

Specific Applications

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OFFSHORE CRANE



American Aero Crane Boom & Accessway (at end of Boom)

Fiberglass grating such as ET-5000 25mm (1") is an excellent FRP grating to use on crane booms. Grating is often placed on the boom to provide access for bearing maintenance at the sheave. ET-5000 is extremely light weight and the 25mm (1") wide gritted bar provides exceptional slip resistance. Please note that all boom grating should be thoroughly bolted with locking nuts to eliminate any chance of coming loose.



Pedestal Crane - Brutus Semi

FRP grating on pedestal cranes should be cut in a rectangular fashion instead of pie cuts. For more information see the Grating Fabrication Guidelines in this book (Section 6-11).



Crane Walkway

Transocean Drillship

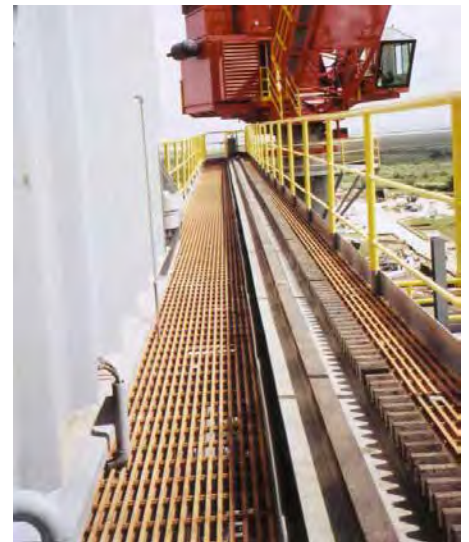
DURADEK® grating used on a bridge crane.



Pedestal Crane

Big Foot Semi-Submersible

This large crane has multiple access ways on the boom.



Crane Walk

ENSCO 7500 Semi-Submersible

DURAGRID® Phenolic grating used on a gantry crane.

WELLBAY



A Lesson in Lifecycle Costs

Ellen Platform

FRP grating used in well bays is one of the oldest Offshore FRP applications dating back to 1979 on the Ellen Platform - Offshore California. 930 m² (10,000 ft²) of DURAGRID® I-4000 grating were used to test the worthiness of the product. Now, decades later, the same grating still exists surviving the rigors of offshore use that typically sees steel grating replaced every 7 years. The multiple changes of



steel grating have saved the operator millions of dollars in grating replacement costs while providing platform sustainability in oil prices ranging from \$13.00 to + \$100.00 per barrel.

More on the Ellen Platform can be found in Strongwell Application Profile #821.



Retrofit Wellbay

South Pass 62A & 62D

1986 marked the first all-fiberglass wellbay installed in the Gulf of Mexico - South Pass 62A. Now regarded as another industry case study on the benefits of FRP, the wellbay was constructed from EXTREN® structures for the platform, access walkways, stairs, handrails, and grating. Engineering, fabrication and installation was provided by Strongwell. Fabrication of the wellbay structure was done based on existing 62A drawings and assembly was performed on dry land to assure a problem-free installation. Upon arrival at the platform, it was determined that significant changes had occurred and the FRP wellbay deck would not work as intended. Two workers from Strongwell modified the wellbay on site and completed the installation in three days. The entire installation was completed without hot work thereby allowing the wellheads to remain fully functional with no loss of revenue.

In 1988, a second, larger wellbay was installed on South Pass 62D. Both platforms (South Pass 62A and 62D) were lost in Hurricane Katrina in 2005.

More on South Pass 62A and 62D can be found in Strongwell Application Profile #524.



WELLBAY

Deepwater Wellbay

TLPs, Semis, Spars

Large, easy-to-install panels of DURAGRID® Phenolic provided a fast durable installation on numerous TLPs, Semis, Spars, and FPSOs. The high cost reduction due to weight is the primary driver for the use of lightweight composite grating on floating platforms. The additional weight savings of FRP is a bonus when platform expansions are considered. Low to no maintenance is more significant to owners with respect to platform sustainability in a time of oil price fluctuations. Cleaning is simple with DURAGRID® Phenolic's wash-thru design. Blasting sand and debris during construction are easily flushed away, minimizing costly repainting. On a single TLP project an estimated 3,500 man hours were saved in painting alone over using steel grating on the wellbay according to the yard's paint experts. Savings like this are often overlooked and not applied to the cost of using steel grating. Once in production, the DURAGRID® Phenolic will shed debris and drilling fluids extending the life of painted steel structure. FRP molded gratings are not recommended as their design can trap debris shortening the steel coating life and cause additional cleaning problems.

More on Floater applications can be found in Strongwell Application Profile #818.



MUD TANK & MUD ROOM

For years, DURADEK®/DURAGRID® and similar products have minimized maintenance/rating replacement in mud areas. The product is suitable for both water and oil based drilling fluids. The panels are light weight (by hand) making them easy to remove for machinery maintenance.



Mud Tanks - Land

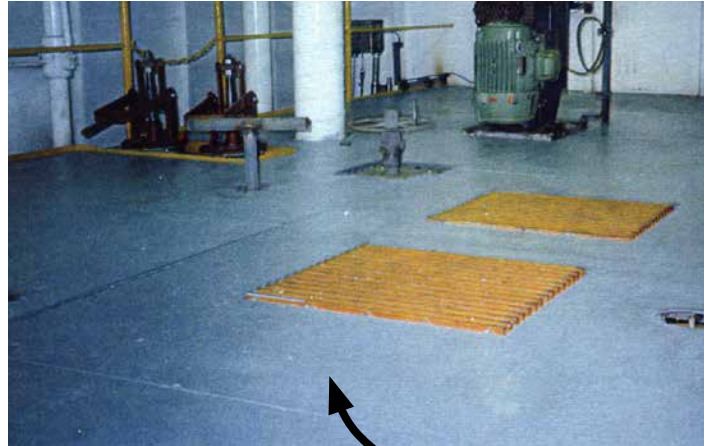
Grating is lightweight and corrosion resistant, providing years of worker safety. These tanks are on their way to Kazakhstan.



Mud Pit Walkway

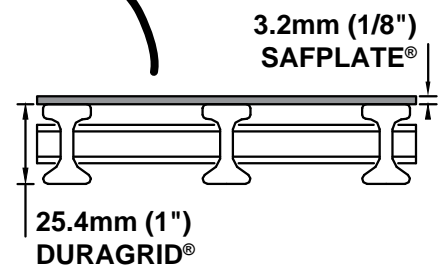
Poole Offshore Rig 18

DURAGRID® I-6000 provides a suitable mud pit walkway on Poole Offshore's Rig 18.



Mud Pit Solid Deck

These mud pits on a Victory Class Semi are covered with a solid deck made of Strongwell's gritted SAFPLATE® and DURAGRID® grating (I-7000 25mm (1")) (see diagram for example). The very lightweight solid surface prevents objects from falling in the mud tanks while containing it's MUD and the associated odors. Grated hatches on the installation were at the owner's request. SAFPLATE® has the same durable anti-slip walking surface as DURADEK®/DURAGRID®. The surface is more slip resistant than diamond checker plate especially when the surface is wet.



Mud Tank Safety Screen

Molded grating acts as a safety screen on this Haliburton mud tank.

BLOW OUT PREVENTERS (BOPs)

Strongwell Handrail and Grating can reduce weight and maintenance while improving worker safety on BOPs. DURADEK®/DURAGRID® gratings have been used on BOPs since the 1980's - Robust enough to handle ram block changes while providing exceptional slip resistance and worker comfort when standing or kneeling. Handrail can be round or square with numerous configurations - fixed or removable. Other grating options to consider: NORSOK, ISO 14122, NMD, non-fire integrity.



