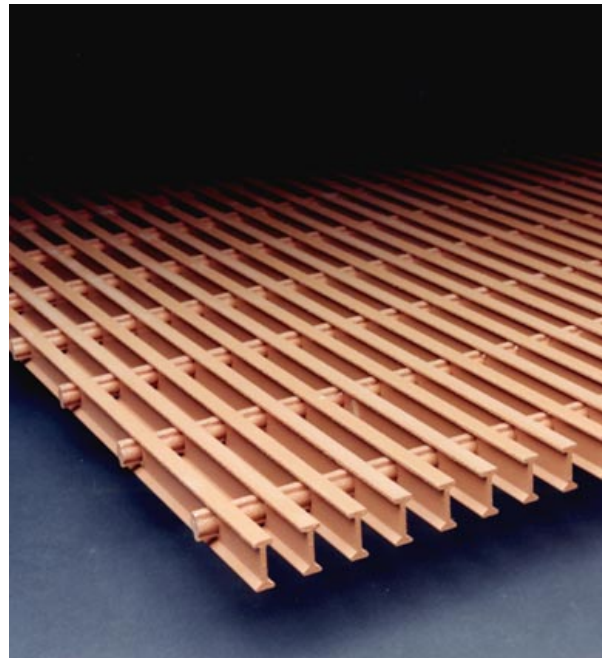


**STRONGWELL**

# **DURAGRID<sup>®</sup> PHENOLIC**

**FIRE RESISTANT PULTRUDED GRATING**



# Fire Resistant Phenolic Grating



Lightweight means low installation costs for offshore applications!



DURAGRID® Phenolic Grating is easy to install, requiring no heavy equipment, cutting torches or welding to make field modifications, thereby saving the cost of shutting wells down.



**Above:** DURAGRID® Phenolic grating for off loading platforms saves weight and maintenance.

**Left:** DURAGRID® can be cut to any size like a solid sheet, easy to remove and reinstall.

## Features

DURAGRID® Phenolic Grating is a dramatic innovation for markets where fire safety is a major concern; offering superior resistance to flame and high temperature with low smoke and toxic fume emissions. The nonflammable nature of phenolics enable phenolic grating to withstand direct flame contact for extended periods of time without major structural damage. Combined with low thermal conductivity this provides fire protection not available with alternate materials.

DURAGRID® Phenolic Grating is the only composite grating to receive U.S. Coast Guard approval. It is accepted for use in locations and applications allowed in the U.S. Coast Guard Policy File Memorandum 2-98 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® I-6000 1-1/2" Phenolic 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** — The unique cross bar construction enables DURAGRID® to be cut like a solid sheet with simple hand tools — no need for pinning or banding!
- **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 4 times the strength.
- **Dependable Anti-Skid For Safety and Comfort** — DURAGRID® Phenolic Grating has a permanently bonded grit epoxy anti-skid surface for superior slip and impact resistance. Options include fine, coarse (standard), extra coarse or without grit. The wide grating bearing bar is less fatiguing than conventional metal grates and less damaging than steel serrated grating.
- **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.

## Applications

DURAGRID® Phenolic Grating is designed to be used as walkways, platforms and decking for:

- Offshore construction
- Aircraft
- Tunnels/Mass Transit
- Mining
- Industrial/Processing Plants
- Public Buildings
- Shipbuilding
- Refineries
- Automotive

# Technical Data

**REDUCED SMOKE AND TOXIC FUME EMISSIONS**

DURAGRID® Phenolic grating generates much less smoke and toxic fumes when exposed to fire than traditional FRP products. Measured levels\* were well below polyester, vinyl ester and epoxy.

