and deposition of the gypsum leached out of limestone and shale by circulating waters.

Varieties:

"Rock Gypsum" is the type usually mined. It is soft granular or compact rock, usually white to gray in color, containing from a trace of impurities up to 30 or 40 percent. "Selenite" is a pure crystalline variety of gypsum occurring in transparent monoclinic crystals or cleavable masses. "Alabaster" is a white, compact, fine grained variety of rock gypsum which is used to some extent for carving, especially in Europe. "Satin Spar" is a fine, translucent fibrous variety of gypsum with a beautiful silky sheen.

Where Found

There are numerous deposits of gypsum of commercial importance in the United States. They are found in New York, Ohio, Michigan, Iowa, Kansas, Texas, Oklahoma, California, Colorado, Montana, New Mexico, Virginia and Utah from which thousands of tons of gypsum products are shipped each year. Valuable deposits are found in Nova Scotia, New Brunswick and Ontario, Canada. Large tonnages of Nova Scotia and New Brunswick rock are shipped to United States cities on the Atlantic seaboard where they are made into plaster and plaster products. San Marcos Island off the coast of Lower California (Mexico) is a source of gypsum rock for some of the West Coast producers of gypsum products. Commercially worked deposits are located in Jamaica and Dominican Republic in the Caribbean. The purity of gypsum rock varies rather widely and, to be commercially practical, the gypsum content should be at least 75% and preferably 85%. For white specialty plasters such as many industrial plasters, rock of at least 98% and preferably 99% purity or higher is required.

Characteristics

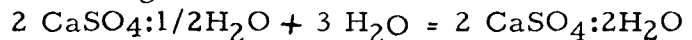
Gypsum is crystalline calcium sulphate which consists of 79.1 calcium sulphate and 20.9% water (by weight). By Volume, water in the crystalline calcium sulphate is 48%. It has the property of releasing three-fourths of its water of crystallization when heated to about 335°F., most of the water being released at 250°F., to form calcined gypsum. Crystalline gypsum has vapor pressure rises and, when it passes the vapor pressure of the surrounding medium, the gypsum will give up its moisture. In saturated air, this point is 212°F. To actively promote calcination, however, it is necessary to heat the gypsum to about 250°F. When heated to 420°F., practically all the water of crystallization is released to form soluble anhydrite or second settle stucco.

These products (calcined gypsum) have the property of reuniting with water and recrystallizing (setting) to form the original crystalline hydrated calcium sulphate. Since it is a simple recrystallization process, the set (recrystallization) can be speeded up (by use of accelerators) or slowed down (by use of retarders). Ordinary calcined gypsum, neither accelerated nor retarded, usually will set in from 30 to 60 minutes, depending upon purity and method of calcination. As gypsum hardens in setting, it increases in volume slightly, which is the reason that it takes such good detail in casting operations. When crystallization is complete, the set gypsum has only to be dried to reach its maximum strength.

THE CHANGES INVOLVED IN THE SETTING OF CALCINED GYPSUM

(a) Chemical Reaction

When calcined gypsum is mixed with water, an interlocking mass of gypsum crystals is formed according to the following reaction:



Heat is generated during this reaction which is exactly the reverse of the calcining operation where three-quarters of the water of crystallization is driven off, forming a new crystal. Calcined gypsum added to water chemically combines with about 18% of its weight of the mixing water, forming gypsum crystals and setting to a firm, hard mass, the density and strength of which are largely controlled by the amount of mixing water used.

(b) Thermal Change

Theoretically, when water is added to a pound of calcined gypsum, about 50 B.T.U.'s of heat are given off in setting. This heat generation is of considerable importance in the casting of molding plaster in glue molds. If the heat is generated too quickly, as might be the case of a very quick-

setting molding plaster, and the temperature of the cast runs over 110°F., the glue or gelatin molds may be melted or softened. In casting a 2"x4" cylinder of pure molding plaster using 70 parts of water to 100 parts of plaster by weight with the initial temperature of the slurry about 70°F., heat rise in the cast as it is setting will be from 35 to 40°F. An impure gypsum will, of course, generate less heat. The temperature used in setting of gypsum also is valuable in applications such as poured-in-place gypsum fibered concrete in the wintertime, as the heat generated is relied upon to prevent the slurry from freezing before set.

(c) Volume Changes

A plaster cast will expand in setting, the amount of expansion depending on the purity of the plaster and the amount of mixing water used. At a plastering consistency using 50% water, the linear expansion of a pure plaster will be about 0.18%. If used at a pouring consistency with 70% water, the expansion will be about 0.16%. The setting expansion of a molding plaster is a valuable property as it insures the filling out of every fine detail of the mold. The volume of a set plaster case changes slightly as temperature and humidity conditions change. We have no exact figures on expansion due to changes in moisture content, but the thermal expansion of sanded plaster is said to be .0000092 of an inch per degree Fahrenheit - only slightly more than concrete or steel. The setting expansion of gypsum can be decreased to as low as 0.04% by the addition of certain chemicals.

COMPARISON WITH LIME

Gypsum differs markedly in its characteristics from lime and Portland Cement. Limestone is calcined carbonate (CaCO_3). When heated to high temperatures (1525°F. or higher), carbon dioxide (CO_2) is released and calcium oxide and magnesium oxide are formed (quick lime). The quick lime is usually reacted with water to form calcium and magnesium hydroxides (hydrated lime). When the hydrated lime is exposed to the air in the presence of moisture, the carbon dioxide in the air reacts with the hydroxide to produce the original carbonates and water. This reaction causes the mass to harden, but is a very slow process and often is not completed for many years. This slow hardening was one of the primary reasons lime plaster was superseded by the faster setting gypsum plaster as basecoat plastering. It also is the prime reason why lime is completely unsatisfactory as a casting medium.

COMPARISON WITH PORTLAND CEMENT

Portland Cement is made from a mixture of limestone and shale or clay with a small amount of gypsum to regulate the setting time. The proportions of

the limestone and clay or shale are carefully controlled so as to produce the proper proportions of lime, silica, and alumina which are necessary to make good Portland Cement. The raw materials are crushed so that most all will pass a 100 mesh screen and they are then heated, usually in a rotary kiln, to a maximum temperature of about 2500° to 2600°F., where they react together chemically to form complex silicates and aluminates, losing carbon dioxide and water in the process.

These complex silicates and aluminates react together when mixed with water to form other complex chemical compounds. These reactions require considerable periods of time except under very special conditions, which is why cements and concretes are normally kept wet for at least seven days and do not develop full strength until about 28 to 30 days. Portland Cement does not expand upon setting which, combined with its slow setting properties, makes it noncompetitive with gypsum for most casting purposes or for plastering, except under certain limited conditions.

The chief advantages of Portland Cement over gypsum are in strength and water resistance. These characteristics are the principal reasons for the use of Portland Cement for structural purposes especially for exterior work such as buildings, roads, sidewalks, dams, and etc. Only the high strength gypsums such as Densite and Hydrocal exceed Portland Cement in strength.

BESTWALL GYPSUM COMPANY
GYPSUM MANUAL

MANUFACTURE of GYPSUM WALLBOARD and GYPSUM LATH

Board Products

Gypsum Wallboard, Lath and Sheathing are composed of a core, hydrated calcined gypsum fibers and other ingredients, surfaced on both sides with smooth, uniform, specially-prepared paper forming the finished surfaces and serving as a reinforcement.

Each raw material used in the manufacture of these products is for a specific purpose, and only those that meet our rigid specifications are used. The quality and structural value of each board product depends upon its composition and fabrication during manufacture. To thoroughly understand the quality, properties, uses, etc., of each product, its composition and manufacture should be known. Therefore, the manufacturing may best be followed by starting with the raw materials and following their course, step by step, through the process.

1. RAW MATERIALS

(a) Paper:

Bestwall manufactures in its own paper plants, most of the special paper used for surfacing wallboard, lath and sheathing. A different kind of paper is used for each finished product. Bestwall's three paper mills are located at Pryor, Oklahoma; Thorold, Canada; and Delair, New Jersey. Some paper, as necessary, is purchased from outside sources in accordance with our own specifications.

The papers are manufactured on seven or eight cylinder paper machines, which means that there are seven or eight separate layers of paper stock felted together to form the solid finished sheet. The finished sheet as formed consists of 3 parts which are known as the face liner, filler, and bond liner. By building up the solid sheet in this manner, the composition of each part of the sheet can be controlled so as to produce a paper which will have the properties required by the finished gypsum board products.

All papers used for wallboard, lath and sheathing have certain properties in common:

1. The bond liner in all cases is made from unsized stock and is designed to produce perfect bond to the gypsum core. The bond to the gypsum core is accomplished by the bond liner absorbing

the saturated gypsum solution from the gypsum slurry used for forming the core. Gypsum crystals grow in this saturated solution that has been absorbed by the bond liner and inter-lace into the crystals of the core, thereby producing the bond.

2. The filler of all our paper is made from a specially-treated (sized) paper stock to render it water resistant. The water resistance of the filler is very important. It is one of the features of the paper which we use for all types of board, lath and sheathing. The filler is designed to prevent the free water present in the slurry and core from percolating through the face and back papers to the surfaces while the board is being manufactured. If this water filtered through the face and back papers, it would cause unsightly water marks, stains, etc. on the finished sheet.

The water resistant filler in lath paper prevents the passage of free water present in gypsum plaster mortar when it is applied on the surface of gypsum lath, from passing through the covering paper into the core of the lath.

3. The face liner used for wallboards is made from a special paper stock which is colored, highly sized, and treated to render it water and scuff resistant. The finished surface is smooth, uniform, and nonabsorptive. The face liner of lath paper is water absorbent exactly the same as the bond liner (as explained in 1 above), because its surface must have the properties of bonding to the gypsum plaster applied to the lath.

