1975

Design Versatility

PLAINTIFF'S EXHIBIT

USG-713

in the roof deck...

U.S.G. gypsum concrete can be shaped to virtually any roof configuration—curves, pitches, sawtooth angles or flat. It provides the adaptability needed to design buildings of distinctive appearance with no sacrifice of construction efficiency.

A free Computer Design Comparison Service is available to provide optimum bar joist spacing. This service may reduce in-place costs of deck and joists from 6¢ to 10¢ psf, still obtaining lowest insurance rates (see Specifications, page 15).

over the deck...

Gypsum concrete simplifies building design and permits use of constant height columns and level decks. Slopes for drainage are readily screeded over concrete, wood or insulated decks.

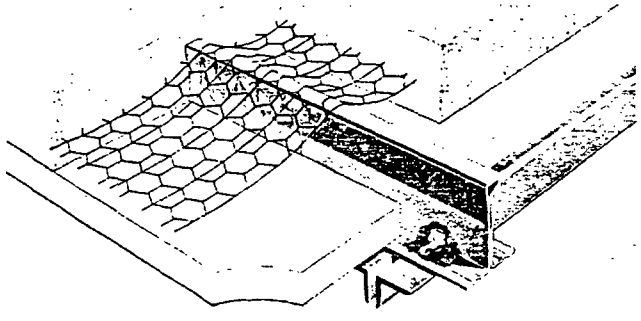
A certification program assures that PYROFILL or THERMOFILL Gypsum Concrete meets or exceeds industry standards for dry density and compressive strength (see page 15).

PYROFILL Gypsum Concrete is mill-formulated and composed of calcined gypsum and wood chips or shavings. It is mixed with clean water, only, at the job site and poured-in-place over permanent formboards or other decks as a drainage fill. Thermal resistance (R) value is 0.67 per inch. PYROFILL complies with ANSI A59.1-1968 and ASTM C317-64 (1970) Standards.

THERMOFILL Gypsum Concrete is mill-formulated and composed of calcined gypsum and graded perlite aggregate. It is mixed with clean water, only, at the job site and poured-in-place over permanent formboards. Thermal resistance (R) value is 0.87 per inch. THERMOFILL complies with ANSI A59.1-1968 and ASTM C317-64 (1970) Standards. Not available north of 40th Parallel from Oct. 1 to April 1, except for use as drainage slope fill.

Steel sub-purlins vary in size, weight and shape and are selected according to required span and loading. They provide lateral bracing, anchorage against uplift, and restrict deck movement due to temperature change. Sub-purlin spacing accommodates 24″, 32″, or 48″ formboard widths with a slight tolerance for ease of formboard placement. Sub-purlins are spaced approx. 24⅝″, 32⅝″, or 48⅝″ o.c. and are welded to the structural framing members. When 48″ wide formboard is used with light sub-purlin sections, supporting steel spacing should not exceed 36″ o.c.

USG Steel Sub-purlins are roll-formed from 16-ga., 18-ga. and 20-ga. hot-dipped galvanized metal. An exclusive lightweight design provides low in-place costs for bar joists spacings up to 6′0″ (see table, page 9). They offer necessary roof support over short spans for any U.S.G. poured gypsum concrete roof deck. Assemblies using USG Sub-purlins qualify for 2-hour UL fire rating (UL Designs P207 and P002).



Cost-saving USG Sub-purlin is ideal for short spans; quick one-weld installation resists uplift.

USG Sub-purlins anchor the slab against uplift forces and supply strong lateral bracing. Galvanized finish requires no painting. Quick one-weld installation eliminates usual double welds at sub-purlin ends and affords uplift resistance up to 500 lbs. with ⅜″ weld through web and flanges to framing.

Other sub-purlins, neither manufactured nor sold by U.S.G., are available for heavier loads and longer spans (see page 9).

Reinforcing mesh for PYROFILL is one of following types:

1. KEYDECK—A galvanized wire mesh, woven with 16-ga. straight wires and 19-ga. diagonal wires.
2. 48-1214—A galvanized, welded wire mesh with 12-ga. longitudinal wires at 4″ o.c. and 14-ga. transverse wires at 8″ o.c.