**NFPA 258** (ASTM E662)

Dmc	48.4
Ds @ 4 min.	5.1

**MIL M-14H**

Ignition Time	248 sec
Burning Time	23 sec

**Products of Combustion**

Hydrogen Chloride	0 ppm
Aldehydes HCHD	2 ppm
Ammonia	0 ppm
Carbon Monoxide	25 ppm
Carbon Dioxide	650 ppm
Oxides of Nitrogen as NO <sub>2</sub>	24 ppm
Cyanides as HCN	2 ppm

**Acute Inhalation Toxicity**  
NTS Modified Pittsburgh Protocol  
LC 50 >148 gm

\*Measured on phenolic flat plate

**FIRE SAFETY**

DURAGRID® Phenolic Grating Meets or Exceeds USA Fire Safety Standards

ASTM D635-77 <1 cm/min.

ASTM E84

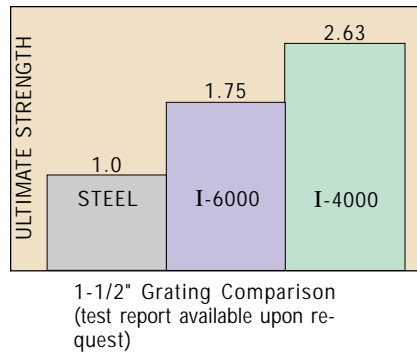
Flame spread-index	≤ 5
Smoke index	≤ 25
UL-94	VO

### Accessories

- **Panel Hold Downs** — Weldable 316 L stainless steel saddle clips or flush mount hold downs
- **Panel Connectors** — Saddle clips with a SS bar that connects panels
- **Stair Treads and Landings** — 11" deep with "D" nosing
- **G-Clip** — Specially designed for offshore installations, the SS 316 clip for I-6000 1-1/2" eliminates field drilling for mounting grating

**DURAGRID® Phenolic Grating**  
Approved by U.S. Coast Guard Level 2 (L2)  
USCG Approval #164.040/1/0

**U.S. Coast Guard Safety Manual Vol.II, Paragraph 5.C.6. PFM 2-98**  
Refer to PFM 2-98 for Structural Fire Integrity Matrix



### 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") (1-1/2") 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. Color shall be brown. 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. The panels shall be coated with a polyurethane coating 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".

### Load Deflection Tables Based at 44" (clear span of 44" per USCG approval)

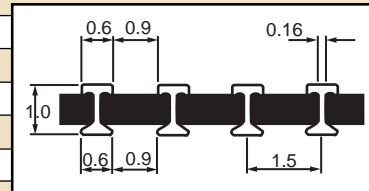
Series	Bearing Bar Center	% Open	Approx. Weight	Capacity PSFU *	Capacity PFC **
I-6000 1-1/2"	1.50"	60%	3.3 lbs/sq.ft.	300	700
I-5000 1-1/2"	1.20"	50%	3.9 lbs/sq.ft.	375	875
I-4000 1-1/2"	1.00"	40%	4.5 lbs/sq.ft.	450	1050

\* Uniform load capacity to produce a deflection of .25" at midspan

\*\* Concentrated load capacity to produce a deflection of .25" at midspan

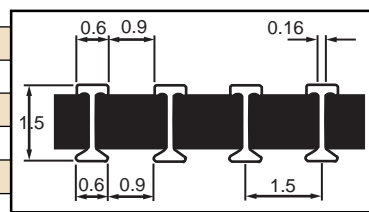
## I-6000 1" Bearing Bars Spaced 1-1/2" On Center

