

Questions & Answers For **UNITED INTERLOCK® GRATING**



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1.) Interlocking of Different Gauges

Question: Can 14 gauge and 18 gauge planks be interlocked with each other?

Answer: Yes. With United Interlock® Gratings roll-formed shape, you are always assured of leg shapes which are identical. The tooling is such that the 14 gauge and 18 gauge will both fit with each other. This combination is frequently called for in mezzanine applications that have light loads and heavy pedestrian traffic in specific areas. The entire structure does not have to be of the same gauge and panel width.

2.) Long Length - Less Deflection

Question: What is the advantage of using long, multiple span planks over short, single span planks?

Answer: There are numerous advantages, with these five being the most important:

- A. With multiple span grating, you will get less deflection, with the same load.
- B. Multiple span lengths allow the staggering of end joints, giving a smoother more level overall surface.
- C. Multiple span grating planks normally allow less attachment points. Attachment of every panel at every stringer is rarely needed.
- D. Multiple span grating planks give less potential trip points on the floor. A triple span would have only one third (1/3) as many field joints as a single span.
- E. Longer lengths mean less pieces to handle. This saves money in unloading, transporting and installing.

3.) Black Iron Material

Question: If I don't need a protective coating, can I order uncoated steel and save money?

Answer: This is not recommended. Although pound-for-pound uncoated steel is usually less expensive, it doesn't always end up that way. Due to the way our grating is manufactured, uncoated material is a special order item and would be treated as such for each particular job. Less than mill quantities (40,000#) usually costs more per pound, thus galvanized stock material turns up cheaper, as we always buy it at the best mill price.

On large orders, we can get caught in an ordering trap. Steel mills can ship 10% short on an order. Therefore, we must always order at least 10% over, and we must take it. All of a sudden we can end up with 20% to 25% more material than the CUSTOMER wants. Since we have no market for uncoated grating, the CUSTOMER must pay for that extra material.

For these reasons, black iron usually costs more than galvanized material.

4.) Heel & Toe Plate Heights

Question: When do you use a 4", 6½" and/or 8" heel-toe plate with United Interlock® Grating?

Answer: A good rule of thumb is to check the OSHA regulations requiring a kick plate 4 inches above the walking surface. The main purpose is to prevent tools, etc., from being dropped onto workers below the Walkway. Our 6½" H-T plate is used with a 2½" leg meeting the 4" requirement.

Our 4" H-T plate, when used with 2½" rib grating, gives 1½" above a working surface. This H-T plate originally was designed in conjunction with the billboard companies for use on their staging platforms. They wanted a short plate which would do three things: 1) Keep paste buckets from sliding off, 2) provide something which the men would bump their heels against, and 3) provide a rear plate to rest the foot of the ladder against.

Most outdoor advertising companies still use the 4" H-T plate. Local OSHA interpretation does not always agree as to whether their rules apply to billboard staging platforms.

The United Interlock® assortment of accessories offers all options and the choice is with the CUSTOMER.

5.) Heel-Toe Plate Design

Question: Is there any good reason for United Interlock® Gratings Heel-Toe plate design as opposed to a flat plate?

Answer: Yes. There are several advantages:

- A. The turned-over top provides a safety edge in case someone falls.
- B. The rigid top and bottom give excellent rigidity, allowing longer spans.
- C. The shape actually adds strength to the span, which is very important long span catwalks and platforms.
- D. The rigid shape, extending below the top of the surface, gives excellent configuration for attachment by either bolting or tack welding.

6.) Brake-Formed vs. Roll-Formed

Question: A competitor offers a grating made on a press brake. Will it have the same interlocking characteristics as United Interlock® Grating which is roll-formed?

Answer: No. Up until the 1970s United Interlock® Grating was made on a press brake, and therefore, we are quite familiar with the many problems inherent to press-broken material.

The most significant problem was camber in sheets. When a sheared sheet is more than 10' or 12' long, sheet camber is a real problem. If my memory is correct, commercial tolerance in 20' was 3/4". What happened was that we would end up with lots of leg on the ends and no leg on one side in the middle. This is the reason that many plank-type grating manufacturers hold their lengths to 10' or 12'.