The face liner of gray wallboard back paper is made from stock that is slightly sized so as to render it scuff-resistant. The face liner of the paper used on sheathing is made from paper stock which is colored black, highly sized, and treated to render it water resistant, and scuff resistant. The finished surface is smooth, uniform and nonabsorptive.

(b) Stucco:

The stucco used for manufacturing the core is designed especially for this purpose. It is of proper fineness and is low in water carrying capacity. This produces a core which has the proper hardness and strength.

(c) Glass Fiber:

The glass fiber used in Bestwall gypsum wallboards is the continuous textile grade which is soft and non-irritating to the skin. It has a very high tensile strength, being stronger than many steels. It is obtained in multiple strands wound in spools, and is cut to proper length continuously in synchronization with the belt speed of the board machine. The glass fiber is used under Bestwall Gypsum Company's Patent No. 2, 681, 863.

(d) Paper Fiber:

Paper Fiber is used along with glass fiber in all lath and board products except Firestop Bestwall, which contains only glass, lath and fiber. The paper fiber is scrap paper purchased from outside sources or waste paper from the wallboard operation. The paper is beaten up in water in a hydro-pulper in either a 2-1/2 or 3 percent concentration. It is pumped to the mixer by a variable speed pump which proportions the proper amount of paper pulp, depending upon the type of product being made and the speed of operation.

The glass fiber and paper pulp are added to the core for the following reasons:

1. To give proper mailing properties to the core and to eliminate chipping and shattering of the core at open edges of the board.
2. To reduce the brittleness of the core.
3. To produce a wallboard that has the required flexibility and which can be handled without breakage.
4. To reduce the weight of the board.

(e) Adhesives:

The gypsum crystals which form the core and bond it to the bond liner of the paper used are very fine and brittle. To protect these crystals, and to add to the bond between the core and the bond liner of the paper, a special adhesive is used. This adhesive is mixed into the ingredients in the core. It is water soluble and, therefore, concentrates between the gypsum crystals where the core is in contact with the bond liner. This reinforces the crystalline structure and adds to the bond between the core and the paper covering. This concentration of the adhesive at the surfaces of the core is somewhat similar to the action of the soluble gum added to produce the case-hardened surfaces of statuary casting plaster.

(f) Accelerator:

The gypsum core must be set hard by the time the board reaches the cut-off knife, which is near the end of the board machine, so that the board can be cut into the required lengths. This makes it necessary to use an accelerator to regulate the setting time of the slurry. The accelerator which we use is ordinary pulverized gypsum rock. Chemical accelerators such as potassium sulphate, ammonium sulphate, etc. may also be used.

(g) Foam:

The foam added to the slurry used for producing the core is made from a solution of rosin soap or other foaming agent. This solution is passed through special equipment that beats it into a stable, uniform-structured, small-bubble foam. The foam produces microscopic air voids throughout the gypsum core. The soap solution reacts with the gypsum to form insoluble calcium salts which further reinforce the void structure of the gypsum core. Foam is added to the slurry to:

1. Increase the thermal insulation value of the board.
2. Reduce the brittleness of the core.
3. Add to the flexibility of the board.
4. Reduce the weight of the board.

2. PROCESS OF MANUFACTURE:

Each step in the process of manufacture is carefully controlled to produce quality and uniformity in the board, lath or sheathing. Quality depends upon the combination of the face and back paper used and the structure of the core (the paper has been described above). The paper and the structure of the core controls rigidity, structural strength and durability of the finished product. The required hardness and strength of the core can be achieved by proper formulation of the dry ingredients and control of the water-plaster ratio.

The proper mixing of the dry ingredients, the addition of the foam, paper pulp, glass fibers and the proper wet mixing before the slurry is poured onto the paper covering are all very important. A very rigid system of inspection, testing and control is maintained at all our plants to make sure that the pro-

per percentage of each raw material is used, and that the mixture is thoroughly dry mixed and wet mixed before it is used for forming the core.

(a) Dry Mixing:

It is essential to thoroughly mix the glass fiber, accelerator and adhesive into the dry stucco so that a uniform mixture is obtained. Dry mixing is accomplished in the conveying equipment as the material is delivered to the wet end of the machine.

(b) Wet Mixing:

The dry ingredients are fed into a high-speed centrifugal mixer and are blended with mixing water, paper pulp and foam. The consistency of the slurry is accurately controlled by regulating the mixing water through the use of a recording water meter. The weight of the slurry is controlled by varying the foam content as required to produce a slurry of a definite density. Slurry from the mixer is discharged in three streams so that three streams of gypsum lath may be made at one time. For other boards, the streams all blend together at the forming rolls except where two streams of sheathing are made in which case only two streams are used.

(c) Edge Formation:

Square Edge, Tapered Edge, Tongue & Groove Edge, and Beveled Edge Boards are made by cutting grooves along the edges of the face paper after it leaves the paper rack. The inside grooves regulate the width of the finished product. As the grooved paper approaches the forming rolls, it is folded into the various shapes along the grooves which are required for the particular type edge being made by means of edge folding devices. Spaces between grooves are set depending upon the type product being made and its thickness. Gypsum lath paper is not grooved along its edges but is passed through edge forming devices which fold the paper in a semi-circle on each side producing a "round" edge product.

As the papers pass through the forming rolls, adhesive is applied to each edge of the back paper which serves to stick the edges of the back paper to the folded edges of the face paper.

(d) Thickness:

Thickness of the various products is controlled by the spacing of the forming rolls.

(e) Length of the Machine:

As the gypsum board or lath leaves the forming section, it is carried on wide rubber belts and carrier rolls to allow time for the gypsum core to harden (set). The total length of the machine depends to a considerable degree upon the speed operated. Our longest machine is at Brunswick where this distance is 949 ft.

(f) Cut-Off Knife:

All plants use rotary knives for cutting the board into various lengths. The drive for the cutting mechanism is adjustable so that lengths can be varied as needed for various products.

(g) Transfer Table:

After the boards are cut to length, they are picked up by a transfer table and carried sideways to a tippable table which feeds the boards into the dryer. The dryer runs parallel with and alongside the board machine. As 48" wide wallboards are transferred, they are inverted so that the ivory face is turned up. This preserves the finish of the ivory paper from blemishes, slick spots, etc. which may occur when the paper is in contact with the kiln rolls.

(h) Drying

The board from the transfer is fed by the tippable table into the dryer which has 6 or 8 decks, and is wide enough to take 2 streams of board 4' wide, 3 streams 32" wide, 4 streams 24" wide, and 6 streams 16" wide. Our dryers are heated either by steam coils or by direct combustion of natural gas. The temperature is carefully controlled in the various zones into which the dryer is divided so as to dry the products properly. Large circulating fans blow the hot gases over the boards and laths and the moisture which is evaporated is blown out through exhaust stacks.

(i) Take-off:

In all plants except Blue Rapids, wallboard products are grouped into pairs face to face automatically and conveyed through a bundling machine where the end tapes are applied. The bundled packages are stacked automatically and handled to the warehouse

or loading dock by fork trucks. Lath is handled on a separate system where it is bundled into 6 pieces to the bundle (5 at Sigurd). At Blue Rapids, board and lath are unloaded from the kiln by hand and fed into the packaging machines.

(j) Pinholath

Pinholath is made under exclusive license from the Pinco Co. under Patent No. 3,879,662. The pinholes puncture the paper and permit water from plaster applied thereto to be absorbed into the core in a controlled amount. This serves to rigidify the plaster next to the paper face and is designed specifically for use with machine applied plaster.

(k) Perforated Lath

The perforating is done by a punching machine at the end of the board machine; the operation being performed on the wet lath before it is cut into 48" lengths. The perforations are 3/4" in diameter and spaced 4" apart.

(l) Reclaiming Department

In this department, re-cutting equipment is available so that the damaged goods can be cut into smaller sizes and reclaimed for shipment to the trade.

(m) Loading Cars & Trucks

Loading cars of wallboard, lath and sheathing is done under close supervision. All possible precautions are taken to insure delivery of board in good condition. To illustrate the precautions which are taken, here is the routine which is followed in loading cars:

All cars are carefully inspected before they are accepted for loading wallboard, lath & sheathing. Any cars with leaky roofs, broken or unusually dirty floors, etc., are rejected. All loose nails are pulled from the floors & sides. Any loose boards are fastened to prevent damage to the load. After the cars have been cleaned and prepared, the floors are covered with dunnage board and the walls covered with paper. Only then does loading start. While loading the cars, paper pads are attached to the side of the cars to protect the ends & edges of the piles of board, lath or sheathing. Special care is used to brace, tie and protect the piles, and to prevent shifting or damage enroute.

Wherever possible, gypsum board products are now loaded into box cars or on flat cars by fork lift trucks. By this method, whole units are set in place at one time. Spacers are placed between each unit so that the forks of the lift truck can be easily inserted and withdrawn.

Flat cars are covered & the load held in place with steel strapping.

3. INSPECTION:

All raw materials and entire process of manufacture are under the supervision of competent inspectors. An inspector is on duty at all times and on all shifts and is responsible for the quality of the products produced on that shift. Every step in the process is checked hourly or at fixed intervals as a matter of control. Finished boards are tested hourly or more often for thickness, width, length, bond, nailing properties, flexibility, strength, weight, appearance, resistance to moisture, etc. All tests and inspections are recorded on standard report forms which are made up in duplicate. These reports are watched by the board plant superintendent as the entries are made throughout the day. The reports when completed are signed by the inspectors and turned over to the board plant superintendent and plant manager for approval. One copy of the report is sent to the Paoli Laboratory. These reports are carefully analyzed by all concerned and then filed for reference.

