

# A NATIONAL GYPSUM CASE STUDY

**Hi-Impact® Brand  
5/8" Fire-Shield® Type X**

## **DENVER SPORTS ARENA USES HI-IMPACT® BRAND WALLBOARD IN HIGH TRAFFIC AREAS**

**PROJECT:** Pepsi Center – Denver, CO

**OWNER:** Ascent Entertainment –  
Denver, CO

**ARCHITECT:** HOK Sport –  
Kansas City, MO

**CONTRACTOR:** Denver Drywall  
Company – Englewood, CO

**PROJECT HISTORY:** When the state-of-the-art Pepsi Center opened its doors for the first time on October 1, 1999, the entire city of Denver was bursting with pride over the new home of the NBA Denver Nuggets and the NHL Colorado Avalanche. Ascent Entertainment, which owns the two sports franchises, had contracted with HOK Sport, one of the nation's leading architectural firms, to design its new arena.

**PROJECT OBJECTIVE:** While designing the Pepsi Center, HOK architects desired a specialty gypsum wallboard for use in such high traffic areas as concourses, stairwells and vomitories (the portal entrances connecting the seating area to the concourses). They also specified impact and abrasion resistance wallboard in the Nuggets practice complex and locker room facilities.

"Our architects were seeking an alternative to masonry in these areas of the facility," said Steve Thompson, Construction Administrator for HOK Sport. "Fiberock™ was the specialty gypsum wallboard that was initially specified, but it had no tapered edges and absorbed more paint than regular gypsum board, which required additional finishing.

**HI-IMPACT BRAND WALLBOARD SOLUTION:** "The drywall contractor (Denver Drywall Company) and Wiley McMillan of National Gypsum Company met with us and introduced us to Hi-Impact Brand Wallboard," Thompson continued.



*The Pepsi Center is home to the NBA Denver Nuggets and the NHL Colorado Avalanche.  
(Photo courtesy of Tim DeFrisco/ Pepsi Center)*

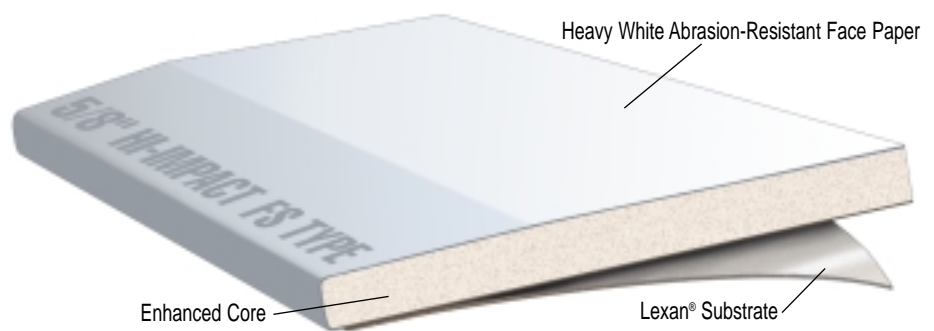
"It featured tapered edges, an abrasion resistant face paper that would take finish, and seamless joints like regular wallboard."

"HOK was looking for improved surface resistance and impact resistance, which our Hi-Impact Brand Wallboard offered," McMillan recalled. "They liked the fact that no additional control or expansion joints would be required when abutting to 5/8" Type X gypsum board. And they liked that it was competitively priced to what they had originally specified."

**DRYWALL CONTRACTOR'S PERSPECTIVE:** "Another product was originally specified but we recommended Hi-Impact Brand Wallboard because of

our success with the product on school construction projects that required impact and abrasion resistant wallboard," said Tom Joslyn, Chief Operating Officer for Denver Drywall Company, the drywall contractor on the Pepsi Center. "We felt the level of finish required at the Pepsi Center demanded a better product.

"We recommended Hi-Impact because of the ease of installation and finish compared to other substrates. It was like hanging regular gypsum wallboard," Joslyn noted. "We installed 120,000 square feet of Hi-Impact Brand Wallboard at the Pepsi Center."



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*— Tom Joslyn, Denver Drywall*

# TECHNICAL INFORMATION

## Hi-Impact® Brand 5/8" Fire-Shield® Type X

### MANUFACTURER

National Gypsum Company  
2001 Rexford Road  
Charlotte, NC 28211  
(704) 365-7300

Technical Information:  
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(1-800-628-4662)

Fax: 1-800-FAX-NCCC  
Fax: (1-800-329-6421)

Internet Home Page:  
www.nationalgypsum.com

### DESCRIPTION

Hi-Impact® Brand Fire-Shield® Type X Wallboard panels consist of a fire-resistive type X gypsum core encased in heavy smooth white abrasion resistant finish paper on the face side and strong liner paper on the back side. Lexan® substrate is bonded to the back side of the panel to provide additional impact/penetration resistance. Hi-Impact Brand wallboard features a specially formulated core to provide fire resistance ratings when used in tested systems. Long edges of the panels are tapered to allow joints to be reinforced and concealed with Gold Bond Joint Tape and Joint Treatment Compounds.

#### Basic Uses

This unique wallboard is designed for use in wall assemblies in areas where surface durability and impact/penetration resistance is a major concern.