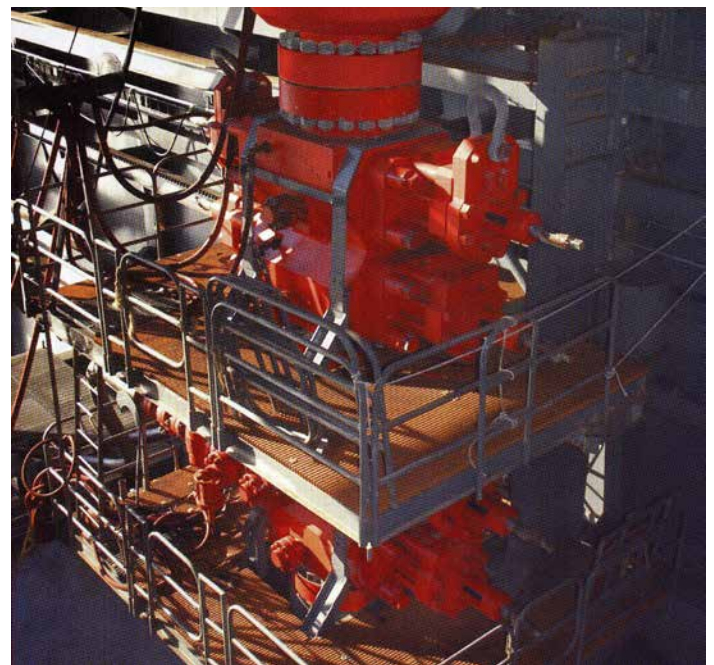
Additional related applications include:

- Texas decks
- BOP stump access
- Closing unit
- Stabbing boards
- Derrick - racking area for derrick man
- Diverter spools (grating or anti-slip plate)



Related Products:

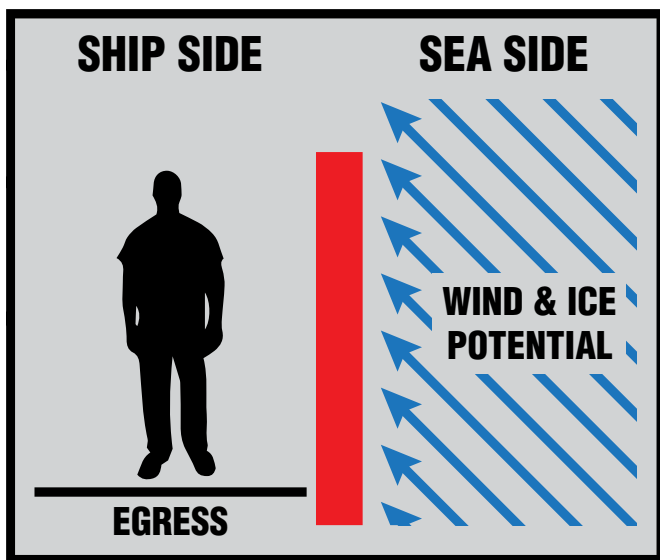
- FRP gratings
- Handrails - round or square - fixed or removable
- FRP kickplate
- Non-slip gritted plate
- FRP fixed ladders



WIND/WEATHER WALLS AND SUNSHADES

Low to no maintenance with exceptional thermal properties make Strongwell building panels an ideal material for wind wall, weather wall or sun shade applications. Windy areas offshore typically create additional corrosion by blowing salt air onto structures. FRP material can slow the process by blocking the wind and limit thermal transfer from the exterior to the interior. They are safe to touch in extremely cold temperatures.

WEATHER WALL = PROTECTION FROM OUTSIDE (WIND & ICE)



"Weather Wall" = protection from outside

Temperature is the same on either side of the wall - the wall blocks ice and wind.

Typical Wall Height: 2m

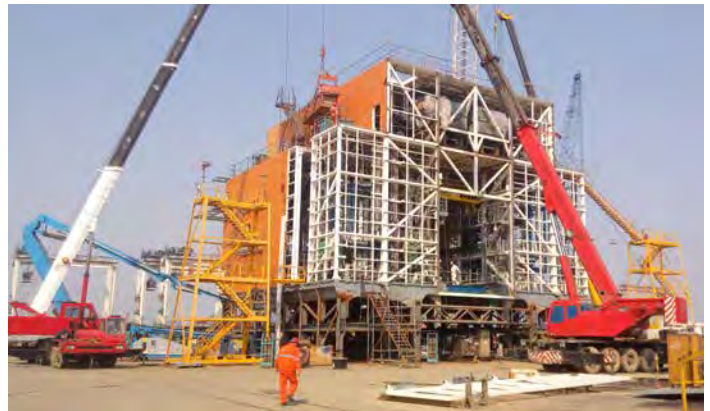
**Typical Spans: Vertical = $\leq 2\text{m}$
 Horizontal = $\leq 4\text{m}$**

Flare radiation not an issue due to position

FPSO Windwall Concept

Arctic

Composites can provide valuable protection from green water (salt spray) when used as a perimeter protection on an arctic FPSO. It can also be used to enclose bridges between fixed platforms – protecting workers from harsh environment.



Windwall

Van Oord Subsea Rock Installation Vessel - Bravenes

Subsea rock installation vessels are suitable to work in all types of weather conditions. The heart of the operation of this vessel is a flexible fallpipe transporting rock up to 1500 meters waterdepth. This section of the vessel is covered with Strongwell COMPOSOLITE® product as a windwall to protect the moon pool area. Strongwell also supplied DURAGRID® Phenolic I-5500 38mm (1.5") grating and stair treads for walkways.



Windwall

FRP windwalls are often used to enclose the drill floor on different types of drilling rigs. Installation is simple and the product is lightweight and corrosion resistant. Any penetrations are easily accomplished. While this windwall is located on a deepwater semi-submersible, they are also common on jack-up and platform rigs.

WIND/WEATHER WALLS AND SUNSHADES



Courtesy of Pipex px® (a division of FGS - NOV)



Courtesy of Pipex px® (a division of FGS - NOV)

FPSO Weather Canopy and Wind Wall

North Sea

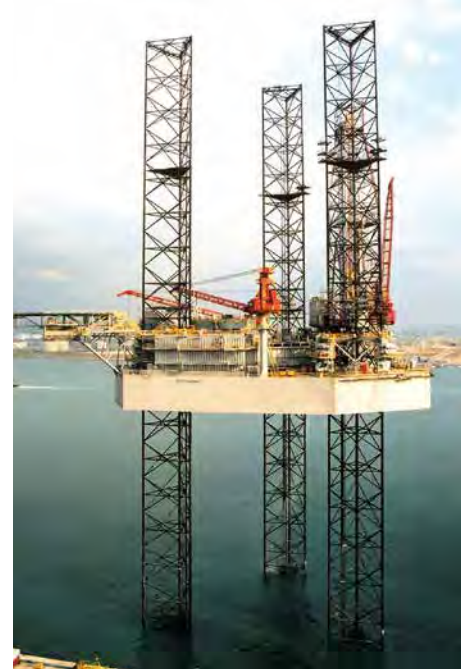
FRP enclosure designed and fabricated by Pipex px® to cover access to accommodation modules on the Maersk Curlew FPSO.



Sunshades for Platform Bridges

SAFPLANK® has been successfully used as sunshade over bridges that link platforms together. In warm areas, the steel structure heats considerably and relief from the sun is necessary. FRP sunshade have a number of features: They are poor conductors of heat while steel absorbs and radiates additional heat. They are maintenance free - they will not rust from the salt air and they will not deteriorate from seabird excrement (as steel does).

JACK-UPS



Ladders & Cages

SAFRAIL™ fiberglass ladders and cages from Strongwell provide safe access with low maintenance. They are particularly important for inspection in ballast tanks and void areas where steel ladders regularly corrode.

The Chiles Discovery (Keppel FELS Mod V-B)

Reduced weight by 18 tons by utilizing Strongwell composite products in the cantilever area.



Grating as Impact Protection

Grating used as impact protection and a walkway over chiller units will reduce maintenance costs and is very lightweight.



Additional Applications:

- FRP ladders & grating in pre-load tanks
- Grating and handrail on access walkways/pipe racks
- FRP shelving in parts storage areas
- Lightweight cover plates on jacking unit
- FRP dog houses
- Outside drains on drill floor
- Windwalls on derrick
- Lifeboat muster areas
- In the cantilever, BOP stump areas
- Mud room

Generous use of DURAGRID® Phenolic on walkways around Jack-up legs will provide a maintenance free solution for many years.

SPAR, SEMI, & TLP HULLS

Grating, Handrail, and Ladder Installations inside of the hull can represent very difficult situations. Typical complications include: Cramped conditions for moving equipment, little space for lifting devices, and an environment of damp salt air ideal for corrosion. Since the first hull installation in 1995, owners have remarked how user friendly Strongwell FRP products are in these applications and it would be foolish to use any traditional material.