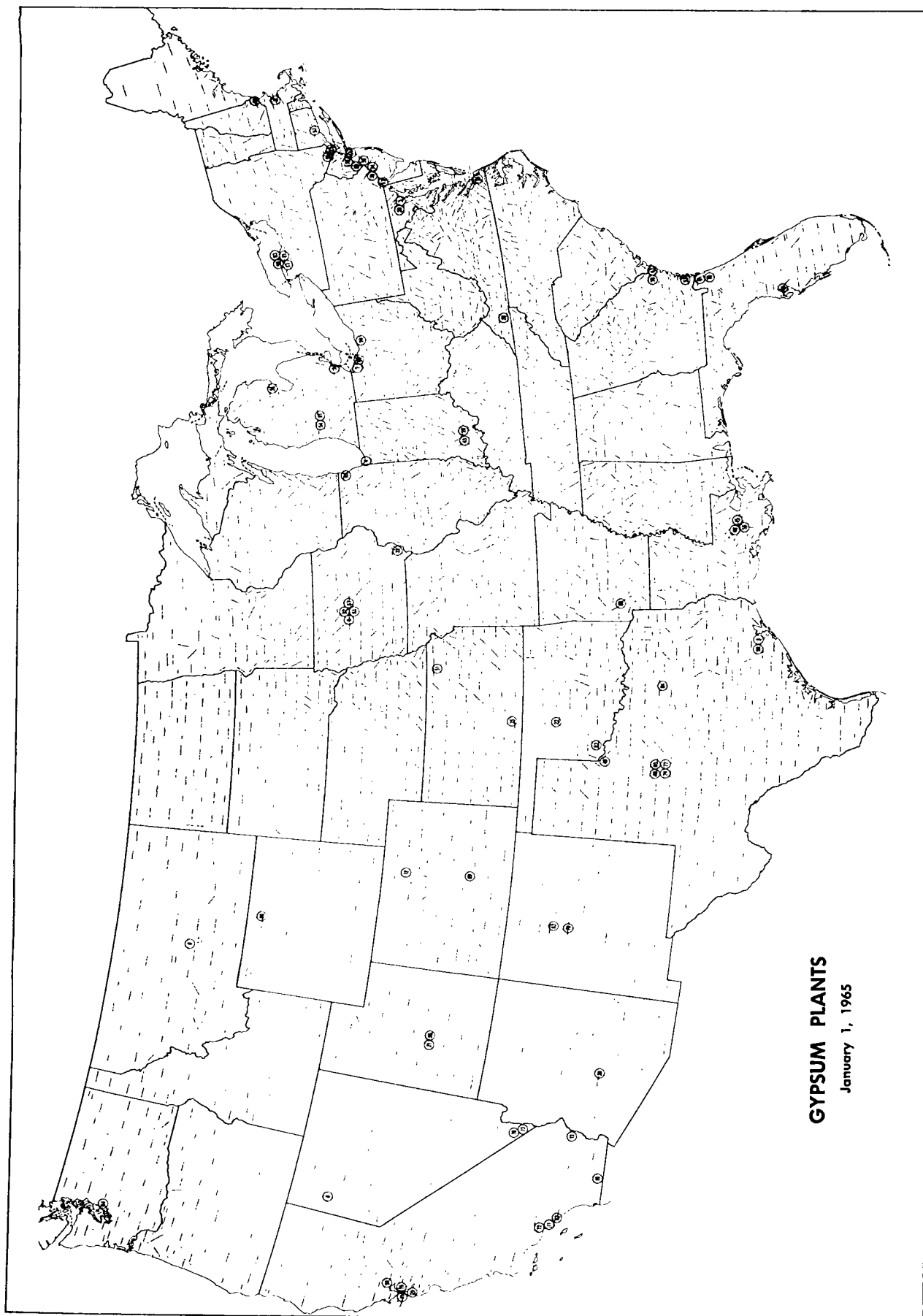
4. SAMPLES:

All samples of wall board, lath and sheathing are cut from standard production at Fort Dodge where the sample department is located.

BESTWALL GYPSUM COMPANY
GYPSUM MANUAL

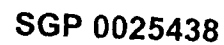
<u>COMPANY</u>	<u>MAIN PLANT</u>	<u>%Bd Pl. Bd. Pl. & Bd.</u>	<u>INDUSTRY POSITION BOARD ONLY</u>
American Gypsum Co.	Albuquerque, N.M.	1	
Barrett Division	New York, N.Y.	1	
Bestwall Gypsum Co.	Paoli, Pa.	9	3
Celotex Corporation	Chicago, Ill.	4	
Dierks, Inc.	Briar, Ark.	1	
Fiberboard Paper Products (Pabco)	San Francisco, Calif.	4	
Flintkote	New York, N.Y.	5	
Grand Rapids Gypsum Co.	Grand Rapids, Mich.	1	
Kaiser Gypsum Co.	Oakland, Calif.	7	4
National Gypsum Co.	Buffalo, N.Y.	2 18	2
Republic Gypsum Co.	Duke, Okla.	1	
Ruberoid	Wheatland, N.Y.	1	
Texas Gypsum Co.	Dallas, Texas	1	
U. S. Gypsum Co.	Chicago, Ill.	26	1
	TOTAL	82	

SGP 0025436



GYPSUM PLANTS
January 1, 1965

**MINE,
QUARRY,
OR BY SHIP
TO COAST PLANT**



BESTWALL GYPSUM COMPANY
GYPSUM MANUAL

GYPSUM PLANTS

Listed below are the operating gypsum plants in the United States as of January 1, 1965. The corresponding number next to each plant location is shown on the attached map.

UNITED STATES GYPSUM COMPANY

Headquarters: Chicago, Illinois

- | | |
|--|--------------------------------|
| 1. Baltimore, Maryland | 14. New Brighton, New York |
| 2. Charlestown, Massachusetts | 15. New Orleans, Louisiana |
| 3. Detroit, Michigan | 16. Norfolk, Virginia |
| 4. East Chicago, Indiana | 17. Oakfield, New York |
| 5. Fort Dodge, Iowa | 18. Philadelphia, Pennsylvania |
| 6. Gerlach, Nevada | 19. Plaster City, California |
| 7. Gypsum, Ohio | 20. Plasterco, Virginia |
| 8. Heath, Montana | 21. Sigurd, Utah |
| 9. Houston, Texas | 22. Southard, Oklahoma |
| 10. Jacksonville, Florida | 23. Sperry, Iowa |
| 11. Los Angeles, California
(in const.) | 24. Sweetwater, Texas |
| 12. Loveland, Colorado | 25. W. Haverstraw, New York |
| 13. Midland, California | 26. Willow Valley, Indiana |

NATIONAL GYPSUM COMPANY

Headquarters: Buffalo, New York

- | | |
|----------------------------|-------------------------------|
| 29. Baltimore, Maryland | 31. Clarence Center, New York |
| 30. Burlington, New Jersey | 32. Fort Dodge, Iowa |

NATIONAL GYPSUM COMPANY

Headquarters: Buffalo, New York (Continued)

- | | |
|-----------------------------|-------------------------------|
| 33. Harlem River, New York | 40. Rotan, Texas |
| 34. Lorain, Ohio | 41. San Francisco, California |
| 35. Medicine Lodge, Kansas | 42. Savannah, Georgia |
| 36. National City, Michigan | 43. Shoals, Indiana |
| 37. New Haven, Connecticut | 44. Tampa, Florida |
| 38. Phoenix, Arizona | 45. Waukeegan, Illinois |
| 39. Portsmouth, N. H. | 46. Westwego, Louisiana |

BESTWALL GYPSUM COMPANY

Headquarters: Paoli, Pennsylvania

- | | |
|-------------------------|----------------------------|
| 49. Acme, Texas | 54. Grand Rapids, Michigan |
| 50. Akron, New York | 55. New Orleans, Louisiana |
| 51. Blue Rapids, Kansas | 56. Sigurd, Utah |
| 52. Brunswicks, Georgia | 57. Wilmington, Delaware |
| 53. Fort Dodge, Iowa | |

KAISER GYPSUM COMPANY

Headquarters: Oakland, California

- | | |
|---|----------------------------|
| 58. Antioch, California | 61. Jacksonville, Florida |
| 59. Delanco Twp., New Jersey
(in const.) | 62. Long Beach, California |
| 60. Houston, Texas | 63. Rosario, New Mexico |
| | 64. Seattle, Washington |

CELOTEX CORPORATION

Headquarters: Chicago, Illinois

- | | |
|--------------------|-----------------------------------|
| 65. Celotex, Texas | 66. Cody, Wyoming (Big Horn Div.) |
|--------------------|-----------------------------------|

CELOTEX CORPORATION
Headquarters: Chicago, Illinois

67. Fort Dodge, Iowa

68. Port Clinton, Ohio

FIBERBOARD PRODUCTS INC. (PABCO)
Headquarters: San Francisco, California

69. Adobe, Colorado

71. Newark, California

70. Arden, Nevada (in const.)

72. Southgate, California

FLINTKOTE (BLUE DIAMOND)
Headquarters: New York, New York

73. Arden, Nevada

76. Savannah, Georgia (in const.)

74. Camden, New Jersey

77. Sweetwater, Texas

75. San Francisco, California
(in const.)

AMERICAN GYPSUM COMPANY
Headquarters: Albuquerque, New
Mexico

REPUBLIC GYPSUM COMPANY
Headquarters: Lubbock, Texas

78. Albuquerque, New Mexico

82. Duke, Oklahoma

BARRETT DIVISION ALLIED
CHEMICAL CO.
Headquarters: New York, New York

RUBEROID
Headquarters: New York, New York

79. Edgewater, New Jersey

83. Wheatland, New York

DIERKES
Headquarters: Kansas City,
Missouri

TEXAS GYPSUM COMPANY
Headquarters: Dallas, Texas

80. Briar, Arkansas

84. Dallas - Fort Worth, Texas

GRAND RAPIDS PLASTER COMPANY
Headquarters: Grand Rapids, Michigan

81. Grand Rapids, Michigan

BESTWALL GYPSUM COMPANY
GYPSUM MANUAL

WALLBOARD PRODUCTS

- (a) Bestwall Gypsum Wallboard is available in square edge, tapered edge, or beveled edges. Thicknesses available are 1/4", 3/8", 1/2" and 5/8" thicknesses and 48" widths. Tapered edge differs from square edge in that during manufacture vinyl tapes up to 1/32" thick are inserted under the edges of the board. This holds up the edges of the board, taking the shape of the vinyl tape, until the core hardens and thus produces a taper on the face. Beveled edge board is made by making three score marks on each edge of the paper and then forming each edge one half perpendicular and the other half at a 45° angle. All thickness boards are bundled two pieces to the bundle.