#### Advantages

- Provides greater resistance to surface abuse, indentation and impact/penetration resistance than fiber-reinforced gypsum panels.
- Hi-Impact Brand Wallboard's smooth white face paper is highly resistant to scuffing when sanding wallboard joints and fasteners providing a superior surface for decoration
- Lightweight, cost-efficient material that readily accepts a wide range of decorative finishes.
- Hi-Impact Brand Wallboard is easily cut for quick installation, permitting painting or other decoration and the installation of most metal or wood trim almost immediately.

### LIMITATIONS

Hi-Impact Brand Wallboard

- Exposure to excessive or continuous moisture and extreme temperatures should be avoided.
- Hi-Impact Brand Wallboard is not recommended where it will be exposed to temperatures exceeding 125° F (52° C) for extended periods of time.
- Hi-Impact Brand Wallboard should not be used as a base for tile or wall panels in tub and shower enclosures.
- Hi-Impact Brand Wallboard is not recommended for use on the interior side of exterior walls in hot, humid climates such as the Southern Atlantic and Gulf Coast areas.

#### Sizes & Types

Width: 4" (1219 mm)  
Lengths: 8' through 12'  
(2438 mm - 3658 mm)  
Thickness: 5/8" (15.9 mm)  
Edges: Tapered

### TECHNICAL DATA

#### Indentation Resistance (Hardness) Modified ASTM D 1037

	5/8" NGC Hi-Impact Brand Wallboard	5/8" Fiber Reinforced Gypsum Panel
Load, lbs @ 0.100"	232	177
Load, lbs @ 0.200"	469	266

**Procedure Summary** - To measure surface indentation, a load was applied to steel ball (diameter 0.438"), at a rate of 0.25"/minute to an indentation depth of 0.100" and 0.200".

#### 3M Surface Abrasion Resistance (Abraser-30# Weighted Wire Brush) Modified ASTM D 4977

	60 Cycles
5/8" NGC Hi-Impact Brand Wallboard	.022"
5/8" Fiber Reinforced Gypsum Panel	.411"

**Procedure Summary** - A 3M Granule Embedding Test Machine with 30# weighted wire brush was activated and after every 10 cycles (10 forward and 10 back strokes) the surface erosion was measured.

#### Taber Surface Abrasion Resistance (Abraser-Sand Paper) Modified ASTM D 4060

	Number of Cycles
5/8" NGC Hi-Impact Brand Wallboard	125
5/8" Fiber Reinforced Gypsum Panel	125

Number of cycles performed without abrasion depth exceeding .01"  
**Procedure Summary** - A Taber Abraser with two rubber wheels fitted with S-42 sand paper was activated and after every 25 cycles the surface erosion was measured.

#### Applicable Standards

ASTM C 36 Federal specification SS-L-30D Type III Grade X (Fire-Shield)  
5/8" Fire-Shield Type X Hi-Impact wallboard has been accepted by the State of New York Office of Mental Health for use in new construction and renovation.

Acceptable for use in accordance with New York City Report of Materials and Equipment Acceptance Division MEA S-95-M. Complies with New York City flame spread and toxicity requirements.

#### Water Vapor Permeability

In tests conducted accordingly to ASTM test method E 96 (desiccant method), Fire-Shield Hi-Impact wallboard showed a permeance of less than 0.3 perm.

#### Fire Endurance

1 Hour Rating: 5/8" Fire-Shield Type X Hi-Impact wallboard screw attached vertically to both sides of 20-gauge 3-5/8" studs spaced 16" o.c. with 1-1/4" long, type S screws spaced 8" o.c. along edges and 12" o.c. in the field of the board. Wallboard joints staggered.

UL U495, V416  
WHI Test No: 651-0429.01

2-Hour Rating: Constructed with a base layer of 5/8" Fire-Shield Type X Hi-Impact wallboard with an additional layer of 5/8" Fire-Shield wallboard type X screw attached vertically to both sides of 20-gauge 3-5/8" studs spaced 16" o.c. with joints staggered between face and base layer. Base layer attached with 1-1/4" long type S screws spaced 8" o.c. along edges and 12" o.c. in the field of the board. Outer layer attached with 2-1/2" long type S screws spaced 8" O.C. in the field and along vertical edges and 8" O.C. to the floor and ceiling runners. UL U495.

Due to the added thickness, Compass International 2" Bugle Pilot screws are recommended for fastening.

#### Impact Resistance Data

Per ASTM D 2394 Modified-inchcape Testing Services report numbers:  
ITS 13394-764  
ITS 13661-231  
ITS 13668-231

Board Type	Backing	Impact Rating (ft./lbs.)
5/8" Fire-Shield Type X Hi-Impact 1000	0.010" GE Lexan Substrate	264
5/8" Fire-Shield Type X Hi-Impact 2000	0.020" GE Lexan Substrate	846
5/8" Fire-Shield Type X Hi-Impact 3000	0.030" GE Lexan Substrate	1450
5/8" Fire-Shield Type X Hi-Impact 8000	0.080" GE Lexan Substrate	>2188

#### System/Impact Rating (Ft/Lbs.)

5/8" FS Drywall (1 layer)	60
5/8" FS Drywall (2 layers)	72
5/8" Gypsum Fiberboard (w/fiberglass mesh)	144
8" CMU (unreinforced)-single block	72
NGC Hi-Impact 1000	264
NGC Hi-Impact 2000	846
NGC Hi-Impact 3000	1450
NGC Hi-Impact 8000	>2188

**National**  
**Gypsum**  
COMPANY