SPAN INCHES	A = 2.496 IN <sup>2</sup> /FT OF WIDTH    S = 0.656 IN <sup>3</sup> /FT OF WIDTH    I = 0.328 IN <sup>4</sup> /FT OF WIDTH										MAXIMUM LOAD	SAFE LOAD 2:1 SAFETY FACTOR	E x 10 <sup>6</sup> PSI
	u	Δu	200	400	750	1000	1500	2500	3500	4500			
12	u	.200	.400	.750	1.000	1.500	2.500	3.500	4.500	5.500	20.800	10.400	4.41
	Δu	.003	.006	.013	.016	.025	.041	.058	.075	.091	.344	.172	
	c	.100	.200	.375	.500	.750	1.250	1.750	2.250	2.750	10.400	5.200	
Δc	.002	.005	.011	.013	.020	.033	.046	.060	.073	.273	.137		
18	u	.133	.267	.500	.666	1.000	1.666	2.333	3.000	3.666	9.900	4.950	4.84
	Δu	.010	.020	.039	.051	.076	.125	.178	.223	.279	.753	.377	
	c	.100	.200	.375	.500	.750	1.150	1.750	2.250	2.750	7.430	3.715	
Δc	.009	.016	.030	.041	.061	.101	.142	.182	.224	.601	.301		
24	u	.100	.200	.375	.500	.750	1.250	1.750	2.250	2.750	5.800	2.900	5.14
	Δu	.023	.045	.086	.112	.170	.283	.396	.509	.623	1.312	.656	
	c	.100	.200	.375	.500	.750	1.250	1.750	2.250	2.750	5.800	2.900	
Δc	.018	.036	.069	.090	.137	.227	.317	.408	.499	1.050	.525		
30	u	.80	.160	.300	.400	.600	1.000	1.400	1.800		3.712	1.856	5.40
	Δu	.040	.084	.157	.210	.315	.524	.735	.946		1.947	.974	
	c	.100	.200	.375	.500	.750	1.250	1.750	2.250		4.640	2.320	
Δc	.033	.067	.126	.168	.253	.421	.589	.757		1.569	.780		
36	u	.67	.133	.250	.333	.500	.833				2.577	1.287	5.63
	Δu	.070	.139	.261	.348	.523	.870				2.694	1.347	
	c	.100	.200	.375	.500	.750	1.250				3.866	1.933	
Δc	.057	.111	.214	.278	.418	.697				2.154	1.077		
42	u	.57	.114	.214	.286	.428					1.884	.942	5.69
	Δu	.109	.219	.411	.549	.823					3.615	1.807	
	c	.100	.200	.375	.500	.750					3.298	1.649	
Δc	.088	.176	.329	.439	.658					2.894	1.447		
48	u	.50	.100	.187	.250						1.436	.718	5.81
	Δu	.161	.321	.600	.801						4.601	2.300	
	c	.100	.200	.375	.500						2.873	1.435	
Δc	.128	.257	.479	.642						3.683	1.842		
54	u	.44	.89	.166	.222						1.132	.566	5.83
	Δu	.225	.455	.847	1.134						5.782	2.891	
	c	.100	.200	.375	.500						2.548	1.274	
Δc	.180	.364	.680	.910						4.635	2.318		
60	u	.40	.80	.150	.250						.906	.453	5.86
	Δu	.310	.621	1.166							7.024	3.512	
	c	.100	.200	.375							2.266	1.133	
Δc	.248	.497	.930							5.619	2.809		



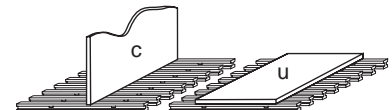
## I-6000 1-1/2" Bearing Bars Spaced 1-1/2" On Center

