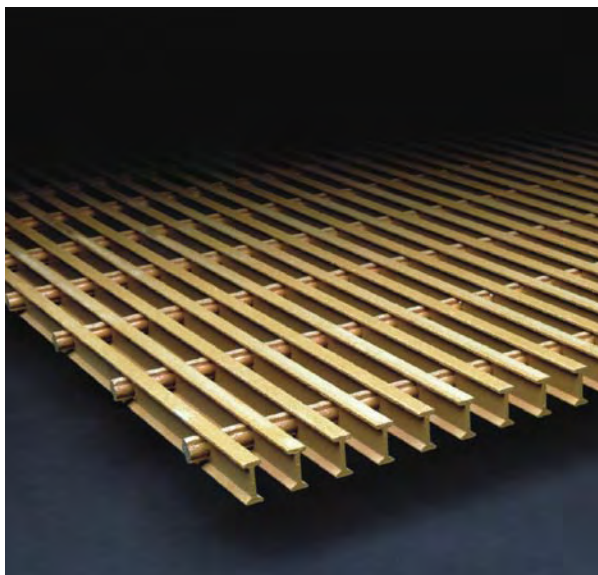
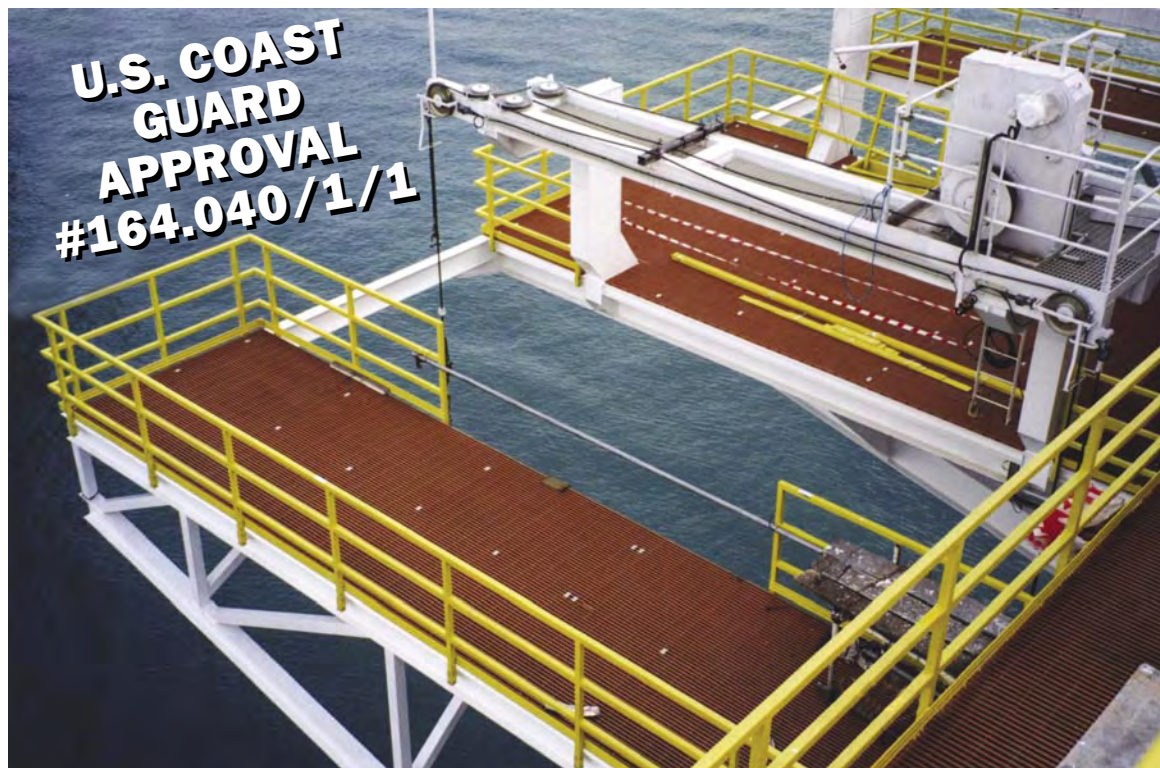


STRONGWELL

DURAGRID[®] PHENOLIC

FIRE INTEGRITY COMPOSITE GRATING



Fire Integrity Phenolic Grating



DURAGRID® Phenolic Grating has been used to reduce weight and maintenance on offshore oil production platforms for more than a decade.



DURAGRID® Phenolic Grating's unique construction allows for many penetrations to be cut without adding additional supports.