The effective cross-sectional area of reinforcing mesh placed at 90° to the sub-purlins is .026 sq. in. per foot of mesh width. U.S.G. neither manufactures nor sells reinforcing mesh.

in the formboards... concealed or exposed

Four U.S.G. Formboards offer complete freedom of design. They are used singly or in combination to provide insulation, fire protection, moisture resistance, pleasing appearance, economy of installation, or sound control. They serve both as a formboard for the poured gypsum concrete and, when needed, as semi-finished ceilings eliminating costs of additional ceiling material. Their superior fire protection makes added fireproofing materials unnecessary and often reduces insurance costs.

SHEETROCK Formboard is a rigid gypsum board, treated to resist mildew effectively where adequate ventilation is provided. Two-hour fire ratings and 46 STC are available with 2″ gypsum slabs and exposed tees. Ideal for almost every roof deck need, concealed or exposed. Makes economical ceilings for warehouses, light manufacturing buildings, schools—any construction where durability and low cost are desired.

FIRECODE Formboard is a rigid, highly insulative board suitable for 2-hour fire-rated construction. The mineral fibers will not contribute to mildew growth. Reduces reflected noise —provides performance up to 50 NRC (see table at right). Available in two types:

Custom has a white factory-applied finish; used for high ceilings that require a semi-finished surface with built-in acoustical properties and good light reflectance.

Economy has a natural matte surface with a medium tan color. Ideal for concealed areas where a ceiling will be suspended below the deck or where ceiling appearance is not an important factor.

Asbestos Cement Formboard is a rigid, industrial type board that provides more resistance to heat and humidity than other formboards. Ideal for use on exterior soffits and above heat-producing machinery where temperatures at the board are less than 125° F.

CS035 0251

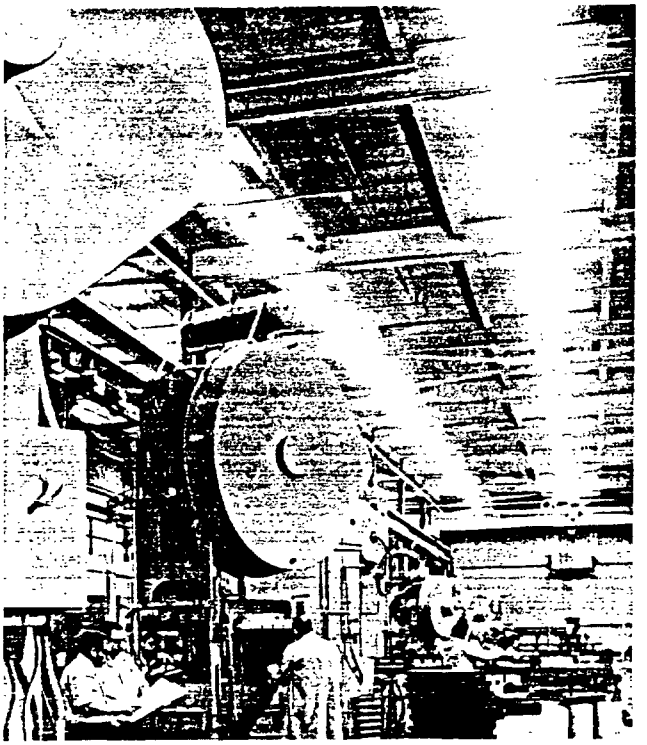
built-in acoustical performance to help meet OSHA standards

As a result of the Occupational Safety and Health Act of 1970, plant management is faced with the choice of maintaining noise levels within specified ranges, or limiting the duration of employees' exposure to high noise levels. Since reduced exposure has the effect of increasing production costs, every effort should be made in new plant design to limit noise levels.

Another regulation requires all plants with Federal contracts over $10,000 to eliminate continuous noise over 90 dbA where workers are present.