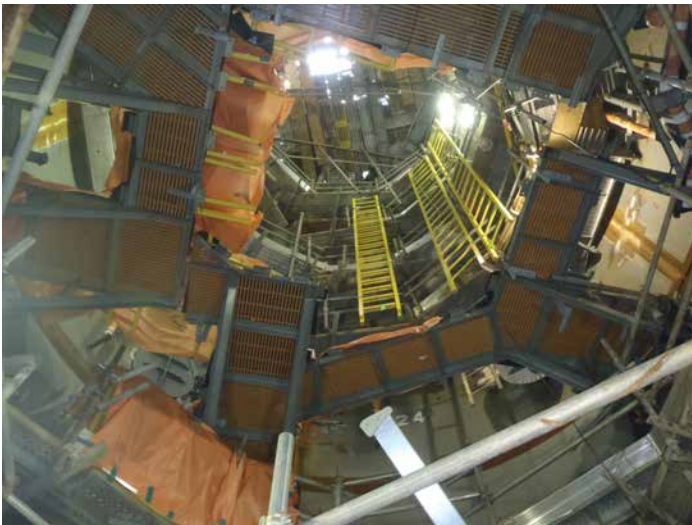
Column Pump Grating

Jack St. Malo - Gulf of Mexico

Like most deepwater semi-submersible hulls, pumps are installed at the bottom of the columns. The owner wanted a robust FRP grating for the installation of these heavy pumps and selected DURAGRID® Phenolic 45mm grating. They were very pleased with the results.

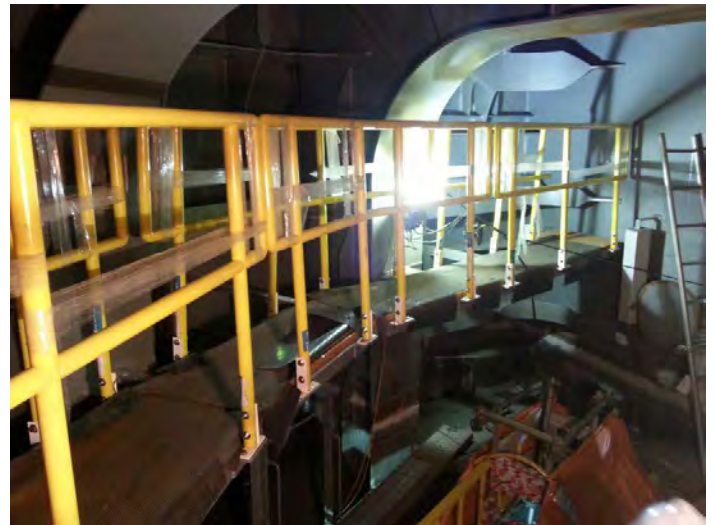


DURAGRID® Phenolic is well suited for multiple levels within a drilling semi's columns.



TLP Column Walkways

Inside the columns and lateral column connectors of a TLP are maintenance free walkways of Strongwell grating, SAFRAIL™ handrail, and ladders.



Strongwell SAFRAIL™ and DURAGRID® Phenolic Grating (covered) provide safe access inside a TLP hull.

SPAR, SEMI, & TLP HULLS



Thruster Area Grating

Semi-submersible thruster areas are often small, congested and require on the spot custom fitting of grating. It is significantly easier to install FRP grating on various elevations in these areas using simple cutting tools. Most owners will agree that this is the best solution for this area.



Auger Sump Access Platform

Offshore Louisiana - Gulf of Mexico

This platform was specifically constructed from Strongwell FRP structures, grating, and handrail. It's intended to provide safe access to a sump hanging from the deck of the TLP. The owner had concerns about producing this in steel because the steel could do serious damage to the riser/tensioners if the platform was damaged in a storm. The solution was to use Strongwell FRP which would have little or no effect on the tensioner system during the same event.



This platform is mounted on top of the sump - with a ladder leading to the lower platform.

Other Hull Applications:

- Ballast water areas
- Pre-load tanks
- Sea Chests
- Turrets
- Riser Access Platforms

FPSOs

FPSO's have numerous opportunities for the use of FRP. While weight is always a consideration, FPSO's are often located in remote areas where replacement of rusty steel can be costly. The use of low-no maintenance composites improve sustainability of the asset during periods of low return on investment.



Winch Deck Grating

DURAGRID® Phenolic was used on the winch deck at the base of the flare tower on the Cossack Pioneer FPSO.

Note: FRP grating is not recommended on the flare tower itself.



Access Way Grating & Handrail

In addition to deck (or module) grating, using FRP grating and handrails on the exterior of the turret saves weight and maintenance. Grating for access ways inside the turret may be in contact with the sea and should be treated like jacket areas. Appropriate wave zone attaching methods should be applied in this area.



Living Quarter Grating

When additional housing was required on the Kikeh FPSO, Strongwell DURAGRID® Phenolic was used on the new living quarters.

FPSOs



Separator Module Grating & Handrail
DURAGRID® Phenolic grating and SAFRAIL™ handrail were used on this separator module.



Boat Landing Module Grating

Some FPSOs are designed with boat landing modules attached to hull side. These are excellent applications for FRP grating.

MARINE VESSELS

Strongwell Fiberglass products are best applied at the new build stage. Owners must be very cautious with their specification as yards are quick to substitute a lesser product over a fully-qualified product. Verification of a current USCG and Class Type Approval (to that particular vessel) should be required. Failure to do so have led to delays caused by authorities desiring this information. As of January 2017, IMO has required vessels using FRP for access to the tanker bow must show proof that that product meets current fire integrity standards-ASTM F3059-15. DURAGRID® Phenolic meets this IMO requirement. Please contact Strongwell for more information.

Typical Marine Applications (LNG, LPG, Tanker & Bulk Carriers):

- Deck grating & working stage areas
- Flying passage, center passage, access to the bow walkways gratings
- Manifold, above manifold, and spill tank area grating and removable handrail
- Lifeboat area gratings
- Ballast water grating, stairs, and ladders
- Exterior ladders



Spill Tank Grating

The spill tank area is a typical replacement of steel grating several years after the new vessel leaves the yard.



Tanker Bow Access

DURAGRATE® molded grating installed as access to the bow on a tanker (2010).

Note: This application is not approved by the US Coast Guard, Class, or IMO.



Courtesy of Pipex px®
(a division of FGS - NOV)

Stair/Platform Structure

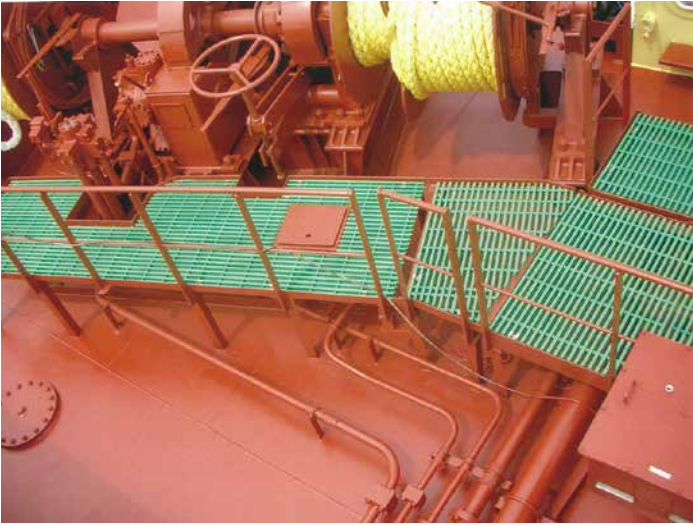
Designed and fabricated by Pipex px®, the Stolt Acergy Polaris pipe layer vessel (now decommissioned) used an EXTREN® structure, SAFRAIL™ railing, and DURAGRID® grating and stair treads for a walkway to save weight while providing access over the pipe laying mechanism.



Small Hop-Ups

Small hop-ups (mini platforms) are a good application for DURADEK® FRP grating

MARINE VESSELS



DURAGRID® Phenolic is a green alternative on today's modern ships – No more blasting, recoating, and chasing rust stains down the deck due to rusty steel grating.