Second, during the press braking process the formation of hard and soft spots occurs in the steel. When the press brake comes down evenly from one end to the other, various areas of metal spring back in different ways. This also happens from one sheet to the next, as the entire coil of steel is slightly inconsistent. Because of this, press broken material cannot give a consistently tight interlock fit. Those manufacturers who press brake design a loose fit to accommodate this problem.

The third problem with press-broken material is inconsistency in operation performance. Each time a setup is made for a different gauge, leg height or leg configuration, it is very difficult to obtain the exact same tolerances. As guide pins wear, the tolerances change, and the material is not consistently pushed tightly against the stops, and the tolerances change.

The press brake manufacturing process makes it difficult to get a good, tight interlocking fit. Upon a material check you will find no consistency of tightness, and usually a very loose fit on press-broken material. This process will not yield a true interlock fit such as United Interlock® Grating finishes.

7.) OSHA Approval

Question: Is United Interlock® Grating approved by OSHA?

Answer: OSHA does not give blanket approvals or disapprovals to any products. It has certain safety standards which must be met, and if a product conforms to those standards, an owner is not cited for violating those standards.

We have found nothing in OSHA which spells out any requirements for Grating.

The closest statement is that slippery walking surfaces are not allowed. To the best of our knowledge, there has never been an instance where United Interlock® Grating has not been accepted as an anti-skid walking surface.

Stair tread requirements are very specific and, in our opinion, our anti-skid stair treads meet OSHA requirements. Part of this requirement is loading and this is spelled out on page 17 of the catalogue. We do not know of any instance where OSHA has not accepted United Interlock® Grating anti-skid stair treads.

8.) OSHA On Anti-Skid Stair Treads

Question: OSHA section 1910.24(f) - Fixed Industrial Stairs says, "All treads shall be reasonably slip resistant". Does United Interlock® Grating slotted smooth material meet this requirement?

Answer: We don't know. Most of the stair treads we manufacture are of anti-skid material. We do make a few of slotted smooth material on specific order. Since they are being used, we assume that they have either been approved or never inspected.

The question comes in the phrase, "reasonably slip resistant". Slotted grip material is more slip resistant than some other materials. It is less slip resistant than others. OSHA spells out that bar grating treads must be of their anti-skid design unless they have anti-skid nosing. From this, we make the assumption that our slotted smooth tread, without a nosing, probably would not meet OSHA requirements. However, it might meet them in the extra heavy-duty design which has a non-slip nosing.

9.) Unpunched Planks

Question: Can you furnish United Interlock® Grating in a solid, unpunched surface?

Answer: Yes. This is done frequently when the CUSTOMER wants a solid floor where no debris can drop through. Usually the floor is one of 14 gauge material and sometimes 6" wide material if there is a lot of heavy traffic or light wheel loads being applied.

When specifying unpunched, try to get the owner or engineer to specify lengths over 20'. This will give you a competitive edge.

10.) 18" & 24" Widths

Question: Why doesn't Unistrut make an 18" or 24" width plank?

Answer: The wider the plank, the weaker it gets in the overall load carrying ability. Rarely is someone looking for something lighter, to carry less loads.

With United Interlock® Gratings 6" 9" & 12" widths, we can accommodate any width configuration that will carry more load with less deflection, both in the long spans and the cross rib spans.

11.) Galvanized Coating - After Fabrication

Question: Can United Interlock® Grating be made of black steel, and then hot dip galvanized after fabricating?

Answer: Yes and No. Physically, it can be done; but the resulting product would be expensive and probably not satisfactory.

Presently we make our grating from hot dip galvanized coil. The coil is galvanized to very rigidly controlled specifications, and the galvanizing ends up being very tightly bound to the steel. This gives us a quality galvanized product.

Hot dip galvanizing, after fabrication, usually is done on intricate welded shapes after all the welding and fabricating is done. In theory, the zinc covers all welds, holes, joints, etc. This is not always so, because quality varies with the individuals doing the cleaning and the galvanizing. Many times it can turn out better, but many times it can be worse than pre-galvanized.