Above: DURAGRID® Phenolic Grating's 3-piece cross-rod system has been time tested for durability.

Left: DURAGRID® Phenolic Grating is very lightweight. The initial installation or removal of panels for area access can be performed quickly.

DURAGRID® Phenolic Grating has set the world offshore standard for fire integrity composite grating. Strongwell's use of the highest quality raw materials, state-of-the-art manufacturing processes and superior engineering results in a product of unmatched quality and performance. Strongwell's pultrusion facilities are ISO-9001:2000 certified to further ensure that DURAGRID® Phenolic Grating is manufactured following the utmost quality standards.

Features

DURAGRID® Phenolic Grating is a dramatic innovation for markets where fire safety is a major concern; offering superior resistance to high temperature with low smoke and toxic fume emissions. The nonflammable nature of phenolics enable phenolic grating to withstand higher temperatures than traditional FRP products for extended periods of time without major structural damage. Combined with low thermal conductivity, phenolic grating provides fire protection not available with alternate materials. DURAGRID® Phenolic Grating also offers the best strength-to-weight ratio for projects that require maximum weight optimization.

DURAGRID® Phenolic Grating is the first composite grating to receive U.S. Coast Guard approval. It is accepted for use in locations and applications as allowed in both the U.S.C.G. Policy File Memorandum 2-98 and ABS Appendix 3 (*ABS Guide for Building and Classing Facilities on Offshore Installation 2000*) for fire retardant grating meeting structural fire integrity Level 2 (L2).

In addition, DURAGRID® Phenolic Grating has these features:

- **Grating with the Strength of Steel** — Compared to standard steel grating, DURAGRID® Phenolic I-6000 1-1/2" can carry 1.75 times the load of equivalent steel grating. Unlike metal gratings, DURAGRID® Phenolic has memory—returning to its original shape if design loads are exceeded.
- **Ease of Fabrication** — DURAGRID® Phenolic Grating requires no cutting torches, welding or heavy equipment to install or make field modifications. The unique cross-bar construction enables DURAGRID® to be cut like a solid sheet with simple hand tools — no need for banding as with metal grating.
- **Lightweight, Easy to Install** — DURAGRID® Phenolic is approximately one-third the weight of steel bar grating. It is also much lighter than molded FRP grating, yet nearly four times the strength.
- **Dependable Anti-Skid Surface For Safety and Comfort** — DURAGRID® Phenolic Grating has a bonded grit epoxy anti-skid surface for superior slip and impact resistance. Grit options include fine, medium, #3 quartz, coarse or without grit. The wide grating bearing bar is less fatiguing than conventional metal grates, less damaging than serrated steel grating and not dangerously sharp like some molded gratings.
- **High Impact and Fire Resistance** - DURAGRID®'s special mat reinforcement protects the primary load bearing roving fibers from impact delamination and provides cross-sectional strength. An outer layer of resin rich phenolic provides optimal fire resistance.

Typical Applications

- Offshore production platforms
- Offshore drilling (MODU's)
- Docks/jetties/load-out areas
- Shipboard applications
- Tunnels/mass transit
- Aircraft
- Mining
- Public buildings
- Industrial/processing plants
- Refineries

Technical Data

Fire Safety

Compared to typical polyester, vinyl ester and epoxy FRP products, DURAGRID® Phenolic Grating is a major improvement in reduced smoke density, reduced smoke toxicity and structural fire integrity when exposed to fire. DURAGRID® Phenolic Grating complies with Annex 1, Part 2, 2.6.1 and 2.6.2 (smoke and toxicity testing) FTP Code (International Code for Application of Fire Test Procedures) issued by the International Maritime Organization. Further information on smoke and toxicity tests is available from Strongwell upon request.

ASTM D635-77	ASTM E-84	UL-94
Flammability Rate cm/min. <1	Flame spread-index 10 Smoke index 10	VO

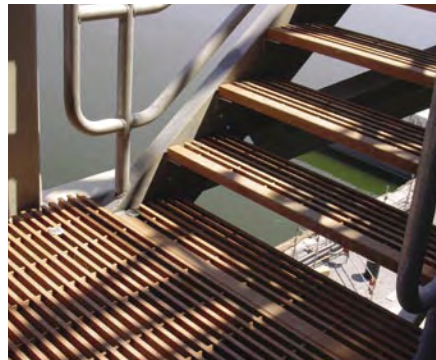
Accessories

Panel Hold Downs — Strongwell offers numerous types of grating hold down fasteners.