(Note: colors other than brown may have additional cost)



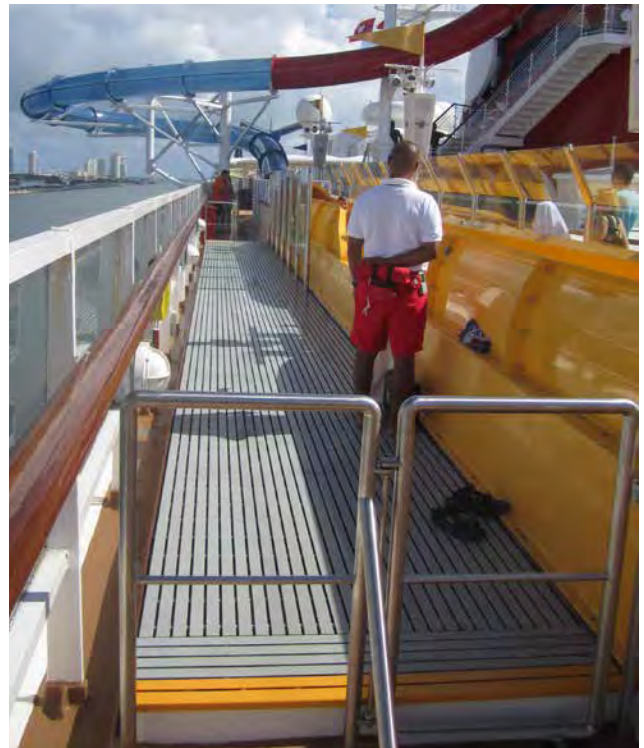
Standby Vessel

Size of vessel does not matter, as this standby vessel has replaced steel grating with DURAGRID® Phenolic.



Elevated Platform

This white elevated platform will never see rust stains from the grating. The use of FRP grating, structures, handrail, and ladders is also better for sensitive marine electronics as they have a high degree of transparency.



Access Walkway

DURAGRID® T-1800 grating boards a water park ride on this cruise ship. Strongwell FRP is used in many of today's modern Water Parks, Theme Parks, Zoos, and Aquariums.

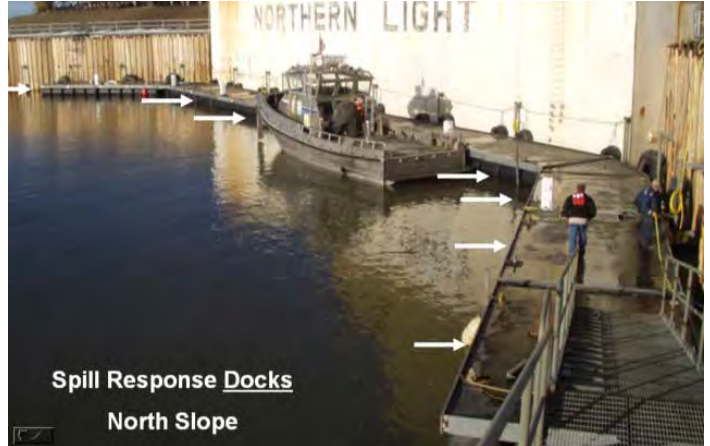
MARINE DOCKS & TERMINALS



Liquids ship loading facility incorporates low maintenance DURADEK® grating and SAFRAIL™ handrail system.



Floating ship access docks with low maintenance handrails.



Spill Response Docks
North Slope



Alaskan spill response docks are constructed from EXTREN® and COMPOSOLITE® FRP materials.



Tanker pier insert using DURAGRID® Phenolic Grating

MARINE DOCKS & TERMINALS



Steel handrail being replaced with SAFRAIL™ at an LNG loading dock in the Middle East. Metallic parts on the dock see constant corrosion as seawater is sprayed on the vessel to cool the LNG loading process. FRP handrail will never corrode.



Corroded steel grating and handrail were replaced with DURADEK® and SAFRAIL™ on this port ship loading arm.



All FRP walkway over separator in refinery. EXTREN®, DURAGRID®, and SAFRAIL™



Coastal Coker Conveyor - access walkways - grating and handrails



Strongwell's FRP sheet piling offers reasonable upfront material costs, lower exposure to job site risks, no maintenance upon installation and lower transportation costs than steel due to FRP's high strength to low weight ratio.

LAND DRILLING RIGS

Land Rigs require lightweight, durable composite structures for weight reduction on roads or for helicopter lifts in remote areas (mountainous, jungle, arctic, etc.).

Typical Uses Include:

- Stairways
- Cabinets (enclosures)
- Handrails & ladders
- Cellar pit covers
- Grating for mud pits & derrick
- Windwalls & derrick cladding
- Retractable light poles



Mud Pit Grating

DURADEK® grating atop mud pits and walkways between the pits.



Removable Stairway

Lightweight removable stairway constructed of EXTREN®, SAFRAIL™, and DURADEK®.



Rig Lighting Support

EXTREN® tube used to support rig lighting. The pole telescoped into the module for travel.



Storage Boxes

EXTREN® plate and angle was used in the construction of storage boxes.



Control Station Support

EXTREN® plate and square tube used to support air valve control stations.

COLD WEATHER

Strongwell products perform very well in extreme cold temperature conditions. The product actually increases in strength as the cold increases! These materials have proven themselves over many years in harsh environments.

Method	Method	Property	Temp	Results (Average)
Compression	ASTM D695	Compressive Stress at Yield (Ksi)	21°C	54.6
			-160°C	55.3
Flex	ASTM D790	Flexural Stress at Max Load (Ksi)	21°C	91.2
			-160°C	95.6
Short Beam Shear	ASTM D2344	Short Beam Shear Strength (Psi)	21°C	4977.8
			-160°C	5834.1
Izod	ASTM D256	Impact Strength (ft*lb/in)	21°C	67.2
			-160°C	72

Cold Application Features:

- Building panels tested to -60°C: panels get stronger
- DURAGRID® Phenolic grating and SAFRAIL™ Railing Systems tested to -190°C
- Charpy impact not an issue at extreme cold
- Safe to touch at very cold temperatures
- Low to no maintenance: not affected by salt spray or natural elements
- Good dimensional stability
- Poor thermal transmission
- Lightweight: for helicopter to remote areas

Applications

- Wellhead and valve covers/protectors/boxes
- Buildings, thermal breaks, wind & sea spray protection
- Stairs, platforms, handrail, grating, flooring, ladders, and mats



Oilfield Building

North Slope, Alaska, USA

This building was constructed from Strongwell's DURASHIELD® foam core building panels over a steel framework. The poor thermal conductivity of the panel, its insulation factor, and light weight are excellent for this harsh environment.



Rig Mat Road

North Slope, Alaska, USA

These rig mats (substitute for "board roads") were constructed from EXTREN® plate and DURAGRID® grating. They operate in temperatures below -40°C providing safe passage of the largest mobile drilling rigs in Alaska.

COLD WEATHER



Exterior Cladding - Derricks, Drill floors, and more

Arctic Alaska Drilling Units

3" DURASHIELD® insulated panels (all blue color) are ideal for arctic conditions with excellent low temperature properties - poor thermal transmission, dimensionally stable, and low to no maintenance.



Observation Towers (structures)

St. Paul Island, Alaska, USA

EXTREN® structure, SAFPLANK® interlocking decking panels, and SAFRAIL™ ladders and handrail used in a remote area Arctic Observation decks.



Complete Buildings

Arctic North Slope

3" DURASHIELD® insulated panels have been used for several decades on the Alaska North Slope by oil companies as well as the Federal Aviation Association. Smaller trailer built buildings make exceptional work storage sheds while providing workers protection from the elements in an emergency.



Handrail and Ladders

South Pole, Antarctica

Strongwell's SAFRAIL™ railing and ladder profiles were used on and around a research telescope located at the South Pole. Temperatures that can dip to -82°C , but average -49°C are not a problem for the Strongwell product.

COLD WEATHER



Grating & MARRS® OFFSHORE Handrail

Arctic FPSO Barents Sea

Currently, the northern-most operating FPSO in the world - Goliat used large quantities of DURAGRID® Phenolic grating and MARRS® OFFSHORE handrails for weight reduction and low maintenance.



Building Thermal Breaks

Bassett Army Hospital, Fairbanks, Alaska, USA

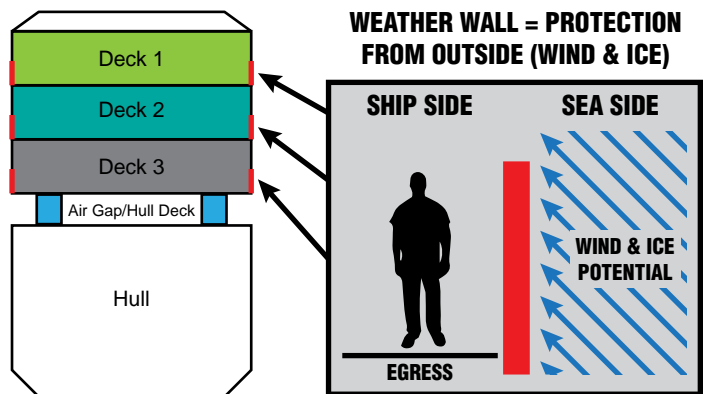
EXTREN® beams and FIBREBOLT® provide a thermal break to prevent cold from transferring into the Army Medical Hospital - Fairbanks, Alaska. This is one of the many features of Strongwell composites.



