

HEALTH and SAFETY PROGRAM 337 – Grating Inspection Procedure

1.0 PURPOSE

The purpose of the Grating Inspection Procedure is to identify, mitigate and control hazards associated with structural and trench grating. This procedure outlines the inspection criteria and frequency for trench grating, structural grating and fixed staircase grating. The information in this procedure includes industry best practices and methods of hazard recognition in order to prevent incidents due to grating failures.

2.0 SCOPE

The scope of this procedure includes all operational and shipping areas at the Westlake Plaquemine complex. Employee responsibilities includes all Westlake personnel, temporary workers, contractors and visitors at the site.

3.0 DEFINITIONS

3.1 IDLH – immediately dangerous to life and health.

3.2 Structural Grating – grating that is either welded or clipped to I-beams or other structural members of an elevated platform. Structural grating can be at lower levels or above grade and is primarily used as a walking / working surface for personnel. Structural grating includes stairways.

3.3 Qualified Person – personnel assigned to perform grating inspections and through knowledge, experience and training demonstrate the ability to inspect grating.

3.4 Trench Grating – grating that covers trenches, ditches, walkways and other areas where personnel or vehicles may walk or travel. For the purpose of this procedure, trench grating comprises of several materials: iron, steel, fiberglass, composite, PVC or other material.

4.0 RESPONSIBILITIES

4.1 Employees – all personnel are required to escalate and report hazards and unsafe conditions associated with grating. Upon discovery, an employee will barricade a grating area posing a potential IDLH hazard and Escalate to unit supervision. A work order should be submitted for all recognized hazards following normal processes for writing work notifications and designated as “safety” work order.

4.2 Unit Management / Department Head – ensures that resources are allocated for required inspections. Communicates expectations for ensuring grating hazards are repaired appropriately and timely. (i.e.: repairs deemed “emergency” or “safety” take precedence.)

4.3 Health & Safety Department – reviews for effective hazard mitigation and control and updates this procedure every three (3) years as needed. Notifies the site of any changes and/or updates. Assists with training and tracking training records for personnel who are assigned, qualified inspectors.

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- 4.4** Operations Supervisors – reviews work orders for grating with validators to ensure proper repairs are being made and that hazards have been mitigated. Ensures that operational personnel who escalate grating hazards receive feedback on the repairs.
- 4.5** Maintenance Supervisors – responsible for ensuring qualified personnel are trained in the repair and identification of grating hazards. Supervisors are responsible to make sure inspections are being conducted as scheduled using the appropriate inspection criteria and that repair work orders are submitted for timely repair.
- 4.6** Maintenance Inspectors – responsible to conduct inspections upon receiving a work order and submitting findings to the Westlake maintenance supervisor for submission to validator for scheduling repair. Upon recognition of a grating hazard, erects appropriate barricade to prevent access until repairs are made.

5.0 Procedure

Throughout the Plaquemine facility, trench grating, structural grating and structural staircases are designed, constructed and installed to provide safe access to plant equipment and operations. Over time, defects, corrosion, incomplete maintenance and improper or lack of barricading can lead to employees being exposed to grating defects, potentially causing injuries. Grating defects can cause employees to be exposed to slips, trips and falls at grade or at an elevated level.

- 5.1 Hazard Recognition & Reporting** –The following section defines minimum guidelines for grating hazard recognition and must be controlled and barricaded until repair is made and deemed safe for access.

5.1.1 Hazard Recognition

- 5.1.1.1** During normal rounds by operations, shipping personnel and tours made by service groups, employees should be aware and evaluate their walking working surfaces for hazards.
- 5.1.1.2** Openings or holes in grating that could cause an injury, trip, fall or another incident shall be covered or protected.

NOTE: Holes have the potential for shoes, boots or the heels of shoes to become caught causing a slip, trip or fall, to the same or lower level. Holes or gaps left uncovered leave potential for falling object hazards and shall be mitigated.

- 5.1.1.3** Grating with corrosion that could affect the ability for the grating to withstand a load should be controlled and reported for repair.
- 5.1.1.4** Grating that does not have an adequate number of clips, that is loose, uneven or not level, shall be barricaded until repairs can be made.

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This picture depicts a floor opening large enough to require it to be covered or repaired. A physical guard or barricade would be erected to control the hazard until the repair was completed.

5.1.2 Hazard Reporting –Employees are responsible to escalate and report hazards regarding structural grating, trench grating and fixed stair grating so they can be assigned a priority for repair.