With our grating, there are two major problems with hot dipping after fabrication. This first is that the uneven zinc buildup is such that the panels will no longer interlock. This can be alleviated by using all double-male planks. The second problem is warpage. The long lengths, when put into the hot cleaning and dipping pots, tend to bow and warp due to the thin sections.

12.) Raw Edges

Question: Since United Interlock® Grating is made from sheet, which was hot dip galvanized before fabrication, won't there be rust forming on the raw edges?

Answer: No. Zinc is a metal which will flow over raw edges. This is a natural chemical action; plus, when dies shear material, they tend to wipe zinc over the raw edge. Since the mid 1960s when United Interlock® Grating was first produced, we are not aware of an instance where the cut edges were cause of failure or deterioration. Corrosion is no worse on the edge than in the center of the sheet.

13.) Attachment to Structural Supports

Question: Must United Interlock® Grating be fastened down to the supports?

Answer: No. Fastening down to the supports is not necessary to make the grating function properly. Because of United Interlock® Gratings snug interlock, panels will stay together and only a few crimps are necessary to make the entire floor system stay in place.

However, because of possible high and low spots in the structural system it may be necessary to attach the grating to the structure at certain points. This can be done with "J" bolts, hold-down clips, or welding.

If the structural system is bar joist, it is necessary for the bar joist to be attached to the grating on minimum of 36" centers in order for the bar joist to function properly.

14.) Floor Grating Gauge Selection

Question: What factors should be considered in choosing between 18 gauge and 14 gauge material?

Answer: The easiest and most common selection method is to look at a building code, see what the uniform loading requirement is, and select a material from the uniform load table of the grating manufacturer. However, here are a few other things that should be considered:

- A. Concentrated wheel loads
- B. Concentrated foot traffic loads
- C. Concentrated point loads such as rack legs
- D. Concentrated spread loads - on what are
- E. Impact loadings
- F. Longitudinal or lateral wind loadings
- G. Erection and construction loads
- H. Offset or eccentric loading
- I. Vibration and fatigue loadings,
- J. Allowable deflection
- K. Future possible loading may be greater than present design loads
- L. Corrosion
- M. Maintenance activity
- N. Cost - new installed cost must be looked at with view of future replacement cost. The cost to go from 18 gauge now is small. Other costs, such as unloading, moving and installing remain the same regardless of gauge.

For heavy traffic and concentrated loading activity, 14 gauge is recommended.

15.) Factory Painting of Grating

Question: Can I get pre-painted United Interlock® Grating?

Answer: Yes, but we do not recommend pre-painted grating prior to installation. Because of United Interlock® Grating's tight inter-locking fit, the coats of paint in the ribs would probably prevent the grating from easily going together. However, that would be no restraint if all the material were double male.

The big problem comes in shipping. It is nearly impossible to ship painted material in such a way that it will not get scratched in shipping. Not only will it scratch in shipping, but also in unloading, field transporting and installation.

If painting is desired, field painting after installation will turn out better and much less expensive.

16.) Field Painting of Grating

Question: Is there any problem in field painting United Interlock® Grating?

Answer: As with any standard galvanized steel product, there is a problem with normal paint sticking to the galvanized coating. There is a film on galvanizing that must be removed. This can be alleviated by wiping off the grating with a commercial solvent, or letting the material weather for several months.

Our recommendation on field painting is to install galvanized material and not to paint until necessary. It may never be necessary, and, the original galvanizing will outlast the first coat of paint. Paint flakes off and wears off in a manner much different from galvanizing.

Field painting can be done by spray, brush or roller. The roller is used only when the top surface needs painting.

17.) Length of Tolerance

Question: Is the length of tolerance on United Interlock® Grating the same as on other gratings?

Answer: No. Bar grating specs say their length tolerance, after trimming, is plus or minus 1/4", for a total variation of 1/2". Grip Strut has lengths of 120 3/8" and 144", with tolerances of minus zero, plus 1/2".

United Interlock® Gratings lengths are basically exact, because we cut the ends with a flying cutoff, using a limit switch. The tolerance is as close as we set it. Usually it is safe to say our tolerance is plus or minus 1/8".

For proper installation, we never recommend tolerances on the plus side. With all plus-length tolerances, grating must be field-cut to fit into fixed length areas.