COMPOSOLITE® Bridge Headwall

Bradley, Maine, USA

COMPOSOLITE® bridge headwall will provide years of trouble free service on this vehicular bridge.



VIEW FROM STERN

FPSO Weather Wall Concept

Weather wall produced from COMPOSOLITE® for Arctic FPSO's. The wall was intended to protect workers from green water spray and icing. This product can also be used on bridges connecting fixed cold weather based offshore platforms. Temperature is the same on either side of the wall.
 Wall Size: 2m x 130m each (approx. 1560 m² total)
 Spans: Vertical = < 2m / Horizontal = < 4m
 Flare radiation not an issue due to position



Stairs on rugged coastline

Round Island, Alaska, USA

A stairway constructed of EXTREN®, SAFRAIL™, and DURADEK® keep a group of walrus company along the rugged rocky coast of Round Island, Alaska.

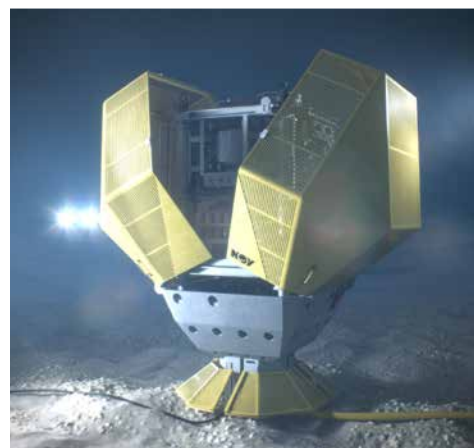
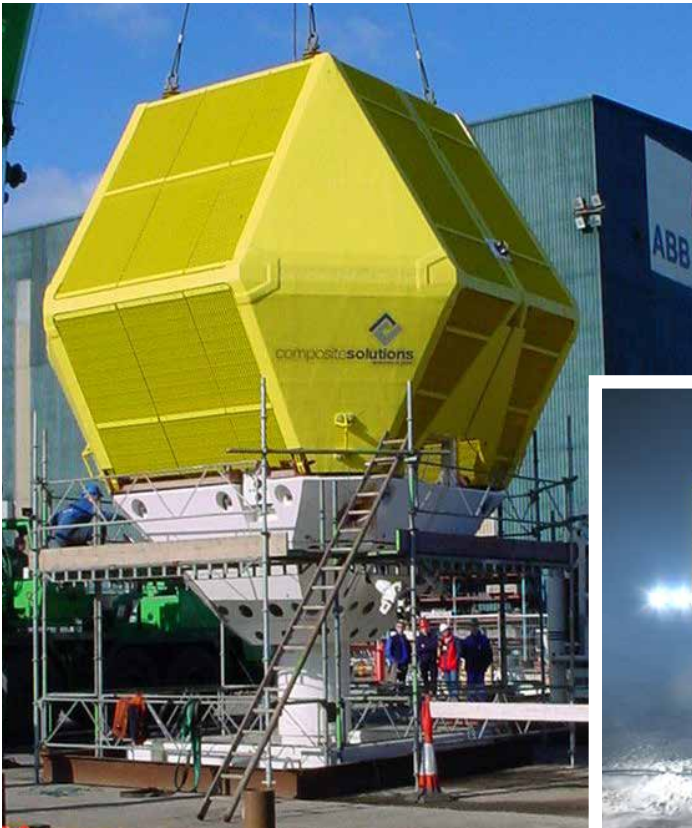
SUB-SEA

Wellhead Protection

North Sea - UK Sector

The Cocoon & Shroud™ Sub-Sea System (designed and fabricated by Pipex px®) is a means of protection for subsea well head equipment which is snag free, thereby reducing the risk to the lives of fisherman, risk of environmental damage, and at the same time, provides protection for the Company's valuable assets. Construction utilizes Strongwell's DURAGRID® grating and high performance composite structures to reduce weight and maintenance. This is a proven design that has been in use in the North Sea since 2001 without significant degradation.

For more information contact Pipex px® (a division of FGS - NOV) at www.pipexpx.com.



Courtesy of Pipex px®
(a division of FGS - NOV)



Courtesy of Pipex px®
(a division of FGS - NOV)

Manifold Protection

North Sea - UK Sector

Strongwell grating products are used as impact covers over manifolds to reduce weight and galvanic action on subsea applications. The deeper the application, the more important weight becomes as crane cables become significantly heavier. DURAGRID® I-4000 38mm (1.5") for 10 k joules impact resistance.

For additional information see Strongwell Application Profile #822

Protection Covers

North Sea - UK Sector

Strongwell products are used to reduce weight and galvanic action on sub-sea applications as impact covers and mudmats.

Contact Strongwell directly with your specific requests.

SUB-SEA



Sub-Sea Impact Protection

Arabian Gulf

DURAGRID® Phenolic

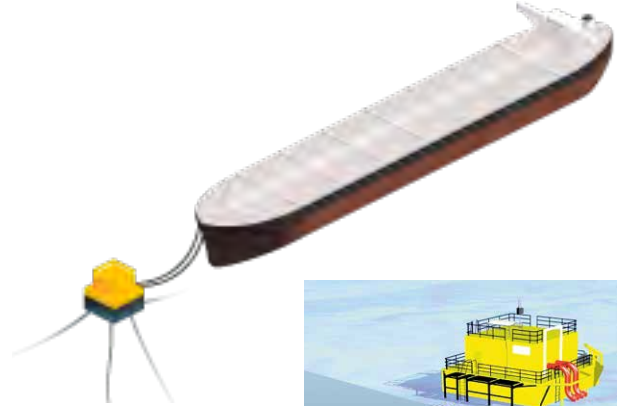


Discharge Caisson

EXTREN® plate and angle were used to fabricate a discharge caisson for a client in Australia. These fabricated parts hold the discharge piping between the platform and the ocean surface. EXTREN® was a natural choice given the severity of the corrosion in the area.

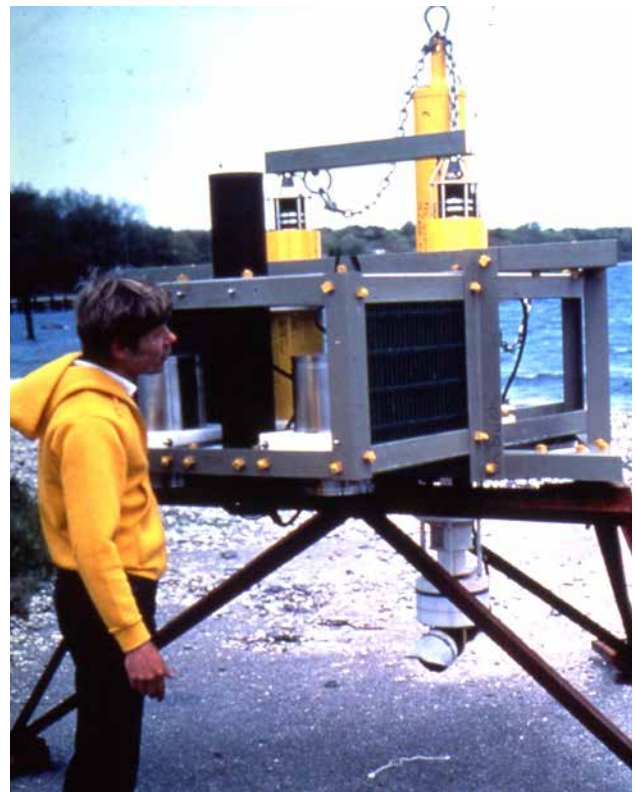
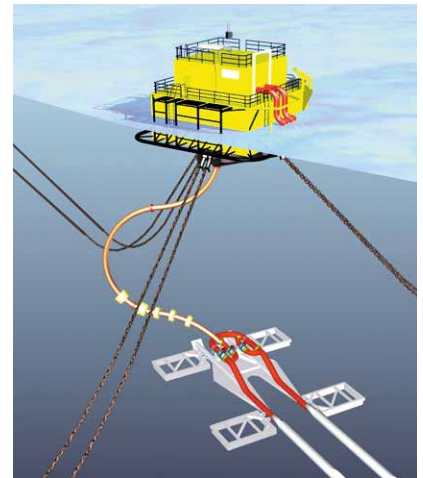
ROV Skid Plates

FRP grating can also be used as a skid plate for undersea ROV's



Single Point Mooring (SPM) Buoys

Grating, handrail, and ladders.