5.1.2.1 Upon recognizing a hazard, an employee shall notify a member of operations and/or maintenance immediately to assist with control or repair measures.

5.1.2.2 If possible, the employee should barricade the area, either with red barricade tape or a physical barricade.

5.1.2.3 Physical barricades may require maintenance involvement for erection of barriers or similar hardware to prevent access.

5.1.2.4 ALL barricades must be erected along with a barricade tag, per HSP-302 Signs, Signals and Barricades.

NOTE: Tags shall note the date erected and a brief description of the hazard identified per HSP – 302.

5.1.2.5 If an employee recognizes a hazard that is creating an **IDLH** situation, the employee shall summons for assistance from maintenance and barricade the hazard appropriately, either physical or other mechanical means, until fully repaired or mitigated. ALL IDLH situations shall have red barricade tape erected in addition to physical barricade.

5.1.2.6 The employee shall escalate all recognizable grating hazards to the operations supervisor or superintendent, to ensure work notifications are written for scheduling repairs. The work notifications / orders should be coded “safety” or “emergency”.

5.2 Annual Inspection - The annual inspection will be conducted by a Qualified Person (see definitions). An inspection of all grating in each operating unit and shipping area (including loading racks and the marine dock) will be completed at least annually.

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- 5.2.1** A Maintenance Work Order for annual grating inspection shall be generated from the maintenance work order / preventative maintenance software.
- 5.2.2** If inspections reveal **IDLH** or other hazard, they shall follow the same barricade procedures listed in sections 5.1.2.
- 5.2.3** The Qualified Person shall review the completed checklist (Appendix A and B or electronic equivalent) with the Maintenance Superintendent and submit work notifications to be repaired.

NOTE: Maintenance should bring clips and tools to make immediate repairs as needed.

6.0 Training

6.1 Employees – Affected employees will receive annual awareness training on, but not limited to, recognizing grating hazards and escalating to operations and/or maintenance according to this procedure and its Appendices. Such training may contain:

- Procedure Requirements
- Gap Recognition
- Ledges / iron supports
- Missing / broken clips
- Corrosion
- Trench Liner Condition
- Erecting Barricades
- Broken / missing Clips

6.2 Qualified Persons – employees designated by supervisors to become trained, Qualified Persons to conduct inspections, will receive training consisting of:

- Procedure Requirements
- Hazard Recognition
- Hazard Reporting and escalation
- Identification of Hazards such as, but not limited to:
 - Gap Recognition
 - Flush Grating
 - Ledges / iron supports
 - Missing Clips
 - Corrosion
 - Trench Liner Condition
 - Erecting Barricades
- Submission of Inspections
- Annual Inspection PM information

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- OSHA 1910 – Subpart D – Walking / Working Surfaces
- HSP – 302 Signs, Signals and Barricades
- PIP (Process Industry Practices) STF005530, STF05535, STE005530

Revision History

Rev	Changes	Approved	Date
0	Procedure Established	H. Garner	09/21

8.0 Appendices

- A. Trench Grating Inspection Form
- B. Structural Grating Inspection Form
- C. Hazard Recognition & Best Practice Examples
- D. Types of Structural Grating Clips

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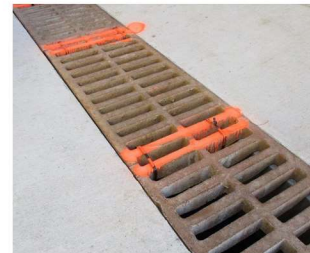
APPENDIX A Trench Grating Inspection Form

Instructions: This inspection form is intended to be used as a guide for inspecting trench grating. Record findings on this form and identify any deficiencies observed. If a deficiency is discovered that cannot be immediately corrected, the area must be hard barricaded and a Safety Work Order generated for repair. The barricade must be tagged on all sides to communicate the hazard. All mitigations must be recorded.

Inspection Guidelines:

- A. Gaps between grating should not exist greater than 2" (inches).
- B. Grating should be flush with walking / working surface.
- C. Grating must be level and not protruding from the walking surface.
- D. Grating ledge, iron support and concrete must be in good condition.
- E. Grating configuration should not present potential for movement.
- F. Protective liner must be in good condition and not deteriorating.
- G. Paint and heavy duty zip ties or bands present on each end.
- H. Ensure debris is not obstructing grating from sitting flush within ledge.

Proper Trench Grating Placement



NOTE:

If conditions exist that are potentially unsafe, install barricade and generate Safety Work Order. Secure any gaps or install zip ties or bands where needed and spray paint to confirm complete inspection for the month / quarter.