NOTE: - Refer to the Brochure "Gypsum Wallboard Products"
File No. 23-L for additional information on Wall-
board Products, which need not be repeated here.

- (b) Insulating Gypsum Wallboard is well presented in the brochure. Some concerns laminate with a paper backed foil which naturally presents a smoother wrinkle free foil side. Bestwall laminates with a bare foil which will reflect even the texture of the backing paper which in no way deters from its end use. Insulating board is shipped bundled with the ivory faces together, and the foil side out being protected by total wrapping with paper and edge tapes and protector and tear strips.
- (c) Gypsum Sheathing is largely made with a water repellant core which is water-proofed with a wax-asphalt emulsion. It may be obtained untreated with the normal white wallboard core on special order. The treated board meets A.S.T.M. designation C79-54. The cover papers on gypsum sheathing are colored black and the face has a large yellow imprint with the Bestwall brand name.
- (d) New Improved Firestop has been given additional fire resistance compared to the original Firestop board. It is made in the same manner as regular Bestwall except that special ingredients (textile glass fiber and raw vermiculite unexpanded) are added to the core in carefully controlled amounts so that Bestwall Firestop lends increased fire resistance to constructions in which it is used. The face is printed to indicate it is Bestwall Type "X" fireproof board. This is so building inspectors may see that Type "X" board is installed on the proper walls needing extra fire protection.
- (e) 5/8" Firestop Gypsum Backer has the same, superior core characteristics as the New Improved Firestop. Read the brochure for details on its use.

- (f) Tile Backer Board is a new product added to Bestwall's line of Wallboard products. It is essential that the special self-adhering vinyl tape supplied by Bestwall is used with this board to seal joint, cut ends and edges. If used in showers it is recommended that it be treated as advised by the Gypsum Association in that the full surface be first water-proofed with the recommended tile adhesive.

PRE-DECORATED GYPSUM PANELING

- (g) Eternawall is regular bevel edged wallboard that has a vinyl sheet laminated to the face and around the edge onto the back. There are now 5 standard colors and a new standard true wood appearance vinyl called Woodmere Walnut. A new feature is the wrap around of the edges which insure adequate adhesion at these places. Nails are available at the plants to use with the 6 standard finishes. A Decorator line of Eternawall is also available with a multitude of colors and patterns. These special vinyls are subject to minimum orders.
- (h) There are now 5 lines of wood grain paneling called Tru-Grain. All except Knotty Pine have a random plank design of black depressed lines. The Knotty Pine design shows a plank design in its photographic reproduction. Block headed nails are available for the 4 tru-grains with the random plank design. All Tru-Grain paneling are now square edge boards. Knotty Pine, Honey Aspen and Mellow Mahogany are finished with a durable transparent coating that will withstand repeated cleaning. The Deluxe Tru-Grain panels Fruitwood and Heritage Cherry offer additional durability. Deluxe Tru-Grain has an additional 2 mil clear vinyl coating.
- (i) Formboard is made 1/2" thick and 32" wide for use as a support for poured-in-place gypsum roof decks. Both cover papers on formboard are heavy and strong to lend strength and rigidity during the pouring of the gypsum fibered concrete. The face paper is treated in manufacture with a fungicide so that mold growth will not occur during the relatively long drying period required for poured-in-place decks. The back paper has a soft absorbent face liner to promote good adhesion between it and the gypsum concrete. The formboard then acts as a tension member of the roof deck which insures high strength.
- (j) Laminated Constructions: Refer to Section 6 - Sub-Section B. There is a technical Data table on various constructions giving fire ratings, sound transmission, building codes, etc. - Section 7 - Partition and Ceiling Systems.
- (k) Joint System Products are dealt with briefly at the back of the Sweet's

Bestwall Gypsum Wallboard Products Literature. References are given of more detailed direction for the use of these products. Section 6 - "Joint Treatment".



GEORGIA-PACIFIC CORPORATION

BESTWALL GYPSUM DIVISION

1965 EDITION GYPSUM WALLBOARD PRODUCTS MANUAL

BOOK #1

TABLE OF CONTENTS

<u>Section #</u>	<u>Sub-Section #</u>
1.	Preface
2.	Table of Content
3.	Manufacture
4.	ASTM - ASA - Trade Marks
5.	Wallboards
	A. General Literature
	B. Regular Gypsum Board
	C. Firestop
	D. Backer Board
	E. Insulating Gypsum Wallboards
	F. Predecorated Wallboard
	G. Sheathing
6.	Joint Treatment
	A. Joint Products
	B. Adhesives
	C. Textures
	D. Tools
	<u>Book #2</u>
7.	Partition and Ceiling Systems (Strip Lamination & Two-Ply Gypsum Lamination)
	A. Semi-Solid Partitions
	B. Double - Solid Partitions
	C. Ceiling Systems
	D. Fireproofing Steel Column
	E. Metal and Accessories
	F. Miscellaneous
8.	Gypsum Tile
9.	Fire and Sound Tests
	A. Fire Ratings
	B. Sound Tests
10.	Building Codes
11.	Miscellaneous

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GYPSUM WALLBOARD MANUALSection 3.

1965 EDITION

MANUFACTURE of GYPSUM WALLBOARD and GYPSUM LATHBoard Products

Gypsum Wallboard, Lath and Sheathing are composed of a core, hydrated calcined gypsum fibers and other ingredients, surfaced on both sides with smooth, uniform, specially-prepared paper forming the finished surfaces and serving as a reinforcement.

Each raw material used in the manufacture of these products is for a specific purpose, and only those that meet our rigid specifications are used. The quality and structural value of each board product depends upon its composition and fabrication during manufacture. To thoroughly understand the quality, properties, uses, etc., of each product, its composition and manufacture should be known. Therefore, the manufacturing may best be followed by starting with the raw materials and following their course, step by step, through the process.

1. RAW MATERIALS(a) Paper:

Bestwall manufactures in its own paper plants, most of the special paper used for surfacing wallboard, lath and sheathing. A different kind of paper is used for each finished product. Bestwall's three paper mills are located at Pryor, Oklahoma; Thorold, Canada; and Delair, New Jersey. Some paper, as necessary, is purchased from outside sources in accordance with our own specifications.

The papers are manufactured on seven or eight cylinder paper machines, which means that there are seven or eight separate layers of paper stock felted together to form the solid finished sheet. The finished sheet as formed consists of 3 parts which are known as the face liner, filler, and bond liner. By building up the solid sheet in this manner, the composition of each part of the sheet can be controlled so as to produce a paper which will have the properties required by the finished gypsum board products.

All papers used for wallboard, lath and sheathing have certain properties in common:

1. The bond liner in all cases is made from unsized stock and is designed to produce perfect bond to the gypsum core. The bond to the gypsum core is accomplished by the bond liner absorbing the saturated gypsum solution from the gypsum slurry used for forming the core. Gypsum crystals grow in this saturated solution that has been absorbed by the bond liner and interlace into the crystals of the core, thereby producing the bond.

1965 EditionManufacture of Gypsum Wallboard & Gypsum Lath (Continued)

2. The filler of all our paper is made from a specially-treated (sized) paper stock to render it water resistant. The water resistance of the filler is very important. It is one of the features of the paper which we use for all types of board, lath and sheathing. The filler is designed to prevent the free water present in the slurry and core from percolating through the face and back papers to the surfaces while the board is being manufactured. If this water filtered through the face and back papers, it would cause unsightly water marks, stains, etc. on the finished sheet.

The water resistant filler in lath paper prevents the passage of free water present in gypsum plaster mortar when it is applied on the surface of gypsum lath, from passing through the covering paper into the core of the lath.

3. The face liner used for wallboards is made from a special paper stock which is colored, highly sized, and treated to render it water and scuff resistant. The finished surface is smooth, uniform, and non-absorptive. The face liner of lath paper is water absorbent exactly the same as the bond liner (as explained in 1 above), because its surface must have the properties of bonding to the gypsum plaster applied to the lath.

The face liner of gray wallboard back paper is made from stock that is slightly sized so as to render it scuff-resistant. The face liner of the paper used on sheathing is made from paper stock which is colored black, highly sized, and treated to render it water resistant, and scuff resistant. The finished surface is smooth, uniform and non-absorptive.

(b) Stucco:

The stucco used for manufacturing the core is designed especially for this purpose. It is of proper fineness and is low in water carrying capacity. This produces a core which has the proper hardness and strength.

(c) Glass Fiber:

The glass fiber used in Bestwall gypsum wallboards is the continuous textile grade which is soft and non-irritating to the skin. It has a very high tensile strength, being stronger than many steels. It is obtained in multiple strands wound in spools, and is cut to proper length continuously in synchronization with the belt speed of the board machine. The glass fiber is used under Bestwall Gypsum Company's Patent No. 2,681,263.

(d) Paper Fiber:

Paper Fiber is used along with glass fiber in all lath and board products except Firestro Bestwall, which contains only glass, lath and fiber. The paper fiber is scrap paper purchased from outside sources or waste paper from the wallboard operation. The paper is beaten up in water in a hydro-pulper in either a 2½ or 3 percent

concentration. It is pumped to the mixer by a variable speed pump which proportions the proper amount of paper pulp, depending upon the type of product being made and the speed of operation.