18.) Wheel Loads

Question: Can two, three and four-wheel carts be used on mezzanines of United Interlock® Grating?

Answer: Although we normally don't recommend the use of rolling carts on grating, there are many successful installations. The problem occurs as a combination of point loads and impact.

Satisfactory installations have the following favorable factors:

- A. Relatively light loads
- B. Low frequency
- C. Large diameter wheels
- D. Pneumatic, rubber tires
- E. Use of 14 gauge grating
- F. Use of 6" wide grating for heavier loads.

The large tires spread the load over more than one rib back to the main legs. The soft rubber tires reduce impact and fatigue. The 4 gauge and 6" width give the greatest strength combination.

Point loading tests are available on United Interlock® Grating and many competitors' gratings. This information is available to any engineer considering wheel loads. AISC's design manual says that floors shall be designed for a minimum of 150% of the maximum wheel load anywhere on the floor.

19.) Stair Tread Selections

Question: What factors should be considered in choosing between Heavy Duty and Extra Heavy Duty Stair Treads?

Answer: Consideration should be given to static loadings, moving loads, impact, load frequency, construction loads, maintenance loads, possible future usage and OSHA requirements.

OSHA is most specific on load carrying ability. It says, "Fixed stairways shall be designed and constructed to carry a load 5 times the normal live load anticipated but never less strength than to carry safely a moving concentrated load of 1,000#". The 1,000# is based on a person weighing 200#. Experience shows that much larger people use stair treads, and maintenance people with tools frequently approach the 300# range.

Another major factor in choosing tread type involves frequency of use. Frequency combined with weight, impact and eccentricity all have a bearing on mental fatigue.

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As a general statement, considering frequency without other considerations, we suggest the following:

Heavy Duty treads are used for normal traffic where use is during each hour of the working shift.

Extra Heavy Duty treads are used where traffic is frequent or continual.

Records show that of the treads sold each year, designers and engineers use 50% Extra Heavy Duty, 50% Heavy Duty.

If in doubt, use Extra Heavy Duty treads.

20.) Deflection

Question: Why do United Interlock® Gratings allowable load tables show no restriction regarding deflection?

Answer: Because acceptable limits of deflection are a personal choice of the designer and differ from one person to the next. United Interlock® Grating goes far beyond other grating manufacturers and shows, on pages 10 thru 15 of our catalogue, actual deflection conditions under all spans and loadings. This gives the designer the freedom to know exactly what he is getting under the conditions of his project.

Various deflection ratios are discussed on page 10 of the catalogue under "Design Considerations". The best way to choose deflection limits is to lay out a few pieces of grating over the span desired, and see how it feels. Span, gauge, and rib height then can be adjusted to meet the results desired.

21.) Application of Concentrated Loads

Question: Over what area is a concentrated load assumed to be applied?

Answer: The American Standard Building Code as published, in part, in the AISC Steel Construction Manual says, "Unless otherwise specified the indicated concentration shall be assumed to occupy an area of 2½ feet square and shall be so located as to produce the maximum stress conditions in the structural members".

United Interlock® Grating tests were made with a 3" wide beam across the 9" width of grating. These loads are much more concentrated than many concentrated loads, and somewhat resemble the loadings applied by one's foot. The greater the area over which a concentrated load is spread, the less critical the load will be.

United Interlock® Gratings load tables assume that the load will be at least 3" wide and spread evenly over both legs. If you have loadings which would be more severe than this, then a special load test should be made to verify actual results of logical engineering assumptions used for interpolation.

22.) Point Loadings

Question: On storage mezzanines, we get many point loadings with bin and rack legs of small angle, small round tubing, and small rectangular tubing. Will United Interlock® Grating resist these very concentrated loads?

Answer: Light loads should present no problem, but as the loads increase, it is necessary to spread the concentrated load from the cross ribs to the legs of the grating. This is true in any type of grating – not just United Interlock® Grating.

Spreading of these point loads can be done by a variety of methods. These include:

- A. Using 14 gauge grating
- B. Using 14 gauge x 6" wide grating
- C. Attaching a flat plate on the top of the grating to carry the load to the legs of the grating
- D. Putting special flat plate on the bottom of the leg of the table or bin. Plate size and thickness will increase with the amount of load.