Area Inspected: _____

	Yes	No
1. Are there cracks present between grating or supporting angle iron ledge?	☐	☐
2. Is the grating protruding or unlevel from the concrete walking surface?	☐	☐
3. Is the condition of the ledge or angle iron damaged, need repair or hazardous?	☐	☐
4. Is the concrete or steel support damaged or in need of repair or hazardous?	☐	☐
5. Does the grating have potential to roll or flip due to its configuration?	☐	☐
6. If present, is trench grating liner or protective coating damaged, does it need repair or is it hazardous?	☐	☐

If ANY of the above questions are "YES", comments are required:

	Yes	No
1. Was the hazard mitigated by hard or soft barricade with tag?	☐	☐
2. If not immediately repaired, does inspection require a Safety Work Order?	☐	☐

note: if a Safety Work Order is required, generate the work order and note the WO # below:

WO #: _____

SUBMIT FORM TO VALIDATOR. VALIDATOR WILL UPLOAD INTO SAP WORK ORDER FOR RETENTION

Comments: _____

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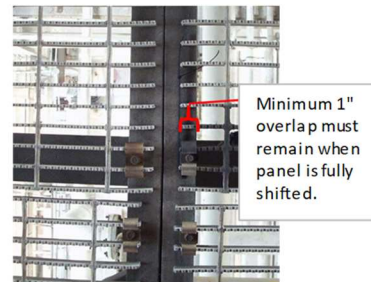
APPENDIX B Structural Grating Inspection Form

Instructions: This inspection form is intended to be used as a guide for inspecting structural grating. Record findings on this form and identify any deficiencies observed. If a deficiency is discovered that cannot be immediately corrected, the area must be hard barricaded and a Safety Work Order generated for repair. The barricade must be tagged on all sides to communicate the hazard. All mitigations must be recorded.

Inspection Guidelines:

- A. Grating must have a minimum 1" overlap when fully shifted.
- B. Grating should be installed to ensure at full travel in any direction, at least 1" overlap on each support
- C. Grating should contain at least 1 clip at each corner of each panel.
- D. Grating should contain at least 2 clips at each intermediate support beam.
- E. Grating panels should be level and plumb, allowing no tripping hazards.
- F. Grating should not shift off a support even if all clips are absent.
- G. If absence of grating, ensure grating is welded to structural members.

Proper Trench Grating Placement



NOTE: If conditions exist that are potentially unsafe, install barricade and generate Safety Work Order. Secure any gaps or install zip ties or bands where needed and spray paint to confirm complete inspection for the month / quarter.

Area Inspected: _____ (it is recommended for each level to have it's own inspection checklist)

	Yes	No
1. Are there cracks present between grating or supporting angle iron ledge?	☐	☐
2. Is the grating protruding or unlevel from the concrete walking surface?	☐	☐
3. Is the condition of the ledge or angle iron damaged, need repair or hazardous?	☐	☐
4. Is the concrete or steel support damaged or in need of repair or hazardous?	☐	☐
5. Does the grating have potential to roll or flip due to its configuration?	☐	☐
6. If present, is trench grating liner or protective coating damaged, does it need repair or is it hazardous?	☐	☐

If ANY of the above questions are "YES", comments are required:

	Yes	No
1. Was the hazard mitigated by hard or soft barricade with tag?	☐	☐
2. If not immediately repaired, does inspection require a Safety Work Order?	☐	☐

note: if a Safety Work Order is required, generate the work order and note the WO # below:

WO #: _____

SUBMIT FORM TO VALIDATOR. VALIDATOR WILL UPLOAD INTO SAP WORK ORDER FOR RETENTION

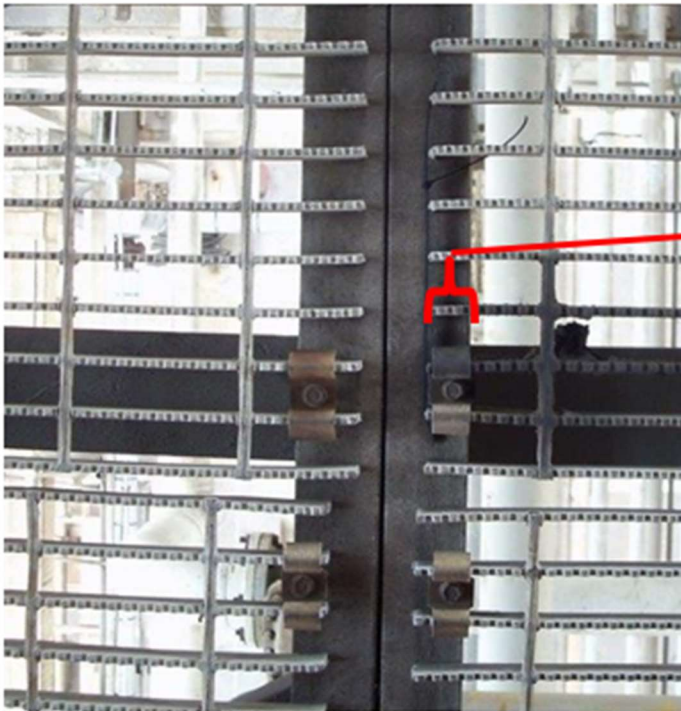
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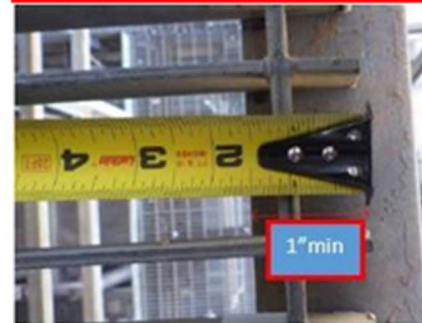
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APPENDIX C

Hazard Recognition and Best Practice Examples



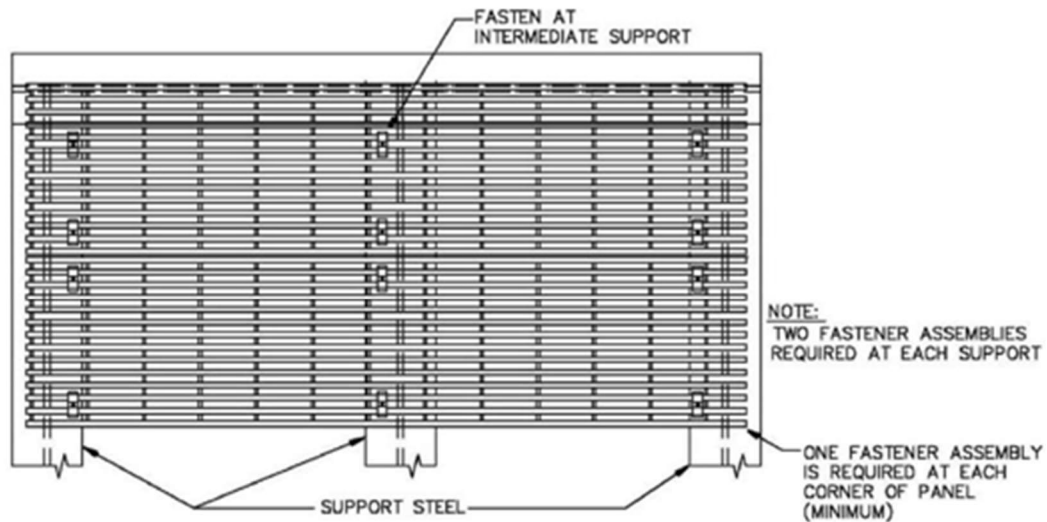
Minimum 1" of overlap must remain when panel is fully shifted.



This picture depicts a floor opening large enough to require it to be covered or repaired. A physical guard or barricade would be erected to control the hazard until the repair was completed.

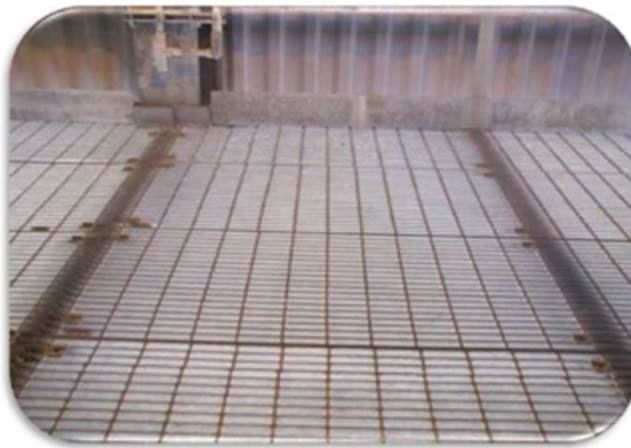


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Typical Grating Panel Fastener Arrangement

Grating inspections should be conducted as if your life depends on it.