- **Saddle Clips:** 316SS may be welded, bolted or screwed into place. Recommended for use on stair treads.
- **G-Clips:** Specially designed for offshore installations, the SS316 clip eliminates field drilling for attaching grating. G-Clips are not recommended for use on stair treads.
- **Hilti System Fastener:** A shot stud system. Fastener top and threaded stud are available from Strongwell.
- **Splash zone** hold down applications. Please contact Strongwell.

Panel Connectors — Saddle clips with a SS bar that connects panels.

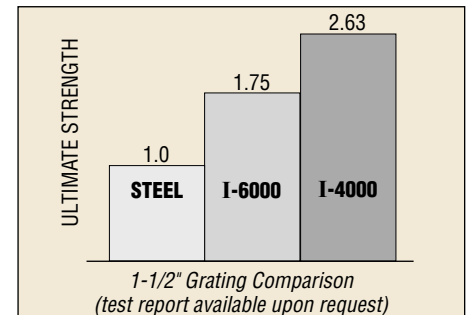
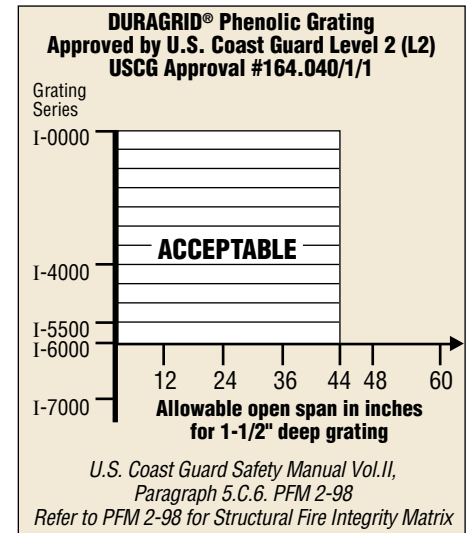
Stair Treads and Landings — Standard 11" deep with 2" deep closed nosing. Contact Strongwell for additional sizes.



Standard Panel Sizes

3ft x 20ft, 4ft x 20ft
1m x 6m, 1m x 5m, 1m x 5.5m

Acceptable Chart



Load Deflection Tables [Based on a clear span of 44" (1120mm)]

Series	Bearing Bar Center	% Open	Approx. Weight lbs/sq.ft. (kg/m ²)	Capacity PSFU* (kN/m ²)	Capacity PFC** (kN/m)
I-6000 1-1/2" (38mm)	1.50" (38mm)	60%	2.9 (14.2)	312 (14.9)	700 (10.2)
I-5500 1-1/2" (38mm)	1.33" (34mm)	55%	3.2 (15.6)	350 (16.7)	790 (11.5)
I-4000 1-1/2" (38mm)	1.00" (25mm)	40%	4.1 (20.0)	450 (21.6)	1050 (15.3)

* Uniform load capacity to produce a deflection of .25" (6.4mm) at midspan

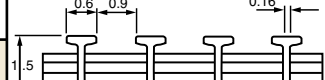
** Concentrated load capacity to produce a deflection of .25" (6.4mm) at midspan

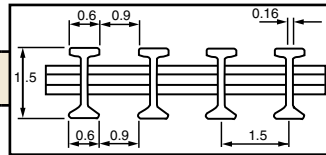
Specifications

Phenolic grating shall be DURAGRID® as manufactured by Strongwell-Chatfield Division, Minnesota. Grating panels shall be made of (1") (1-1/2") deep pultruded I bars. The bearing bars shall be spaced at (1.00") (1.33") (1.50") on center. The bearing bar composite shall be manufactured by the pultrusion process using phenolic resin, continuous glass fibers wrapped by a continuous strand glass mat. Panels shall be assembled into the size ordered using a 3-piece pultruded phenolic cross-rod system. The cross-rods shall consist of a center core wedge and 2 spacer bars that are notched at each bearing bar so that each bearing bar is both mechanically locked and bonded to the web of each bearing bar. The spacer bars shall be continually bonded to the center core wedge. The cross-rods shall be spaced at 6" on center in the panel. The top of the DURAGRID® Phenolic panels shall be covered with a bonded grit, baked epoxy, anti-skid surface. Color shall be brown. The panels shall be UV coated if used outdoors. If U.S.C.G. approval is required, specify 1-1/2" deep bars spaced at 1-1/2" or closer on a maximum clear span of 44". For future information on regulatory approvals, please contact Strongwell directly.