Usually the load is spread back to the two adjacent pairs of interlocking legs. Assuming this resultant load is not greater than load table allowables, there should be no problem.

23.) Rib Replacement

Question: Our Maintenance Crew dropped a large, heavy motor on a mezzanine of United Interlock® Grating and bent one rib and broke out another. What is the best method of repair?

Answer: The bent rib possibly may be bent back into place. Bend it back and look at both ends for any fracture of metal. If there is no fracturing, then everything is OK. If fracturing has started, then remove rib by sawing out for beating out with a hammer.

A removed rib, or adjoining ribs, may be repaired by putting replacement ribs over the removed ribs. This is done by taking a piece of grating (either 1, 2, 3 or 4 ribs long) and cutting off the legs. This flat piece of grating, with ribs but no legs, is laid over the removed ribs and attached with either flat head sheet metal screws or pop rivets. The resultant replacement works very well and is hardly noticeable.

For large sections of damaged grating, a complete section can be cut out and a replacement put in place by bolting or welding.

24.) Salt Water Corrosion

Question: Will the galvanized coating hold up in coastal areas where salt spray is in the air?

Answer: Salt is a known corrosive force on steel. To protect the steel from corrosion, various protective coatings can be put on the steel with a wide variance in resultant protection. Zinc, or galvanizing, is one of the popular protective coatings. A drive through any coastal area will show galvanized fences, guardrail, retaining wall, culvert pipes, gutters, billboards, etc. It is, however, a known fact that galvanized coatings do not last as long in coastal areas as in the farm lands of the midwest. On the other hand, it is also a fact that some inland industrial cities have a more corrosive atmosphere than some coastal areas.

We have a lot of grating used inside and out in coastal areas, with no alarming rate of deterioration of the zinc coating. Once the original zinc coating is gone, then paint is usually used for protection.

United Interlock® Grating's aluminum grating is frequently specified in corrosive situations for a greater life expectancy than galvanized steel.

25.) Handrail Attachment

Question: Can handrails, meeting OSHA requirements, be directly attached to the leg of United Interlock® Grating?

Answer: Yes, but additional support is also necessary. However, it is difficult to reinforce the joint at the bottom of the handrail post adequately to support the required 200# load applied to the top of the handrail post. It is best to attach the handrail posts to the cross members that support the grating.

26.) Cantilevers

Question: Can United Interlock® Grating be cantilevered past a supporting structural member?

Answer: Yes. This is done frequently. The length of cantilever depends on the loads which will be applied. The field condition usually can be set up in the distributor's warehouse to see the results of the proposed design.

27.) Diaphragm Action

Question: Can United Interlock® Grating be utilized as a shear diaphragm?

Answer: Yes. United Interlock® Grating is capable of handling in-plane shear forces and fulfilling the function of a shear plane diaphragm. The amount of resistance is dependent upon: Type and spacing of fasteners, span, type of supporting framework, loading configuration and diaphragm size.

It is a rare situation when United Interlock® Grating would not function as a shear diaphragm.

28.) Fabrication From Blue Prints

Question: Will United Interlock® Grating Distributors fabricate from blue prints?

Answer: Yes. This usually involves cutting pieces to size, marking and special handling. It also involves making drawings for submittal to the contractor and, in turn, to the architect and engineer. This process is time consuming and expensive.

This practice comes from bar grating, which gets into complicated cuts and layouts before galvanizing. It normally is not required with United Interlock® Grating, as it is a field-fit product. Rarely is everything in the field where it is shown on the plans. The field fitting allows easy adjustments to be made on the job with no extra cost to the owner or engineer.

29.) Thickness and Corrosion

Question: Because bar grating is made of thicker steel, it has more corrosion allowance. Won't it, therefore, last longer than the United Interlock® Grating?

Answer: Yes, if corrosion is the only factor being considered. In most grating installations, final failure is not by corrosion, but by loadings.

Deterioration by corrosion must be considered in corrosive conditions. Protection from corrosion is usually handled by other materials such as plastics, aluminum, stainless steel or protective coatings on steel. These protective coatings are paints, epoxies, galvanizing, or combinations of these. All of these alternatives must be considered against cost of new, and cost of replacement.