FIBREBOLT® was used with EXTREN® in the construction of this scientific research instrument which will be placed in saltwater bays.

WAVE ZONE

Areas that are close to the sea that experience wet-dry cycles have always been a major source of corrosion, requiring frequent steel grating and handrail replacement. FRP grating is an excellent choice for these areas provided that the grating is durable, can withstand high wave loading, and that the hold down system complements the grating in its ability to withstand wave forces. **Ordinary grating hold downs should not be used in wave zone applications.**

Wave zone applications can be difficult. It is suggested that parties consult Strongwell on the design and fabrication of products used in this area.

Typical Wave Zone Uses:

- Boat landings – fixed & floating platforms
- Swing decks
- Top of jacket grating – fixed platforms
- Stairways (treads) to sub-cellar deck
- Hull access-spars, TLP, FPSOs
- Anchor bolsters
- Inside FPSO turrets
- ROV skid plates
- Ballast or pre-load tanks
- Sub-Sea blow out preventers (BOPs)
- Sub-Sea manifold protectors
- Sub-Sea wellhead protectors
- Docks – subject to wave slam
- Diver access platforms
- Swim platforms
- Sea chests

Contact us directly for your specific requirements.



South China Sea

DURAGRID® HD 6500 - 38mm (1.5") and SAFRAIL™ on flooded boat landing.



South Pass 62A

Gulf of Mexico

One of the first and most successful wave zone applications until the entire platform eventually succumbed to Hurricane Katrina. Until that time, the application saw numerous tropical storms and hurricanes throughout its lifetime. This +12 (feet) level grating and handrail was designed for waves up to 70 feet and used a “containment” approach attachment. The design of the special built handrail eventually lead to the development of the ASTM F 1092-87 specification.



Offshore Malaysia

Workers prepare grating attachment using the Hilti XBT system. Please note that orientation and proper connection is critical in this application.

WAVE ZONE

Subsea applications require wave zone type attachments as they must pass through this zone on the way to the sea floor. For more information on wave zone attachments, please contact Strongwell.



Arabian Gulf

DURAGRID® Phenolic used on boat landings.



Brownfield

Worker prepares to install Hilti XBT grating fasteners to attach DURAGRID® HD grating on an existing jacket after the corroded steel has been removed.



Offshore Malaysia

Workers install round tube SAFRAIL™ on a top of jacket installation.

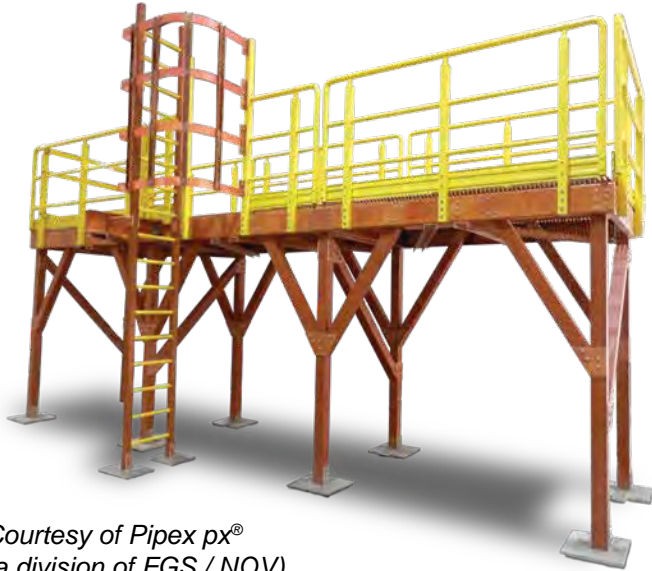


Single Wellhead Access

Molded grating and handrail for single wellhead access application in tidal zones (estuaries).

HOP-UPS / ACCESS PLATFORMS

Small access structures on an offshore platform do not need to weigh several tons, take a long time to fabricate, or require a crane to install. Structures fabricated from Strongwell products include none of the above and they do not rust. Strongwell continues to develop phenolic structures known for low flame spread, low smoke density, and low toxicity.



Courtesy of Pipex px®
(a division of FGS / NOV)

All Phenolic Hop-Up

This North Sea Offshore Platform, designed and fabricated by Pipex px®, is produced entirely out of phenolic products, and incorporates MARRS® OFFSHORE handrails.



Access Stairs

A stairway and landing access to building on the production deck of this Norway based platform.



Courtesy of Pipex px®
(a division of FGS / NOV)

Access Platform

A small foam monitoring platform was designed and fabricated by Pipex px® using EXTREN® structures and MARRS® OFFSHORE handrail. The platform was installed on the Humming Bird FPSO.



Support Structure

This fiberglass structure supports numerous cable tray parts and pieces in addition to the small walkway – Located in the Norwegian section of the North Sea

HOP-UPS / ACCESS PLATFORMS



Courtesy of Pipex px® (a division of FGS - NOV)



Courtesy of Pipex px® (a division of FGS - NOV)

Access Walkway

North Sea - UK Sector

This FRP access walkway (grey) was designed and fabricated by Pipex px® to replace a steel one around chiller units located on the deck of the Beryl Alpha platform, located in the North Sea. During installation, seas were too rough to unload on the side closest to the site. The walkway was brought up on the far side of the platform and hand carried to the installation area.



DURAGRID® Phenolic atop a small steel hop-up frame.

HANDRAILS



Corroded Steel Handrail

This is a piece of corroded steel handrail from a boat landing. The size of the handrail has significantly increased with the corrosion and it is very distorted. It is impossible to determine the strength of this handrail which is a strong safety concern. Other handrails may look very good from constant painting (exterior), unfortunately corrosion may be taking its toll on the inside of the handrail making it impossible to determine how safe the steel handrail is. SAFRAIL™ from Strongwell will not corrode.



Gray Railing

Yellow is the most popular color for handrails, but gray is also available. Regardless of color, the handrail should be UV coated for enhanced UV and color stability. When attaching accessory equipment to the handrail (lights, cable trays, life rings, etc.), strengthening may be considered through post spacing or other means of support.

MARRS® OFFSHORE Handrail

MARRS® OFFSHORE handrails represent an advanced handrail design that conforms to BS EN ISO 14122-3 and Norsok to 1.5 kN/m. This system features an adjustable top rail and articulated corner units (ACUs). The product also conforms to Norsok C-002 Part 6.1 and 6.2 and is available in low smoke phenolic resin systems. The weight difference between a MARRS® OFFSHORE and steel handrail is approximately 28-37 kgs per meter. For more information, visit pipexp.com.



*Courtesy of Pipex px®
(a division of FGS - NOV)*



*Courtesy of Pipex px®
(a division of FGS - NOV)*

MARRS® OFFSHORE handrail installed offshore is also used for cable ladder and lighting. This installation shows additional support for these items.

Additional Applications:

- Lighting poles or mounts
- Instrument panel supports

Qualifications

- MARRS® OFFSHORE BS EN ISO 14122- 3
- MARRS® OFFSHORE Norsok
- SAFRAIL™ NF E-85-218
- SAFRAIL™ ASTM F1092-87
- SAFRAIL™ NFPA 101
- SAFRAIL™ ABS Type Approval



SAFRAIL™ expertly installed on a concrete pier in the Persian Gulf. This is an ideal application.

HANDRAILS



Orange SAFRAIL™ being field fabricated by factory trained installers in the South China Sea. Square tube handrails are easily field fabricated, however, round tube handrail is more difficult and should be fabricated in a qualified shop.



A 3 meter section of assembled round tube SAFRAIL™ is easily lifted with one hand.

SAFRAIL™ Variations

Strongwell FRP handrails (SAFRAIL™) are available in many variations as noted in the list below.