The glass fiber and paper pulp are added to the core for the following reasons:

1. To give proper nailing properties to the core and to eliminate chipping and shattering of the core at open edges of the board.
2. To reduce the brittleness of the core.
3. To produce a wallboard that has the required flexibility and which can be handled without breakage.
4. To reduce the weight of the board.

(e) Adhesives:

The gypsum crystals which form the core and bond it to the bond liner of the paper used are very fine and brittle. To protect these crystals, and to add to the bond between the core and the bond liner of the paper, a special adhesive is used. This adhesive is mixed into the ingredients in the core. It is water soluble and, therefore, concentrates between the gypsum crystals where the core is in contact with the bond liner. This reinforces the crystalline structure and adds to the bond between the core and the paper covering. This concentration of the adhesive at the surfaces of the core is somewhat similar to the action of the soluble gum added to produce the case-hardened surfaces of statuary casting plaster.

(f) Accelerator:

The gypsum core must be set hard by the time the board reaches the cut-off knife, which is near the end of the board machine, so that the board can be cut into the required lengths. This makes it necessary to use an accelerator to regulate the setting time of the slurry. The accelerator which we use is ordinary pulverized gypsum rock. Chemical accelerators such as potassium sulphate, ammonium sulphate, etc. may also be used.

(g) Foam:

The foam added to the slurry used for producing the core is made from a solution of rosin soap or other foaming agent. This solution is passed through special equipment that beats it into a stable, uniform-structured, small-bubble foam. The foam produces microscopic air voids throughout the gypsum core. The soap solution reacts with the gypsum to form insoluble calcium salts which further reinforce the void structure of the gypsum core. Foam is added to the slurry to:

1. Increase the thermal insulation value of the board.
2. Reduce the brittleness of the core.

3. Add to the flexibility of the board.
4. Reduce the weight of the board.

2. PROCESS OF MANUFACTURE:

Each step in the process of manufacture is carefully controlled to produce quality and uniformity in the board, lath or sheathing. Quality depends upon the combination of the face and back paper used and the structure of the core (the paper has been described above). The paper and the structure of the core controls rigidity, structural strength and durability of the finished product. The required hardness and strength of the core can be achieved by proper formulation of the dry ingredients and control of the water-plaster ratio.

The proper mixing of the dry ingredients, the addition of the foam, paper pulp, glass fibers and the proper wet mixing before the slurry is poured onto the paper covering are all very important. A very rigid system of inspection, testing and control is maintained at all our plants to make sure that the proper percentage of each raw material is used, and that the mixture is thoroughly dry mixed and wet mixed before it is used for forming the core.

(a) Dry Mixing:

It is essential to thoroughly mix the glass fiber, accelerator and adhesive into the dry stucco so that a uniform mixture is obtained. Dry mixing is accomplished in the conveying equipment as the material is delivered to the wet end of the machine.

(b) Wet Mixing:

The dry ingredients are fed into a high-speed centrifugal mixer and are blended with mixing water, paper pulp and foam. The consistency of the slurry is accurately controlled by regulating the mixing water through the use of a recording water meter. The weight of the slurry is controlled by varying the foam content as required to produce a slurry of a definite density. Slurry from the mixer is discharged in three streams so that three streams of gypsum lath may be made at one time. For other boards, the streams all blend together at the forming rolls except where two streams of sheathing are made in which case only two streams are used.

(c) Edge Formation:

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Square Edge, Tapered Edge, Tongue & Groove Edge, and Beveled Edge Boards are made by cutting grooves along the edges of the face paper after it leaves the paper rack. The inside grooves regulate the width of the finished product. As the grooved paper approaches the forming rolls, it is folded into the various shapes along the grooves which are required for the particular type edge being made by means of edge folding devices. Spaces between grooves are set depending upon the type product being made and its thickness. Gypsum lath paper is not grooved along its edges (continued on next page)

1965 EDITION

but is passed through edge forming devices which fold the paper in a semi-circle on each side producing a "round" edge product.

As the papers pass through the forming rolls, adhesive is applied to each edge of the back paper which serves to stick the edges of the back paper to the folded edges of the face paper.

(d) Thickness:

Thickness of the various products is controlled by the spacing of the forming rolls.

(e) Length of the Machine:

As the gypsum board or lath leaves the forming section, it is carried on wide rubber belts and carrier rolls to allow time for the gypsum core to harden (set). The total length of the machine depends to a considerable degree upon the speed operated. Our longest machine is at Brunswick where this distance is 949 ft.

(f) Cut-Off Knife:

All plants use rotary knives for cutting the board into various lengths. The drive for the cutting mechanism is adjustable so that lengths can be varied as needed for various products.

(g) Transfer Table:

After the boards are cut to length, they are picked up by a transfer table and carried sideways to a tipple table which feeds the boards into the dryer. The dryer runs parallel with and alongside the board machine. As 48" wide wallboards are transferred, they are inverted so that the ivory face is turned up. This preserves the finish of the ivory paper from blemishes, slick spots, etc. which may occur when the paper is in contact with the kiln rolls.

(h) Drying

The board from the transfer is fed by the tipple table into the dryer which has 6 or 8 decks, and is wide enough to take 2 streams of board 4' wide, 3 streams 32" wide, 4 streams 24" wide, and 6 streams 16" wide. Our dryers are heated either by steam coils or by direct combustion of natural gas. The temperature is carefully controlled in the various zones into which the dryer is divided so as to dry the products properly. Large circulating fans blow the hot gases over the boards and laths and the moisture which is evaporated is blown out through exhaust stacks.

(i) Take-off:

SGP 0025452

In all plants except Blue Rapids, wallboard products are grouped into pairs face to face automatically and conveyed through a bundling machine where the end tapes are applied. The bundled packages are

stacked automatically and handled to the warehouse or loading dock by fork trucks. Lath is handled on a separate system where it is bundled into 6 pieces to the bundle (5 at Sigurd). At Blue Rapids, board and lath are unloaded from the kiln by hand and fed into the packaging machines.

(j) Pinholath

Pinholath is made under exclusive license from the Pinco Co. under Patent No. 3,879,662. The pinholes puncture the paper and permit water from plaster applied thereto to be absorbed into the core in a controlled amount. This serves to rigidify the plaster next to the paper face and is designed specifically for use with machine applied plaster.

(k) Perforated Lath

The perforating is done by a punching machine at the end of the board machine; the operation being performed on the wet lath before it is cut into 48" lengths. The perforations are 3/4" in diameter and spaced 4" apart.

(l) Reclaiming Department

In this department, re-cutting equipment is available so that the damaged goods can be cut into smaller sizes and reclaimed for shipment to the trade.

(m) Loading Cars & Trucks

Loading cars of wallboard, lath and sheathing is done under close supervision. All possible precautions are taken to insure delivery of board in good condition. To illustrate the precautions which are taken, here is the routine which is followed in loading cars:

All cars are carefully inspected before they are accepted for loading wallboard, lath & sheathing. Any cars with leaky roofs, broken or unusually dirty floors, etc., are rejected. All loose nails are pulled from the floors & sides. Any loose boards are fastened to prevent damage to the load. After the cars have been cleaned and prepared, the floors are covered with dunnage board and the walls covered with paper. Only then does loading start. While loading the cars, paper pads are attached to the side of the cars to protect the ends & edges of the piles of board, lath or sheathing. Special care is used to brace, tie and protect the piles, and to prevent shifting or damage enroute.

Wherever possible, gypsum board products are now loaded into box cars or on flat cars by fork lift trucks. By this method, whole units are set in place at one time. Spacers are placed between each unit so that the forks of the lift truck can be easily inserted and withdrawn.

Flat cars are covered & the load held in place with steel strapping.

1965 Edition3. INSPECTION:

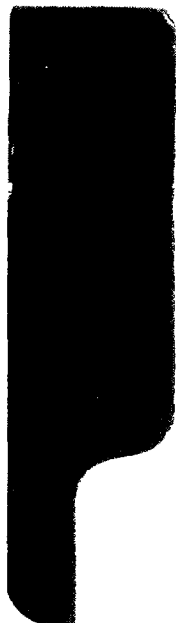
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4. SAMPLES:

All samples of wallboard, lath and sheathing are cut from standard production at Fort Dodge where the sample department is located.

Fig. 1. Sample of wallboard

± 1/4" - Length
- 1/8" - Width
± 1/64" - Thickness



BEST WALL GYPSUM COMPANY

GYPSUM WALLBOARD MANUAL

Section 4.

1965 EDITION

ASTM, FEDERAL, ASA and ETC.

Refer to the Gypsum Lath and Plaster Manual, 1965-Edition, - Section 5 regarding the Standards under which the Bestwall Gypsum Company's Gypsum products are manufactured.

- | | | |
|-------------|---|----------------|
| 1 - A S T M | - | Specifications |
| 2 - Federal | - | Specifications |
| 3 - A S A | - | Specifications |

7/11/65 - 11/11/65

Length

±

Width

Thickness



GEORGIA-PACIFIC

INTERDEPARTMENTAL COMMUNICATION

DATE: October 29, 1968

TO: All Regional & District Managers

LOCATION:

FROM: O. E. Burch

LOCATION: Portland

SUBJECT: New ASTM Standards

Two new important ASTM Standards have been approved as of October 11, 1968.

Please make note of these two standards on your Product Specification Directory and inform interested parties in your region or district that they should be included on their Product Specification Directory.

The two new standards are--

C 630 - 68 T, Specification for Water Resistant Gypsum Backing Board
(Tile Backer)

C 631 - 68 T, Specification for Bond Compounds (Bonding Agents) for
Interior Plastering

A new Product Specification Directory is now being prepared and will be ready for distribution soon.

UEB:ksm

SGP 0025457



GYPSUM PRODUCTS SPECIFICATION DIRECTORY

This list provides a simple up-to-date cross reference of Bestwall products with applicable American Society for Testing Materials Standards (ASTM Standards), Federal Specifications and American Standards Association Specifications (ASA). The last two digits in the

ASTM reference number indicate the year of the edition. Where any specification covers more than one material the type or paragraph is shown. Items for which no standard is written are indicated.