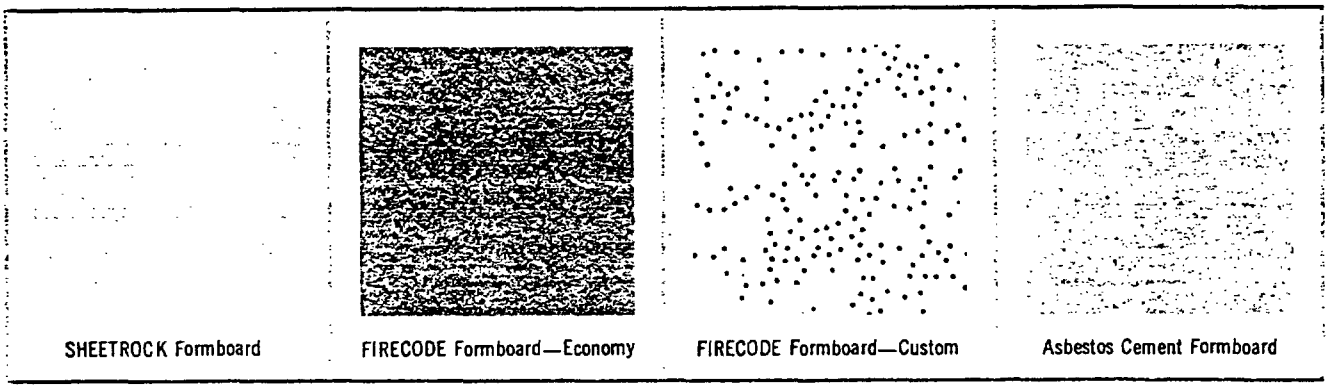
U.S.G. roof deck systems with gypsum concrete poured over exposed glass-fiber formboard offer the most economical method of incorporating a large sound-absorbent surface in new plant construction. The glass-fiber formboards effectively absorb sound and reduce reverberation. Interior noise levels can be reduced up to 7 db with these formboards, which offer .75 to .95 NRC. Glass-fiber formboards are not manufactured by U.S.G.

Exterior noise is efficiently attenuated by the high sound transmission loss of the gypsum deck. PYROFILL Gypsum Concrete, poured 2½" thick over SHEETROCK Formboard, developed STC 46, three points higher than the best-rated steel deck system, as tested by Riverbank Acoustical Laboratories. See U.S.G. brochure IR-548 for complete design data on noise control with U.S.G. roof deck systems.



Gypsum decks help designers comply with OSHA requirements. They effectively control outside noise and absorb noise created by equipment. Light-reflective U.S.G. formboards lower plant illumination and maintenance costs.

U.S.G. formboards



SHEETROCK Formboard | FIRECODE Formboard—Economy | FIRECODE Formboard—Custom | Asbestos Cement Formboard

formboard characteristics

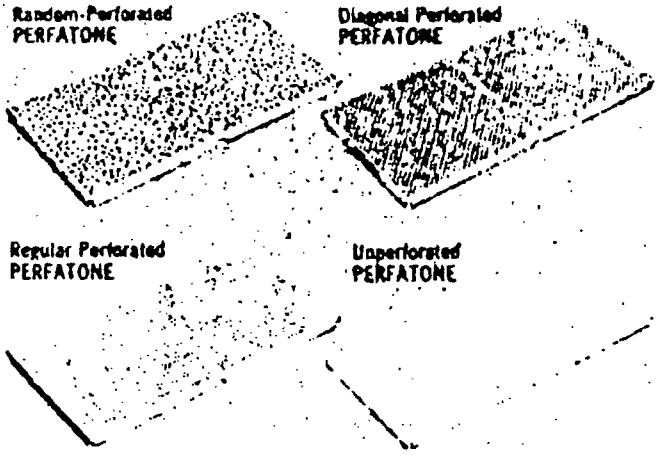
type	SHEETROCK formboard	FIRECODE mineral fiber formboard				asbestos formboard
		custom		economy		
thickness	½"	1"	¾"	1"	1½", 1¾", 2"	¼"
width	32"	32" & 24"	24"	32" & 24"	32" & 24"	32"
length	up to 12' max.	4' to 6'8"	4' to 6'8"	4' to 6'8"	4' to 8'	48"
weight/sq. ft.	2.025	1.65	1.05	1.40	2.15, 2.50, 2.85	2.4
R-value	0.45	3.70	2.78	3.70	5.55, 6.48, 7.40	0.06
flame spread	15-20(1)	5-10(2)		0-5(2)		0-5
noise reduction coefficient	—	.50		.40		—
light reflection coefficient	66%	65%		—		40%
specification compliance	ASTM C318-67 C472-70 Federal Spec. SS-L-30D Type V	Federal Spec. SS-S-118a Class 25 (noncombustible)	Federal Spec. SS-S-118a Class 25 (noncombustible)			Federal Spec. SS-B-755a Type U

(1) Flame spread ratings determined by Underwriters Laboratories testing. (2) Flame spread rating determined by Southwest Research Institute.