Configuration

- All round
- All square - 50mm post
- All square - 65mm post
- All square - 65mm post/50mm inside
- 50mm square post w/round rails
- MARRS® OFFSHORE System
- Wave (Splash) Zone

Number of Rails

- 2 Rail
- 3 Rail
- 4 Rail
- Vertical Picket

Mounting

- Side Mount
- Top Mount
- Socket Mount
- Grouted Socket Mount
- Steel Mount

Kickplate

- 100mm Kickplate
- 150mm Kickplate
- 150mm Channel Kickplate
- No Kickplate

Material

- Polyester (PE)
- Vinyl Ester (VE)
- Phenolic

Dimensions

- Height: 1100mm (42") (Typical)
- Rail Spacing
- Post Spacing

LADDERS

SAFRAIL™ ladder and cage systems are available in numerous configurations to solve small space access issues. These systems may be produced from either polyester, vinyl ester, or phenolic resin depending on the location and/or application. There are a variety of construction methods to suit most applications. Offshore benefits continue to be light weight and low/no maintenance.



Ship Ladder

This ladder is attached to the exterior of a marine vessel (ship). Its design is intended to provide years of maintenance free service in an area that is always exposed to the weather. Construction consists of heavy duty solid side rails with solid diamond shaped IMO style rungs which are also gritted.



Platform Access Ladder

Offshore Norway

This platform access ladder was constructed from square tube, fluted rungs, and a heavy duty FRP ladder cage.



Float Unit Ladders

Several ladders, grating and handrail used as access to this float unit in Brazil (Petrobras).



Separator Unit Access Ladder

Ofon B - Africa

Access to this separator unit utilized a heavy duty IMO style (diamond rung) ladder with solid side rails and a heavy duty ladder cage and safety gate. SAFRAIL™ handrail with 150mm (6") kickplate and DURAGRID® Phenolic grating were also used to complete the package.

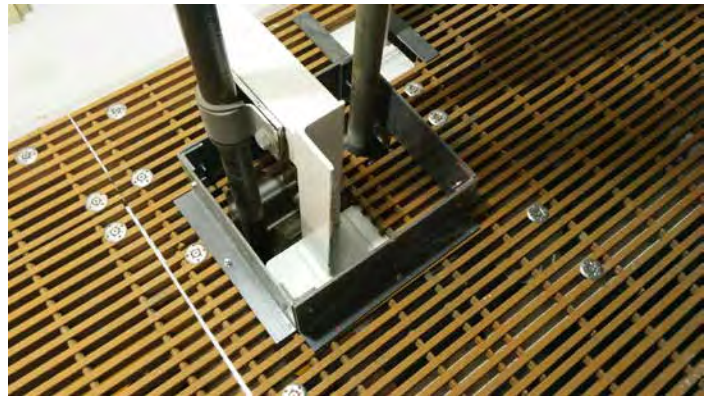
PIPE SLEEVES & KICKPLATE

FRP pipesleeves, kickplates, and penetration plates provide the simplest procedure for working with drop-through protection on an offshore grating installation. These products are lightweight, totally maintenance free and are easily installed in a matter of seconds by mechanical or adhesive methods. FRP pipesleeves are available in 100mm (4") and 150mm (6") heights with various mounting configurations from 50 to 100 mm flanges. Pipesleeves are often fastened by mechanical means, but recent trends show more use of adhesives. Fiberglass is preferred over other materials because of the safe, lightweight, no maintenance features. Strongwell sleeves uses a lower cost fastening system that is fit for purpose. NORSOK (L-002) requires 100mm clearance between the pipe and the sleeve



Typical Pipe Sleeve

A typical pipe sleeve application. Pipe sleeves are available as small as 50mm (2"). Because these sleeves are custom built, irregular sizes are available.



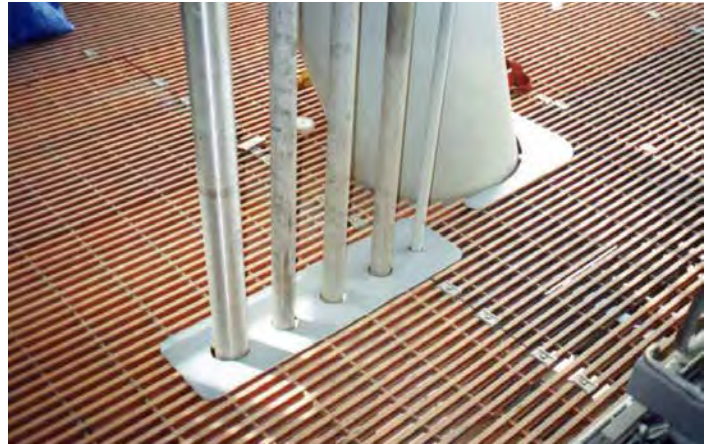
Free Standing Kickplate

Free standing FRP kickplate is also available in 100mm (4") and 150mm (6") heights. This product is available in 20 ft lengths – easy to cut with a chop saw, and simply bolted together with FRP angles. The kickplate can be bolted or bonded to the grating. This product is typically used around cable tray penetrations or rectangular /square holes where needed.



Threshold Plate

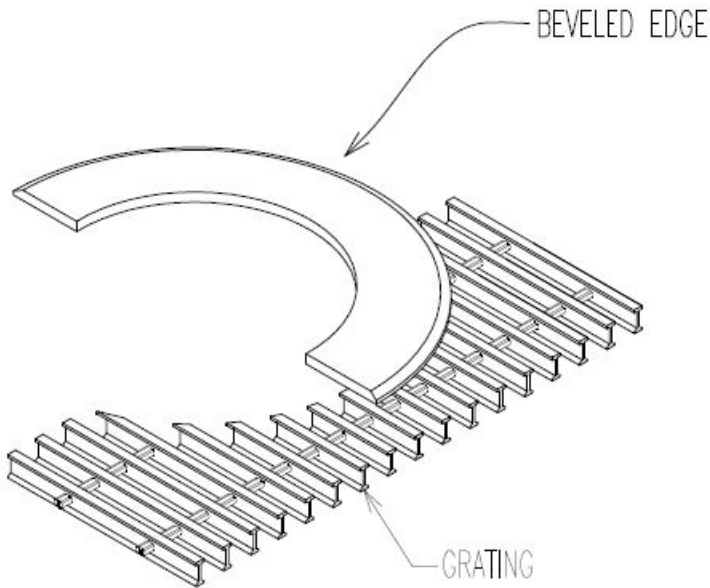
An EXTREN® plate is used as a transition cover where two grating panels of different elevation meet.



Penetration Plate

Penetration plate can be used to cover multiple small pipe penetrations and areas where the angle of the structure creates a requirement for a slightly larger opening (TOG) which should be covered for drop-through or foot protection.

PIPE SLEEVES & KICKPLATE



DETAIL OF PENETRATION PLATE



A partially installed penetration plate is used in place of a pipesleeve for drop through protection by the owner. This plate will likely be bonded to the grating with simple adhesive.



Penetration plate sizes can be adjusted to suit irregular cutouts, but provide an aesthetic appearance to the installation



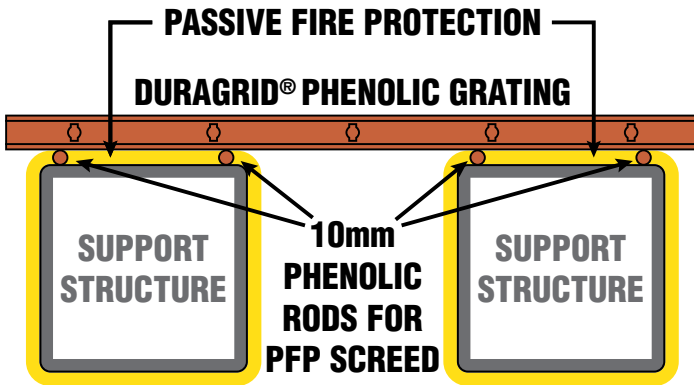
An EXTREN penetration plate successfully prevents a trip hazard cause by the installation of an instrument/control post. These posts often require a 300mm x 300mm (12" x 12") gusseted base-plate welded to the structure and causing

an elevation difference of 38mm (1-1/2"). The 6mm (1/4") thick plate safely covers the hole preventing a possible accident.

For more information see Section 6.

PASSIVE FIRE PROTECTION

The use of intumescent epoxy coatings (commonly referred to as PFP – Passive Fire Protection when referencing use on steel structures) has spawned several new applications for FRP.