SPAN INCHES	A = 3.136 IN <sup>2</sup> /FT OF WIDTH    S = 1.240 IN <sup>3</sup> /FT OF WIDTH    I = 0.928 IN <sup>4</sup> /FT OF WIDTH										MAXIMUM LOAD	SAFE LOAD 2:1 SAFETY FACTOR	E x 10 <sup>6</sup> PSI
	u	Δu	200	400	750	1000	1500	2500	3500	4500			
12	u	.200	.400	.750	1.000	1.500	2.500	3.500	4.500	5.500	35.200	17.600	4.75
	Δu	.001	.003	.004	.005	.008	.013	.018	.024	.029	.188	.094	
	c	.100	.200	.375	.500	.750	1.250	1.750	2.250	2.750	17.600	8.800	
Δc	.001	.002	.003	.004	.006	.011	.015	.019	.023	.151	.076		
18	u	.133	.267	.500	.666	1.000	1.666	2.333	3.000	3.666	15.644	7.822	5.08
	Δu	.003	.007	.013	.017	.025	.042	.059	.077	.093	.397	.198	
	c	.100	.200	.375	.500	.750	1.250	1.750	2.250	2.750	11.733	5.866	
Δc	.003	.005	.010	.013	.020	.033	.047	.061	.074	.316	.158		
24	u	.100	.200	.375	.500	.750	1.250	1.750	2.250	2.750	8.800	4.400	5.31
	Δu	.008	.015	.028	.038	.057	.096	.134	.173	.211	.675	.337	
	c	.100	.200	.375	.500	.750	1.250	1.750	2.250	2.750	8.800	4.400	
Δc	.006	.012	.022	.030	.057	.077	.107	.138	.169	.538	.269		
30	u	.80	.160	.300	.400	.600	1.000	1.400	1.800		5.546	2.773	5.51
	Δu	.014	.028	.054	.073	.108	.180	.252	.325		1.000	.500	
	c	.100	.200	.375	.500	.750	1.250	1.750	2.250		6.933	3.466	
Δc	.011	.023	.043	.057	.087	.144	.202	.260		.800	.400		
36	u	.67	.133	.250	.333	.500	.833	1.166			3.792	1.896	5.64
	Δu	.024	.049	.091	.122	.183	.305	.425			1.384	.692	
	c	.100	.200	.375	.500	.750	1.250	1.750			5.668	2.844	
Δc	.019	.038	.074	.097	.146	.243	.341			1.108	.554		
42	u	.57	.114	.214	.286	.428	.714				2.720	1.360	5.76
	Δu	.037	.076	.142	.190	.284	.474				1.807	.904	
	c	.100	.200	.375	.500	.750	1.250				4.761	2.380	
Δc	.030	.061	.120	.152	.228	.379				1.445	.723		
48	u	.50	.100	.187	.250	.375					2.033	1.016	5.84
	Δu	.056	.111	.209	.279	.419					2.270	1.135	
	c	.100	.200	.375	.500	.750					4.066	2.033	
Δc	.045	.089	.168	.223	.335					1.815	.908		
54	u	.44	.89	.166	.222	.333					1.553	.776	5.90
	Δu	.078	.157	.293	.392	.589					2.747	1.374	
	c	.100	.200	.375	.500	.750					3.496	1.748	
Δc	.063	.126	.236	.315	.471					2.197	1.099		
60	u	.40	.80	.150	.200						1.216	.608	5.94
	Δu	.107	.214	.402	.535						3.252	1.626	
	c	.100	.200	.375	.500						3.040	1.520	
Δc	.086	.172	.321	.428						2.602	1.301		
66	u	.36	.73	.109	.182						.964	.484	5.96
	Δu	.141	.285	.426	.571						3.788	1.894	
	c	.100	.200	.375	.500						2.666	1.333	
Δc	.113	.227	.440	.567						3.025	1.513		
72	u	.33	.67	.100	.167						.780	.390	5.99
	Δu	.182	.369	.551	.720						4.292	2.146	
	c	.100	.200	.375	.500						2.342	1.171	
Δc	.147	.293	.440	.573						3.434	1.717		



DEFLECTION AND MAXIMUM LOAD DATA WAS CALCULATED FROM LAB TESTS CONDUCTED BY STRONGWELL - CHATFIELD DIVISION. Loadings to the left of the bold vertical line in a row, produce a deflection of less than .25 inches.

- c IS CONCENTRATED LOAD LBS/FT OF WIDTH
- Δc IS DEFLECTION UNDER CONCENTRATED LOAD
- u IS UNIFORM LOAD LBS/FT<sup>2</sup>
- Δu IS DEFLECTION UNDER UNIFORM LOAD



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\*DURAGRID® manufacturing location

R5M0100  
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