GYPSUM BOARD PRODUCTS

PRODUCT	THICK- NESS	WIDTH	LENGTH	ASTM STANDARDS	FEDERAL SPEC.	APPLIED UNDER
GP/BESTWALL WALLBOARD Tapered Edge	1/4"	4'	6' to 12'	C 36-67	SS-L-30c Type III—Grade R 3/20/67	ASA A97.1
Square, Tapered or Round Edge	3/8"	4'	6' to 16'			
	1/2"	4'	6' to 16'			
	5/8"	4'	6' to 16'			
GP/BESTWALL INSULATING WALLBOARD Square or Tapered Edge	3/8"	4'	6' to 16'	C 36-67	SS-L-30c Type III—Grade R 3/20/67	ASA A97.1
	1/2"	4'	6' to 16'			
	5/8"	4'	6' to 16'			
GP/BESTWALL ETERNAWALL™ Square or Beveled Edge	1/2" 5/8"	4' 4'	8'† 8'†	C 36-67	SS-L-30c Type III—Grade R or Grade X Class III 3/20/67	ASA A97.1
GP/BESTWALL FIRESTOP™ WALLBOARD Square or Tapered Edge	1/2" 5/8"	4' 4'	6' to 16' 6' to 16'	C 36-67	SS-L-30c Type III—Grade X 3/20/67	ASA A97.1
GP/BESTWALL FIRESTOP INSULATING WALLBD. Square or Tapered Edge	1/2" 5/8"	4' 4'	6' to 16' 6' to 16'	C 36-67	SS-L-30c Type III—Grade X 3/20/67	ASA A97.1
GP/BESTWALL TILE BACKER BOARD Tapered Edge	1/2" 5/8"	4' 4'	8', 11' and 12'	C630-68T	—	—
GP/BESTWALL GYPSUM SOUND DEADENING BD. Square Edge	1/4"	4'	8'	C442-67	SS-L-30c Type IV—Grade R	—
GP/BESTWALL BACKER Square or T & G Edge	3/8" 1/2" 5/8"	4' 2' 2'	8' Std.† 8' Std.† 8' Std.†	C 422-67	SS-L-30c Type IV Grade R Grade X	—
GP/BESTWALL FIRESTOP™ GYPSUM SHEATHING Long edges - Tongue and Groove Core-treated	1/2"	4'	8' & 9'	C 79-67	SS-L-30c Type II Grade R&W	—
Tongue and Groove Core-treated	1/2"	2'	8' Std.†	C 79-67		—
Square Edge Non core-treated	1/2"	2'	8' Std.†	C 79-67		—
GP/BESTWALL DENS-COTE BASE	1/2"***	4'	8' & 10'†	C 588-66T	—	—
GP/BESTWALL LATH Plain, Pinholath or Perfolath	3/8" 1/2"	16" 16"	48" 48"	C 37-67	SS-L-30c Type I Grade R*	ASA A42.4
Insulating Lath	3/8" 1/2"	16" 16"	48" 48"			
Long Length (Plain Only) Round Edge or Tongue and Groove Edge	1/2"	24"	8' Std.†			
				*All Bestwall Lath, except Perfolath, meets Type X Requirements.		

†Standard Length—Other Lengths on Order

**Standard Thickness—Other Thicknesses on Order.

SGP 0025458

GYPSUM PRODUCTS SPECIFICATION DIRECTORY

PLASTER PRODUCTS

BRAND	PRODUCT	ASTM STANDARDS	FEDERAL SPEC.	APPLIED UNDER
GP/BESTWALL	NEAT BASE COAT PLASTER Unfibered, Fibered*, and Extra Fibered*	C-28-66	SS-P-00402a Type II	ASA A42.1
GP/BESTWALL	LITE-MIX BASE COAT PLASTER Unfibered, Fibered (Glass Only) and Masonry Mix	C-28-66	SS-P-00402a Type I	ASA A42.1
GP/BESTWALL	WOOD FIBERED PLASTER	C-28-66	SS-P-00402a Type III	ASA A42.1
GP/BESTWALL	CONCRETE BOND PLASTER	C-28-66	SS-P-00402a Type IV	ASA A42.1
GP/BESTWALL	PREPARED TROWEL FINISH PLASTER	—	—	ASA A42.1
GP/BESTWALL	PREPARED AND FLOAT FINISH PLASTER—White	—	—	ASA A42.1
GP/BESTWALL	BUILDERS LIME (Autoclaved Finish Lime)	C 206-61	SS-L-351 (F)	ASA A42.1
GP/BESTWALL	SMOOTH FINISHING LIME (Normal Hydrated Mason's Lime)	C 6-61	SS-L-351 (F)	ASA A42.1
GP/BESTWALL	SPEEDY MASON'S LIME (Autoclaved Mason's Lime)	C 207-49 S	SS-L-351 (M)	ASA A42.1
GP/BESTWALL	MASON'S LIME (Normal Hydrated Mason's Lime)	C 207-49 N	SS-L-351 (M)	ASA A42.1
GP/BESTWALL	KEENE'S CEMENT	C 61-64	SS-P-00410a	ASA A42.1
GP/BESTWALL	GAUGING PLASTER—White (SATIN SPAR)	C-28-63	SS-P-00402a Type V	ASA A42.1
	Local	C-28-63	SS-P-00402a Type V	ASA A42.1
GP/BESTWALL	MOULDING PLASTER—White (SUNFLOWER)	C 59-65	—	—
	Local	C 59-65	—	—
GP/BESTWALL	DENS-COTE SMOOTH FINISH†	C-587-66T	—	—

*Glass Fibered unless Specified Sisal

†Texture Finish on Order

MISCELLANEOUS PRODUCTS

BRAND	PRODUCT	ASTM STANDARDS	FEDERAL SPEC.	APPLIED UNDER
GP/BESTWALL	JOINT SYSTEM MATERIALS	C 475-64	SS-J-570a 10/24/66	ASA A97.1
*	BONDING COMPOUNDS FOR INTERIOR PLASTERING	C631-68T		
GP/BESTWALL	METRO-MIX	C 317-64		ASA A59.1
GP/BESTWALL	FORM BOARD	C 318-67	Type V SS-L-30c Grade R	ASA A59.1

*Not manufactured by Georgia-Pacific.

Any question not answered by the information on this sheet or available from local sources should be referred to the General Sales Office. Be sure to give all information as to issuing office, date of specification, job description, location, enforcing party, product involved, description of use if other than normal, amount involved, etc. This is particularly important when special limitations under standard specifications are involved.

Gypsum Division field locations have a book of applicable Federal and ASTM Specifications. Each Specification is preceded with a detailed analysis prepared by the Laboratory of which GP/Bestwall products meet the specification and any limitations. The Local Sales Office is authorized to write a letter of certification in accordance with the Laboratory analysis.



GEORGIA-PACIFIC / GYPSUM DIVISION

P.O. BOX 311, PORTLAND, OREGON 97207

SGP 0025459

2/1/65

BEST WALL GYPSUM COMPANY

Cancels previous
issueGYPSUM WALLBOARD MANUAL1965 EDITION

<u>COMPANY</u>	<u>MAIN PLANT</u>	<u>PLANTS</u>			<u>INDUSTRY POSITION BOARD ONLY</u>
		<u>% Bd</u>	<u>Pl.</u>	<u>Bd.</u>	<u>Pl & Bd.</u>
American Gypsum Co.	Albuquerque, N.M.				1
Barrett Division	New York, N.Y.			1	
Bestwall Gypsum Co.	Paoli, Pa.				9
					3
Celotex Corporation	Chicago, Ill.				4
Dierks, Inc.	Briar, Ark.				1
Fiberboard Paper Products (Pabco)	San Francisco, Calif.				4
Flintkote	New York, N.Y.				5
Grand Rapids Gypsum Co.	Grand Rapids, Mich.				1
Kaiser Gypsum Co.	Oakland, Calif.				7
					4
National Gypsum Co.	Buffalo, N.Y.		2		18
					2
Republic Gypsum Co.	Duke, Okla.				1
Ruberoid	Wheatland, N.Y.				1
Texas Gypsum Co.	Dallas, Texas				1
U.S. Gypsum Co.	Chicago, Ill.				26
					1
				TOTAL	82

SGP 0025461

BESTWALL GYPSUM COMPANY

GYPSUM WALLBOARD MANUAL

Section 5
Sub-section A

1965 EDITION

WALLBOARD PRODUCTS

- (a) Bestwall Gypsum Wallboard is available in square edge, tapered edge, or beveled edges. Thicknesses available are 1/4", 3/8", 1/2" and 5/8" thicknesses and 48" widths. Tapered edge differs from square edge in that during manufacture vinyl tapes up to 1/32" thick are inserted under the edges of the board. This holds up the edges of the board, taking the shape of the vinyl tape, until the core hardens and thus produces a taper on the face. Beveled edge board is made by making three score marks on each edge of the paper and then forming each edge one half perpendicular and the other half at a 45° angle. All thickness boards are bundled two pieces to the bundle.
- NOTE: - Refer to the Brochure "Gypsum Wallboard Products" File No. 23-L for additional information on Wallboard Products, which need not be repeated here.
- (b) Insulating Gypsum Wallboard is well presented in the brochure. Some concerns laminate with a paper backed foil which naturally presents a smoother wrinkle free foil side. Bestwall laminates with a bare foil which will reflect even the texture of the backing paper which in no way deters from its end use. Insulating board is shipped bundled with the ivory faces together, and the foil side out being protected by total wrapping with paper and edge tapes and protector and tear strips.
- (c) Gypsum Sheathing is largely made with a water repellant core which is water-proofed with a wax-asphalt emulsion. It may be obtained untreated with the normal white wallboard core on special order. The treated board meets A.S.T.M. designation C79-54. The cover papers on gypsum sheathing are colored black and the face has a large yellow imprint with the Bestwall brand name.
- (d) New Improved Firestop has been given additional fire resistance compared to the original Firestop board. It is made in the same manner as regular Bestwall except that special ingredients (textile glass fiber and raw vermiculite unexpanded) are added to the core in carefully controlled amounts so that Bestwall Firestop lends increased fire resistance to constructions in which it is used. The face is printed to indicate it is Bestwall Type "X" fireproof board. This is so building inspectors may see that Type "X" board is installed on the proper walls needing extra fire protection.
- (e) 5/8" Firestop Gypsum Backer has the same, superior core characteristics as the New Improved Firestop. Read the brochure for details on its use.