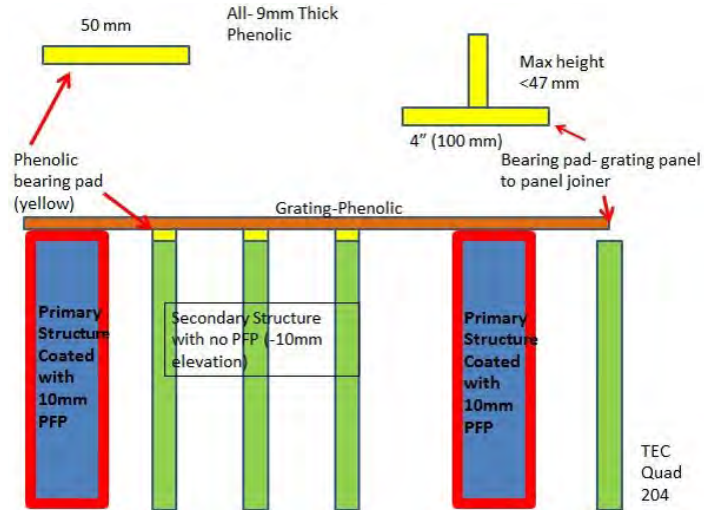
PFP Leveling Rods - Depth Measurement

10mm phenolic bars are placed on the structure to precisely measure a 10mm application of intumescent coating. In event of a fire, the phenolic bars ensure the gratings do not come into contact with the steel once the coating had reacted to form a char. The phenolic is fully compatible with the PFP and the thermal properties of the bar also protect the steel.



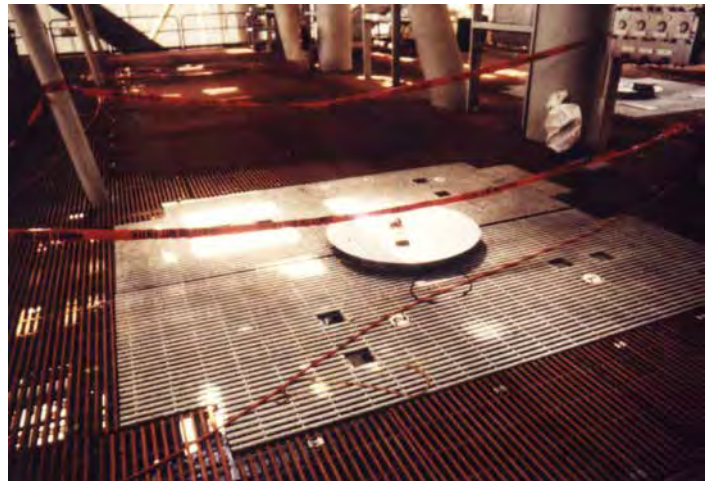
Additional Fire Safety

DURAGRID® Phenolic with spray applied PFP (white) provides extra protection to an area along a blast wall.



Bearing Plates

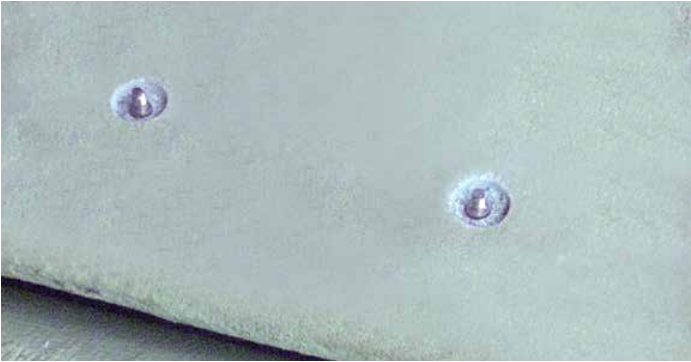
Strongwell produces phenolic bearing plates for standard single panel bearing supports and "T" section bearing plates used where two panels require bearing plates. These bearing plates make up the difference between non-coated and coated support steel. The proper use of these phenolic bearing plates in a PFP application provide a safe consistent grating walk surface.



Wellhead Protection

DURAGRID® Phenolic grating located around the well was sprayed with enough PFP (white color) to cover the grating but leave air flowing through the area. In the event of a fire, the PFP would expand (closing the gap in the grating) preventing any flames from penetrating the area - protecting the well tensioners.

PASSIVE FIRE PROTECTION



Grating Fasteners used with PFP

The Hilti XBT stud system cannot be used directly with PFP. To solve this, Hilti has developed a coring tool which removes the PFP in approximately 20mm diameter down to the steel so the Hilti tool can properly install the stud. The area remaining may be back filled with additional PFP after the stud is set.

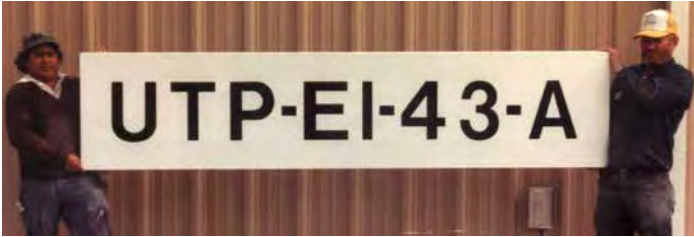
Contact Hilti for more information.



Phenolic Plate

Phenolic plate has excellent fire properties and can be used as passive fire protection on structural beams.

MISCELLANEOUS



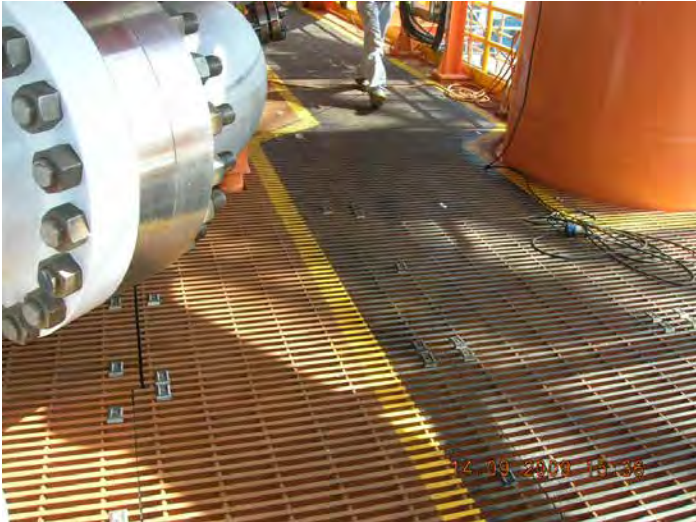
Platform ID Signs

Platform identification signs can be created on corrosion resistant Strongwell EXTREN® structural shapes and plate. Expect a lifetime of use.



Conductive Coating

Conductive coatings may be applied to DURAGRID® Phenolic grating in either black or grey. For more information, please contact Strongwell.



Paint Coating

The extra coarse grit surface on DURAGRID® Phenolic grating enables it to accept a second paint coating – to outline a safety or specific storage areas.



Sampling Station fully supported by DURAGRID® Phenolic (above) and attachment to the grating (right).



MISCELLANEOUS



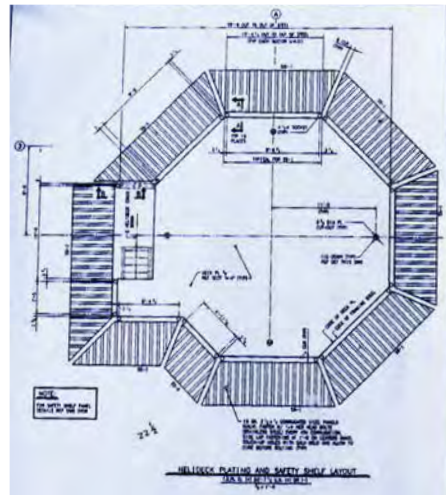
Mud Sack Room Floor

Grating with plate provides acceptable flooring in a Semi mud sack and pump room.



Plated Phenolic Grating

Grating with attached phenolic plate has many benefits. The solid deck protects from flames, providing improved fire safety. It is also the best option for heavy trolleys with small metallic wheels.



Helipad Skirting

Grating with plate used as helipad skirting to provide additional lift area for takeoff. The material is easy to install and corrosion resistant.



DURAGRATE® molded grating used as personal protection on a machinery skid.

Additional Applications:

- EXTREN® plate as covers on exposed cable tray
- EXTREN® plate used on control panels or control stands
- EXTREN® structure incorporated into lighting
- EXTREN® structure to support navigation lights
- EXTREN® structure - storage/parts room applications
- EXTREN® channel for Instrument tray
- EXTREN® used in pipe supports
- Strongwell ballistic panels
- Strongwell storm panels
- DURASHIELD® equipment enclosures (cold)