I-6000 1-1/2" Bearing Bars Spaced 1-1/2" On Center

A = 3.112 IN²/FT OF WIDTH S = 1.176 IN³/FT OF WIDTH I = 0.882 IN⁴/FT OF WIDTH
60% OPEN AREA APPROX. WT. = 3.0 LBS/SQ FT

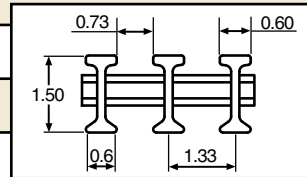
SPAN INCHES		LOAD															SAFE LOAD	DEFLECTION	E x 10 ⁶ PSI
		50	100	5.0 kN	150	7.5 kN	200	250	300	400	500	750	1000	2000	3000	4000	2:1 SAFETY FACTOR		
12	Δu	0.000	0.001	0.03	0.001	0.04	0.001	0.001	0.002	0.002	0.003	0.004	0.005	0.011	0.016	0.021	17601	0.095	4.75
	Δc	0.000	0.001	0.09	0.001	0.13	0.002	0.002	0.003	0.003	0.004	0.006	0.009	0.017	0.026	0.034	8800	0.076	
18	Δu	0.001	0.003	0.08	0.004	0.11	0.005	0.006	0.008	0.010	0.013	0.019	0.025	0.051	0.076	0.102	7823	0.199	5.08
	Δc	0.001	0.003	0.23	0.004	0.35	0.005	0.007	0.008	0.011	0.014	0.020	0.027	0.054	0.081	0.108	5867	0.159	
24	Δu	0.004	0.008	0.21	0.012	0.32	0.015	0.019	0.023	0.031	0.038	0.058	0.077	0.154	0.231	0.307	4400	0.338	5.31
	Δc	0.003	0.006	0.52	0.009	0.78	0.012	0.015	0.018	0.025	0.031	0.046	0.061	0.123	0.184	0.246	4400	0.271	
30	Δu	0.009	0.018	0.48	0.027	0.72	0.036	0.045	0.054	0.072	0.090	0.136	0.181	0.362	0.543		2773	0.502	5.51
	Δc	0.006	0.012	1.02	0.017	1.52	0.023	0.029	0.035	0.046	0.058	0.087	0.116	0.231	0.347	0.463	3467	0.401	
36	Δu	0.018	0.037	0.98	0.055	1.46	0.073	0.092	0.110	0.147	0.183	0.275	0.366				1896	0.695	5.64
	Δc	0.010	0.020	1.71	0.029	2.57	0.039	0.049	0.059	0.078	0.098	0.147	0.195	0.391	0.586		2845	0.556	
42	Δu	0.033	0.066	1.75	0.100	2.65	0.133	0.166	0.199	0.266	0.332	0.498					1361	0.904	5.76
	Δc	0.015	0.030	2.64	0.046	3.96	0.061	0.076	0.091	0.122	0.152	0.228	0.304	0.608			2381	0.723	
48	Δu	0.056	0.112	2.97	0.168	4.46	0.224	0.280	0.335	0.447	0.559						1017	1.137	5.84
	Δc	0.022	0.045	3.89	0.067	5.84	0.089	0.112	0.134	0.179	0.224	0.335	0.447				2033	0.910	
54	Δu	0.089	0.177	4.69	0.266	7.05	0.355	0.443	0.532								777	1.377	5.90
	Δc	0.032	0.063	5.49	0.095	8.23	0.126	0.158	0.189	0.252	0.315	0.473	0.630				1748	1.102	
60	Δu	0.134	0.268	7.11	0.403	10.69	0.537										608	1.632	5.94
	Δc	0.043	0.086	7.49	0.129	11.24	0.172	0.215	0.258	0.344	0.429	0.644					1520	1.306	
66	Δu	0.196	0.392	10.39	0.588	15.60											485	1.898	5.96
	Δc	0.057	0.114	9.93	0.171	14.90	0.228	0.285	0.342	0.456	0.570						1333	1.519	
72	Δu	0.276	0.552	14.64													390	2.153	5.99
	Δc	0.074	0.147	12.84	0.221		0.294	0.368	0.442	0.589						1171	1.724		