- (f) Tile Backer Board is a new product added to Bestwall's line of Wallboard products. It is essential that the special self-adhering vinyl tape supplied by Bestwall is used with this board to seal joints, cut ends and edges. If used in showers it is recommended that it be treated as advised by the Gypsum Association in that the full surface be first water-proofed with the recommended tile adhesive.

PRE-DECORATED GYPSUM PANELING

- (g) Eternawall is regular bevel edged wallboard that has a vinyl sheet laminated to the face and around the edge onto the back. There are now 5 standard colors and a new standard true wood appearance vinyl called Woodmere Walnut. A new feature is the wrap around of the edges which insure adequate adhesion at these places. Nails are available at the plants to use with the 6 standard finishes. A Decorator line of Eternawall is also available with a multitude of colors and patterns. These special vinyls are subject to minimum orders.
- (h) There are now 5 lines of wood grain paneling called Tru-Grain. All except Knotty Pine have a random plank design of black depressed lines. The Knotty Pine design shows a plank design in its photographic reproduction. Block headed nails are available for the 4 tru-grains with the random plank design. All Tru-Grain paneling are now square edge boards. Knotty Pine, Honey Aspen and Mellow Mahogany are finished with a durable transparent coating that will withstand repeated cleaning. The Deluxe Tru-Grain panels Fruitwood and Heritage Cherry offer additional durability. Deluxe Tru-Grain has an additional 2 mil clear vinyl coating.
- (i) Formboard is made 1/2" thick and 32" wide for use as a support for poured-in-place gypsum roof decks. Both cover papers on formboard are heavy and strong to lend strength and rigidity during the pouring of the gypsum fibered concrete. The face paper is treated in manufacture with a fungicide so that mold growth will not occur during the relatively long drying period required for poured-in-place decks. The back paper has a soft absorbent face liner to promote good adhesion between it and the gypsum concrete. The formboard then acts as a tension member of the roof deck which insures high strength.
- (j) Laminated Constructions: Refer to Section 6 - Sub-Section B. There is a technical Data table on various constructions giving fire ratings, sound transmission, building codes, etc. - Section 7 - Partition and Ceiling Systems.
- (k) Joint System Products are dealt with briefly at the back of the Sweet's Bestwall Gypsum Wallboard Products literature. References are given of more detailed direction for the use of these products. Section 6 - "Joint Treatment".



GYPSUM ASSOCIATION

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Information Bulletin

RECOMMENDATIONS FOR STORING AND HANDLING OF GYPSUM WALLBOARD

One of the many problems involved in the handling of gypsum wallboard involves proper support and placement of risers in storage. This is particularly important in those instances where the warehouse handling is mechanized and the majority of the board is transported with a fork-lift truck. Therefore, the Materials Handling, Loading and Stowing Committee presents the following recommendations relative to storage and handling of gypsum wallboard.

Diagram No. 2 shows the recommended number of risers for the various lengths of board, regardless of thickness. The span between risers should not exceed 48 inches under any circumstances. With slow moving items that require prolonged storage, the wavy edged board problem can be solved by reducing the span between risers to 24 inches. Materials used for risers should not be less than 6 inches in width. Great care should be exercised in placing the risers and, as the units are tiered, the risers must be aligned from bottom to top so that each tier rests on solid bearing.

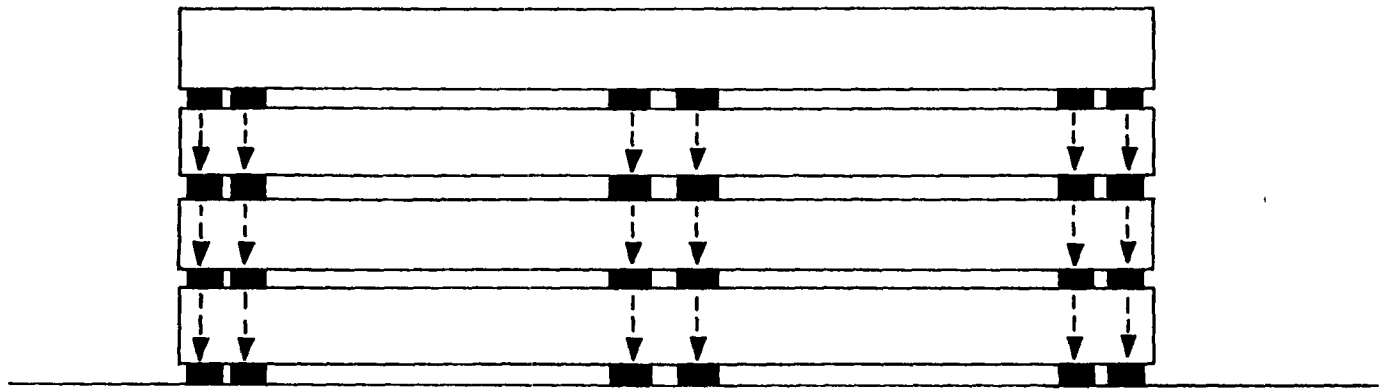
Diagram No. 1 shows the correct method of placing risers where the wallboard is tiered several units high. It also shows what can occur if the placing of risers is not done in accordance with the recommendations.

Dry storage is essential and weather protection should be provided for all storage of gypsum products.

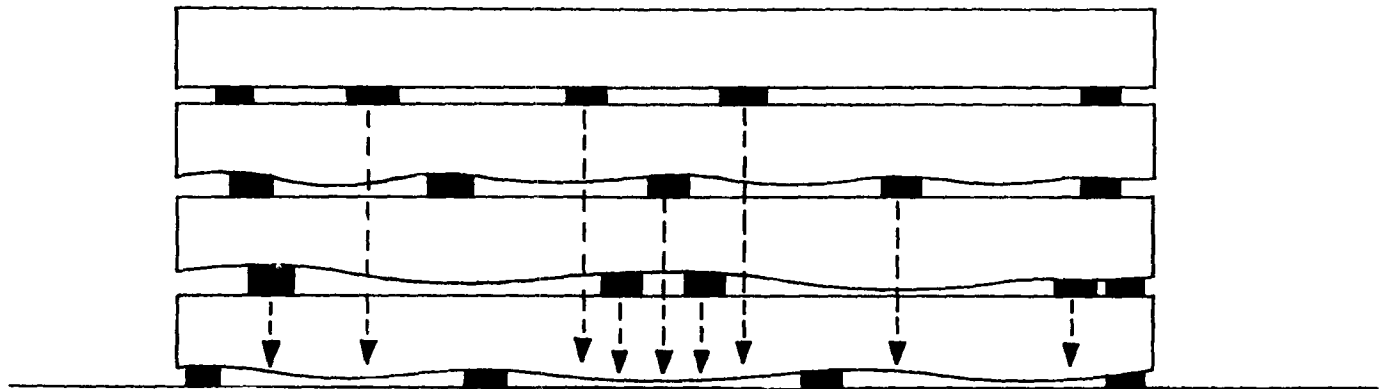
When board is handled by hand from delivery truck to the building where it is hung, the bundles should be carried on edge. It is preferable to pile the board flat down at the destination. Care must be exercised in turning the board from vertical to horizontal as it is piled (diagram No. 3). The most satisfactory method is to stand the board on edge at the near side of the pile as close to the edge of the pile as possible. Tip the board from vertical toward the stack and let it drop on the top of the pile. The air cushion developed as the board drops will be sufficient to prevent cracking, providing the board as it falls in place does not hang over the far edge more than an inch or two. A great portion of the board cracked on the job or after it is hung can be traced to improper stacking on the job site, or in the dealer's warehouse.

This information bulletin is released by the Materials Handling, Loading and Stowing Committee of the Gypsum Association as part of its over-all program for recommending procedures that will reduce the possibility of damage to gypsum products from incorrect handling both in transit and after it has been delivered to the dealer's warehouse.

DIAGRAM NO. 1



CORRECT METHOD OF PLACING RISERS
(DOTTED ARROWS INDICATED LOAD)



INCORRECT METHOD OF PLACING RISERS
(CUMULATIVE PRESSURE ON LOWER
UNITS CAUSES SAG OF WALLBOARD.)