CS035 0252

per JFH 11/22/82

mfg'd by National Gypsum in St. Louis sold by USG used for high humidity areas



as border tile or for decorative effects. For other characteristics, see table on page 2.

function

Fire Protection—Use of Fire-rated PERFATONE systems eliminates need for contact fireproofing and/or intermediate ceiling fire barriers in many installations; Conventional PERFATONE system rated Incombustible by AMA.

Sound Ratings—Excellent absorption and attenuation; see tables, pages 4 and 5.

Maintenance—Provides quick access to any plenum area; easily maintained and highly washable.

Decoration—Has 72% light reflectance in white; can be painted in decorator colors with high-grade metallic paint without impairing acoustical properties, if care is taken not to fill perforations.

limitations

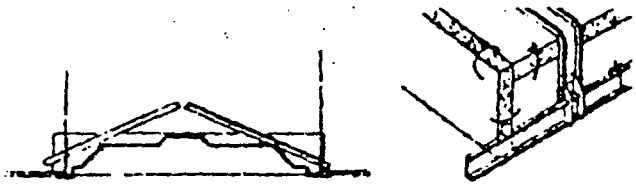
In areas of high humidity or where moisture might impinge against the acoustical surface, Aluminum PERFATONE Acoustical Units with galvanized fittings should be used, or a different architectural design should be considered.

Ratings, erection and specification of the PERFATONE system are covered in USG Folder b-1575.

PERFATONE Accessories, in addition to pans and mineral fiber pads, include more than 50 elements which make up the various systems available—broadest in the industry. A single specification assures the use of parts made to fit and function together—tee runners, wire grids, straps, clips, clamps, spacers, wall moulding, angles, channels, grid pad supports.

THERMAFIBER Rated Light Fixture Protection brings packaged convenience to jobs using USG ceiling systems, whether panel or tile. This consists of 1¼" thick semi-rigid mineral wool board wire-tied and suspended over fixtures. The assembly (illustrated, below) carries U/L Labels covering board module ceiling designs of 1, 1½, 2 and 3 hours for which ratings have been established. It is adaptable to acoustical tile

THERMAFIBER® Insulation Light Fixture Protection



with exposed grid — with concealed Z-spline suspension

and panel ceiling constructions using either an exposed grid or concealed Z-spline suspension.

The THERMAFIBER package is shipped in modules for two constructions using acoustical ceiling board, and one when tile is used.

5. USG Ceiling Boards

description

Three ceiling board products are available from U.S.G. for specialized applications.

—SHEETROCK® Ceiling Board, non-acoustical, for lay-in panel use in ceiling grid systems. Available in nom. 24"x24" and 24"x48" sizes, special sag-resistant gypsum core with either (a) unpainted plain manila face paper, or (b) painted white. Three thicknesses available: ⅜", ½", ⅝".

—USG Asbestos Board, 5/16" thick in nom. 24"x24" and 24"x48" sizes, supplied either Perforated or Unperforated for lay-in use in ceiling grid systems. Square-edged or beveled (1/16" bevel on all four sides). Perforations, 0.19" in dia., are spaced ½" o.c. White Rippletone texture finish.

—Z-Board, a special type ½"x2'x8' gypsum board used where an incombustible base for adhesive application of ceiling tile is required. Nailed to wood members; alternate bases for same application are BAXBORD® and BAXBORD FIRECODE gypsum backing board, SHEETROCK and SHEETROCK FIRECODE gypsum wallboard, ROCKLATH® plaster base. Screwed or nailed to metal channels; alternate bases for same application are BAXBORD and BAXBORD FIRECODE gypsum backing board, SHEETROCK FIRECODE gypsum wallboard.

For other characteristics, see table on Page 2.

6. USG Metal Accessories for Ceilings

description

United States Gypsum markets precision-made metal accessories which contribute to assured performance when the three Z-spline suspension systems are specified:

—Concealed Z-Spline
—Concealed Accessible
—Exposed Z-Spline

U.S.G. also supplies complete accessories for four other systems, described in preceding sections of this catalog. Those are the AIRSON® Air Distribution System, MF Pan Exposed Grid System, PERFATONE Metal Pan System, and AURAGLO® Lighting-Acoustical System. Ratings, erection and specification of all seven assemblies are covered in pertinent USG Systems Folders. For the three spline systems, metal accessories are supplied in five groups as follows:

Basic Grid Parts—1½" and ¾" 16 ga. cold rolled channels, 16' and 20' lengths; electro-galv. spring spacers, 18 ga. trifle clips, 10 and 11 ga. galv. clips.