I-5500 1-1/2" Bearing Bars Spaced 1-1/3" On Center

A = 3.501 IN²/FT OF WIDTH S = 1.323 IN³/FT OF WIDTH I = 0.992 IN⁴/FT OF WIDTH
55% OPEN AREA APPROX. WT. = 3.2 LBS/SQ FT

SPAN INCHES		LOAD																SAFE LOAD		DEFLECTION	E x 10 ⁶ PSI
		50	100	5.0 kN	150	7.5 kN	200	250	300	400	500	750	1000	2000	3000	4000	5000	2:1 SAFETY FACTOR			
12	Δu	0.000	0.000	0.03	0.001	0.04	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.010	0.014	0.019	0.024	19801	0.095	4.75	
	Δc	0.000	0.001	0.08	0.001	0.12	0.002	0.002	0.002	0.003	0.004	0.006	0.008	0.015	0.023	0.031	0.038	9900	0.076		
18	Δu	0.001	0.002	0.07	0.003	0.10	0.005	0.006	0.007	0.009	0.011	0.017	0.023	0.045	0.068	0.090	0.113	8801	0.199	5.08	
	Δc	0.001	0.002	0.20	0.004	0.31	0.005	0.006	0.007	0.010	0.012	0.018	0.024	0.048	0.072	0.096	0.121	6600	0.159		
24	Δu	0.003	0.007	0.19	0.010	0.28	0.014	0.017	0.021	0.027	0.034	0.051	0.068	0.137	0.205	0.273	0.342	4950	0.338	5.31	
	Δc	0.003	0.005	0.46	0.008	0.69	0.011	0.014	0.016	0.022	0.027	0.041	0.055	0.109	0.164	0.219	0.273	4950	0.271		
30	Δu	0.008	0.016	0.43	0.024	0.64	0.032	0.040	0.048	0.064	0.080	0.121	0.161	0.322	0.482			3120	0.502	5.51	
	Δc	0.005	0.010	0.90	0.015	1.35	0.021	0.026	0.031	0.041	0.051	0.077	0.103	0.206	0.309			3900	0.401		
36	Δu	0.016	0.033	0.87	0.049	1.29	0.065	0.081	0.098	0.130	0.163	0.244	0.326	0.651				2133	0.695	5.64	
	Δc	0.009	0.017	1.52	0.026	2.38	0.035	0.043	0.052	0.069	0.087	0.130	0.174	0.347	0.521			3200	0.556		
42	Δu	0.030	0.059	1.55	0.089	2.35	0.118	0.148	0.177	0.239	0.295	0.443	0.591					1531	0.905	5.76	
	Δc	0.014	0.027	2.34	0.041	3.51	0.054	0.068	0.081	0.108	0.135	0.203	0.270	0.540				2678	0.724		
48	Δu	0.050	0.099	2.63	0.149	3.95	0.199	0.249	0.298	0.398	0.497							1144	1.137	5.84	
	Δc	0.020	0.040	3.45	0.060	5.18	0.080	0.099	0.119	0.159	0.199	0.298	0.398					2288	0.910		
54	Δu	0.079	0.158	4.16	0.236	6.25	0.315	0.394	0.473									874	1.377	5.90	
	Δc	0.028	0.056	4.87	0.084	7.36	0.112	0.140	0.168	0.224	0.280	0.420	0.561					1967	1.102		
60	Δu	0.119	0.239	6.30	0.358	9.48	0.477											684	1.632	5.94	
	Δc	0.038	0.076	6.64	0.115	9.97	0.153	0.191	0.229	0.305	0.382	0.573						1710	1.306		
66	Δu	0.174	0.348	9.21	0.522	13.83												545	1.899	5.96	
	Δc	0.051	0.101	8.80	0.152	13.21	0.203	0.253	0.304	0.405	0.507							1500	1.520		
72	Δu	0.245	0.491	12.98														439	2.153	5.99	
	Δc	0.065	0.131	11.38	0.196		0.262	0.327	0.393	0.523								1317	1.724		
78	Δu	0.337																0	0.000	6.01	
	Δc	0.083	0.166		0.249		0.332	0.415	0.497									0	0.000		



DEFLECTION AND MAXIMUM LOAD DATA WAS CALCULATED FROM LAB TESTS CONDUCTED BY STRONGWELL - CHATFIELD DIVISION.

c IS CONCENTRATED LOAD LBS/FT (kN/m) OF WIDTH
Δ c IS DEFLECTION UNDER CONCENTRATED LOAD (mm)
u IS UNIFORM LOAD LBS/FT² (kN/m²)
Δ u IS DEFLECTION UNDER UNIFORM LOAD (mm)
NOTE: Metric shown in red.



STRONGWELL

ISO-9001:2000 Certified Manufacturing Plants

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CHATFIELD DIVISION*

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www.strongwell.com

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