Inspections should include:

- **Looking** for bent components, missing clips, and corrosion;
- **Listening** for popping, metal contacting metal, creaking, or groaning; and
- **Feeling** for wobbling, popping, shifting, lifting up, or dropping down as it is stepped on.

These are often the first indications that there is a problem.



If a panel is designed with enough tolerance that is able to shift out of position and slide off a support beam, there is a serious risk that it could fail to maintain its horizontal position and cause serious injury to personnel.



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Improper installation, vibration, and normal wear over time can all play a role in the failing of grating clips.

Some common failures are:

- Loosening of the clip and shifting off of the support beam.



- Over-torquing of the screw, corrosion, and or vibrational loading causing the self-tapping screw to fail.



Holes in grating should only be covered with suitable materials. Covering holes with inadequate materials such as plywood can create a false sense of security and cause serious injuries.



Bent or damaged grating should be replaced. This condition could indicate that the grating is not designed for the intended load. Additionally, grating in this condition could create a tripping hazard and potentially bend to the point that edges fall off end supports.





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Grating is often modified or removed during operations and maintenance tasks. Once said jobs are complete, grating panels should be returned to their original position and re-secured. Area must be barricaded off and fall protection and other safety measures employed when grating is removed.

Many additional precautions can be taken when working around grating to increase awareness and safety.

Walk around or step over trench grating unless it is the only path available.



Walk around plywood, plates, etc. that are on the walking surfaces. You don't know what might **not** be under it.



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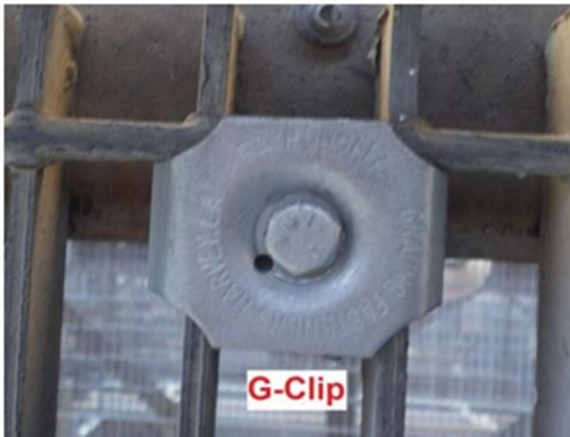
APPENDIX D

Types of Structural Grating Clips

NOTE: This Appendix D is only demonstrating the different types of clips to show inspectors the hazards they may encounter when conducting inspections.

- G-Clips –Integral with ‘Hold-Down’ Clip
- Saddle Clips

Hardware styles for attaching grating clips varies and is available separately. Saddle clips can be installed multiple ways with different hardware; drilled, welded, and clamped are all options. Spring-loaded type hardware for holding clips in place is not recommended due to inconsistent performance and reliability.





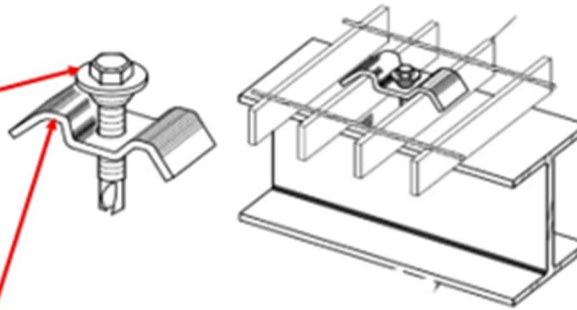
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Self Tapping Screw Design – Drilled Into Structural Beams for additional strength.

Preferred Method of Installation

1/4" – 20 X 3"
Carbon Steel
Self-Tapping
Screw with
integral 5/8"
O.D. Washer
face.

Grating D
Style Clip



Both the Self-Tapping Screw and the
grating clip have coating to withstand
1000 hrs. minimum Salt Fog Test.

Note: Over torquing can lead to premature failure of the screw

Friction Type Clips (No drilling required)

2nd Option for Clip Installation



Left – Proposed Friction Type Clamp – 13 Gauge (.09375") with 3/8"
(.375") Socket Head screw.

Right – Existing "G Type" Clip Design – 14 Gauge (.078125") Top Hat
with 1/4" (.250") Diameter Hex Head Screw

When grating is modified or has potential for bowing/deflection between adjacent panels, a "bridging" clip can assist with keeping the two connected. These clips connect to a common bottom plate that holds them together.