16' and 20' lengths; electro-galv. spring spacer, 18 ga. trifle clips, 10 and 11 ga. galv. clips.

Concealed Z-Spline Parts (all 26 ga.)—¾" and 1¼" Z-splines, 10' lengths, and splices; flat splines; 1¼" finish channels, [illegible] lengths, and splices; No. 90 clips, corner plates, touch-up lacquer.

Exposed Z-Spline Parts—26-ga. 1¼" Z-splines, 10' lengths and splices; tee and angle splines.

Concealed Accessible Parts—Angle splines, 23½" and [illegible] lengths.

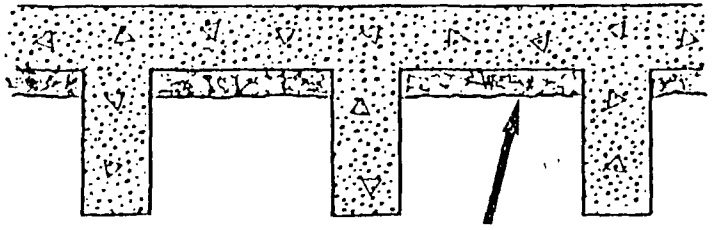
12"x12" Access Tile Parts—Split angles (R [illegible]), [illegible] L-splines.

CS035 0253

FIGURE 2.

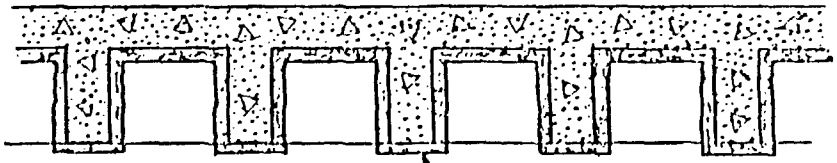
TYPES OF CEILING CONSTRUCTION

CONCRETE JOIST AND BEAM CONSTRUCTION



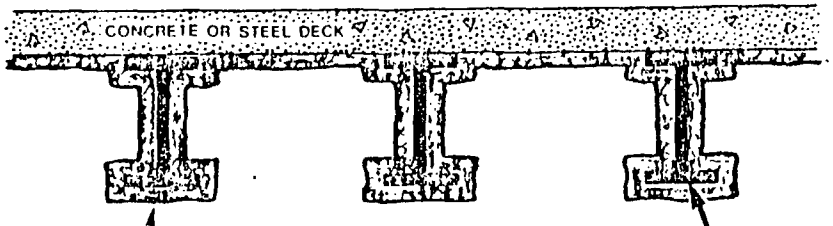
OFTEN ASBESTOS APPLIED
ONLY ON UNDERSIDE OF DECK
NOT ON JOISTS OR BEAMS

CONCRETE WAFFLE SLAB CONSTRUCTION

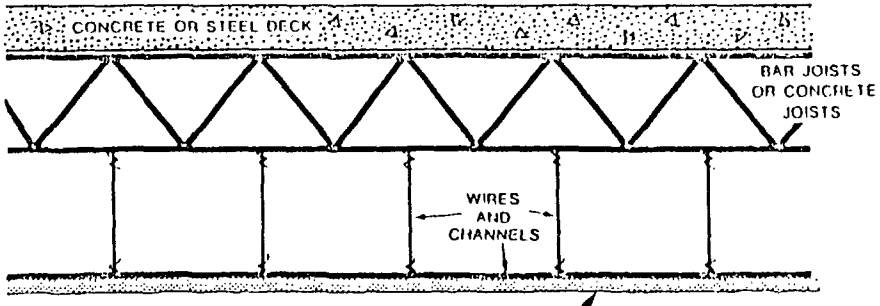


ASBESTOS USUALLY
UNIFORM THICKNESS

STEEL BEAM CONSTRUCTION



SUSPENDED CEILING CONSTRUCTION



ASBESTOS USUALLY SPRAYED ON EXPANDED METAL LATH