Thickness of steel alone does not assure long life. Thinner sections, such as United Interlock® Grating, can match bar grating strength for a lot less money. If money is no factor, then thicker bar grating, with deep sections for equal strength, will probably last longer in a pure corrosive atmosphere.

30.) Welding Galvanized

Question: Can galvanized material be welded, and is there a problem with the fumes?

Answer: The welding of galvanized material is an everyday occurrence in every sheet metal shop in the United States. It is not a problem for people who know how to weld galvanized material. In the welding process, the zinc coating is burned away, and is then recoated with a cold zinc compound.

Yes, there is some toxicity with fumes from galvanized welding. Welding normally is done in an exhaust booth, or on larger structures, where the area has good air movement and ventilation. Where no exhausting or air removal source is available, the welders will sometimes wear respirators.

Follow required codes (state, federal, etc.).

31.) Stair Treads and Nosing

Question: Does OSHA require angle nosings on stair treads?

Answer: No, according to the present OSHA interpretation. Nosings are referred to in OSHA section 1910.24(f). Quoted as follows: (Words in parentheses - our comments) (f) Stair Treads. Each tread and the top landing of a stairway, where risers are used, should have a nose which extends one-half inch to one inch beyond the face of the low riser. (This does not normally apply to United Interlock® Gratings type stair treads since rarely are they used with vertical closed risers at the back of the tread). Nosings should have an even leading edge. (All of our treads meet this requirement). All treads shall be reasonably slip-resistant and the nosings shall be of a non-slip finish. (Since the first sentence spells out the only location where nosings are required, it is assumed that this statement supplies only to that condition). Welded bar grating treads without nosings are acceptable providing the leading edge can be readily identified by personnel descending the stairway and provided the tread is serrated, or is of definite non-slip design. (If serrated bar grating is acceptable without a nosing, United Interlock® Gratings anti-skid surface is also logically acceptable).

The above parenthesized comments are United Interlock® Gratings interpretation, and to the best of our knowledge, OSHA has always accepted our treads, without nosings.

32.) Other Gauges

Question: Can United Interlock® Grating be made in gauges other than 14 and 18?

Answer: Yes, we have the capability to provide both 20 gauge and 16 gauge material. However, both involve special ordered material and only in cases of extremely large quantities would it be less costly than 14 and 18 gauge. Twenty gauge is not recommended for foot traffic, but can be used in some storage type situations.

33.) Short and Long Lengths

Question: Your standard lengths are 20' and 24'. What are the shortest and longest lengths which you can furnish?

Answer: The longest we have furnished were 30' long.

On the short side, we can furnish to as little as 1½ feet long. Short lengths are expensive to roll form, handle and punch, so usually longer lengths are run and sawed to the short length desired.

Special lengths usually require a price adjustment, and lead times quoted by the factory.

34.) Type of Aluminum

Question: What type of aluminum is used in making aluminum United Interlock® Grating?

Answer: Type 5052-H34. This material has both good forming qualities and good corrosion properties.

This is the only aluminum material we stock; however, other types could be looked at if quantities were great enough and the material would form properly.

35.) I've Always Used Bar Grating

Question: How do you overcome the designer who says that they've always used bar grating and see no need to change now?

Answer:

Try a few of these comments:

- Bar grating has been around a long time and where properly specified, has done an adequate job. However, since its origination many years ago, there have been new products brought along in the line of plank type gratings.
- Plank grating was developed making use of sectional properties, thereby producing a product with an excellent strength/weight ratio. As the distance between structural supports increases, the use of plank grating becomes more economical.
- A major factor in the overall structural design of a project is the dead load of the walking surface. The weight savings gained by the use of a plank type grating is passed onto the structural supports. This allows for the use of smaller sections for the supports.
- Since a worker can lift even the longest plank of United Interlock® Grating, no special equipment such as cranes, hoists and fork lifts are required to handle the material. This fact coupled with the ease of installation due to the products interlocking feature makes for installation cost savings as high as 50-75%.
- Field modifications of bar grating are extremely time consuming and costly. Plank grating can be cut with common hand tools with very little effect. This flexibility reduces a major problem to a small inconvenience.

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