DIAGRAM NO. 2

RECOMMENDED PLACEMENT OF RISERS FOR
WAREHOUSE STORAGE OF GYPSUM WALLBOARD

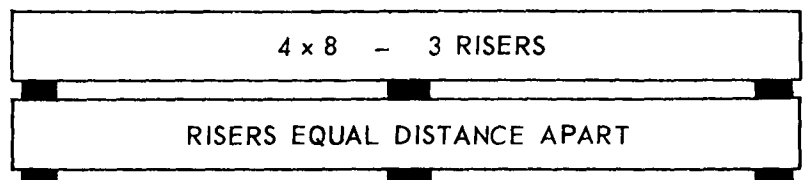
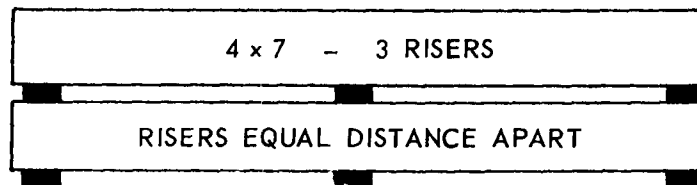
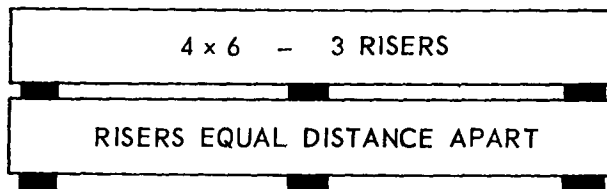
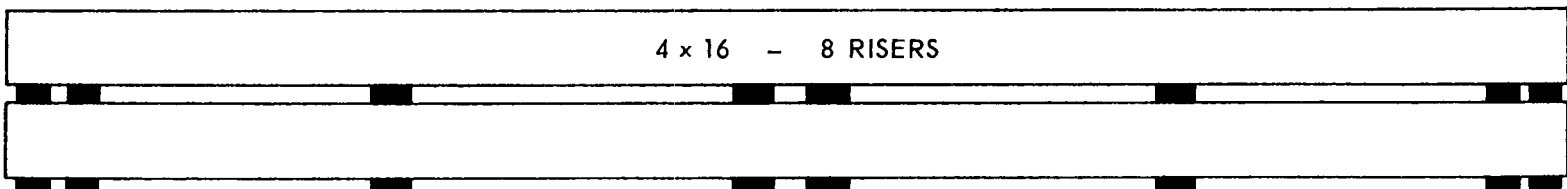
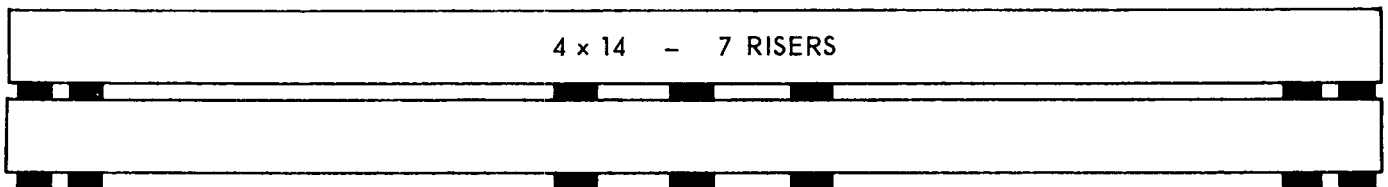
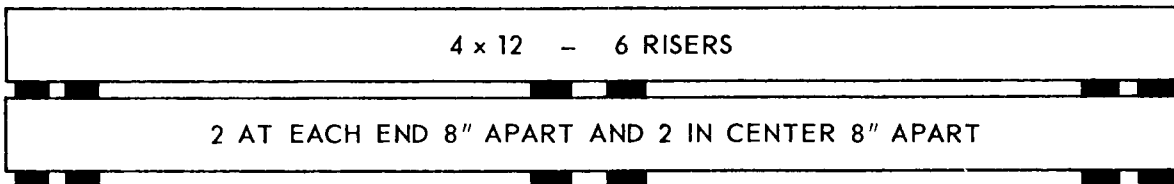
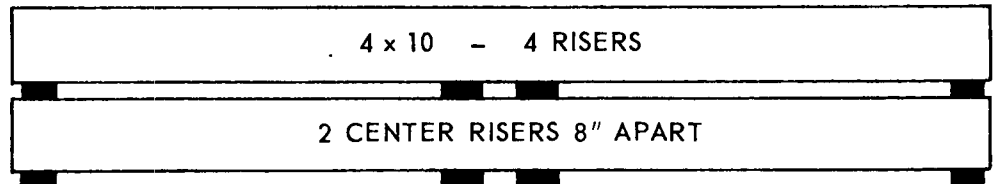
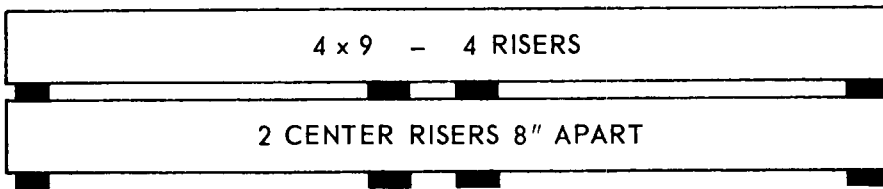


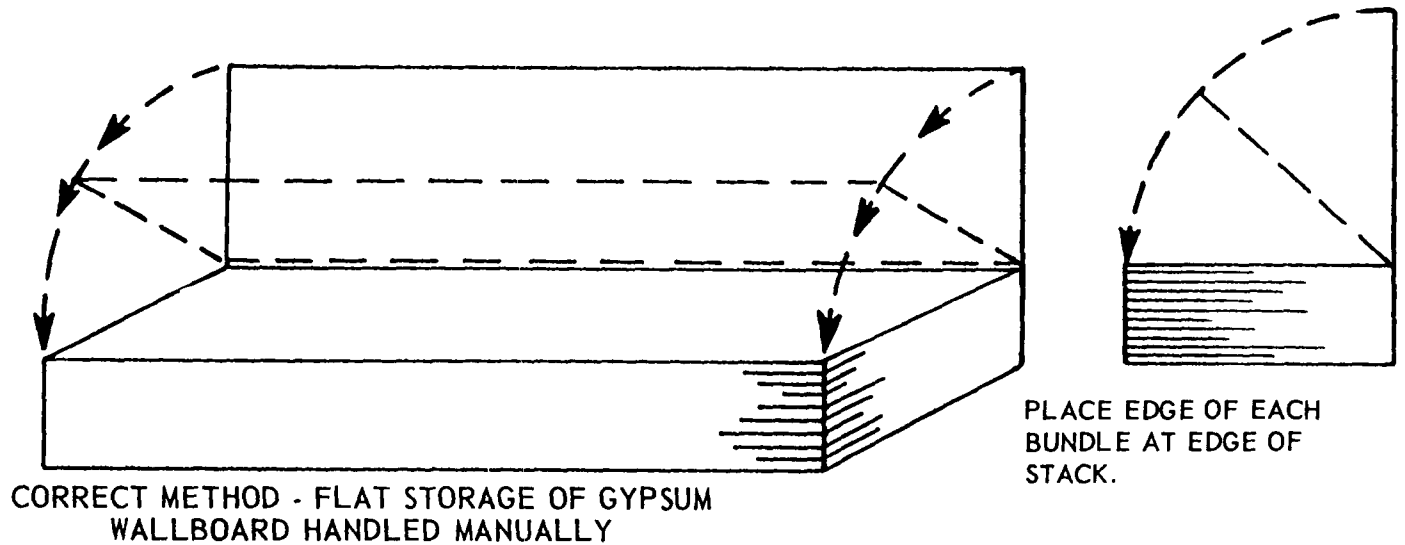
DIAGRAM NO. 2 (continued)



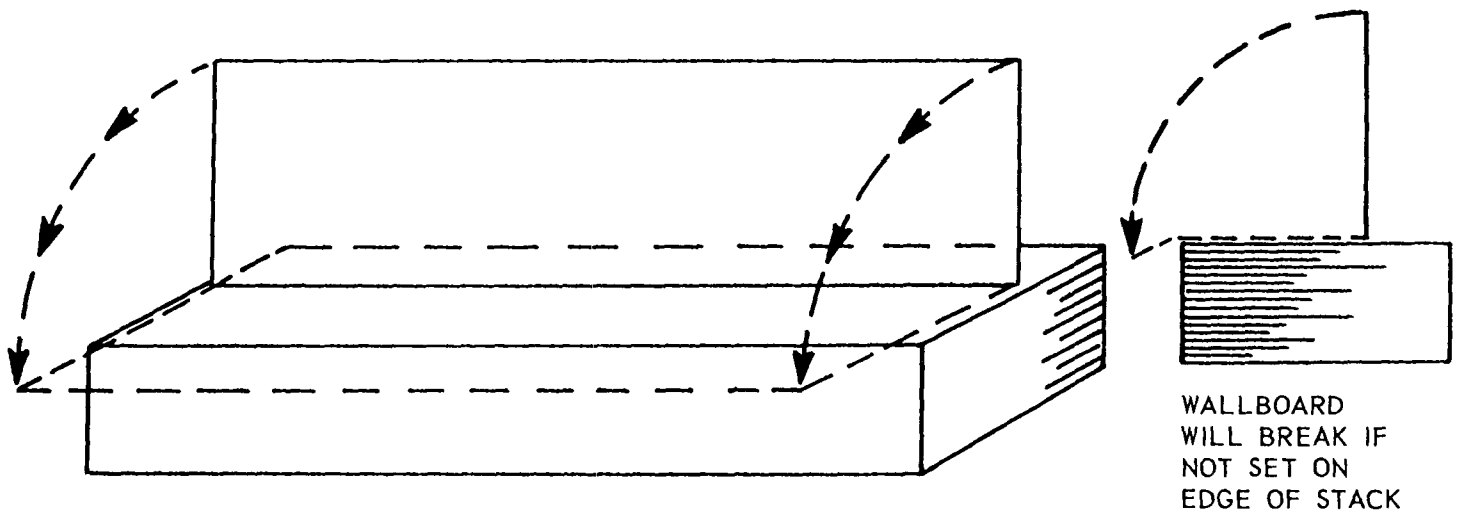
- NOTE: 1) THE NUMBER OF RISERS RECOMMENDED APPLIES TO ALL THICKNESSES OF BOARD OF THAT SPECIFIC LENGTH.
2) MINOR ALTERATIONS IN LOCATION OF RISERS MAY BE REQUIRED TO ADAPT TO DIFFERENT FORK SPACING.

DIAGRAM NO. 3

RECOMMENDED STACKING OF GYPSUM WALLBOARD
(MANUAL HANDLING)



INCORRECT - WALLBOARD WILL BREAK AT OVERHANG



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