



Identifying Levels of Deterioration and Corrosion on Transmission Line Steel Structures and Supports

PPE:

Standard T-Line PPE, including

- Hard Hat
- Safety Glasses
- Gloves
- FR Clothing
- Safety Boots
- Fall Protection

Tools:

- Dull putty knife (screw driver or other similar device)
- Binoculars
- Camera
- Rags

Guidance Document References:

[TD-1001M, Electric Transmission Preventive Maintenance Manual](#)

Level of Use:

- ☐ Information
- ☒ Reference
- ☐ Continuous

Purpose:

This job aid provides consistent evaluation of rust and corrosion on Transmission Line (T-Line) lattice towers, lattice poles, steel poles, and supports. The evaluation will classify the severity and potential impact of the rust, corrosion or deterioration, and the description of each condition level. The Qualified Company Representative (QCR) combines steel condition with other as-found conditions and risk factors to assess and recommend the appropriate priority level.

The QCR should use this guide to select the appropriate condition representing the as-found deterioration or corrosion level for assigning the recommended priority code. Follow instructions in the [ETPM Manual](#), in conjunction with this guide, to document the condition(s) on an SAP notification. For structural integrity or other significant concerns, request an engineering assessment by directly contacting civil engineering or through the local supervisor

Corrosion:

- The corrosion conditions in this job aid apply to the conditions found on the hardware on the structure and the metallic elements of the insulators. Any steel exposed to environmental conditions should be examined for deterioration and/or corrosion.
- The recommended priority code is determined based on the corrosion condition, other as-found conditions, the risk factors, corrosion areas as defined in [Engineering Document 032911, "Corrosion Area – Overhead Lines,"](#) and the QCR's experience and judgement.
- Some occurrences, particularly of heavy to severe corrosion, require an engineering assessment. For these items, submit a request for an engineering evaluation.
- Follow instructions in the ETPM manual, in conjunction with this guide, to document the corrosion condition on an SAP notification.
- Note the drawing on the next page showing which locations are critical/primary members and which locations are secondary members.
- Some painted/coated structures may contain lead-based paints. Higher priority should be considered for structures and supports known to contain lead-based paint.



Identifying Levels of Deterioration and Corrosion on Transmission Line Steel Structures and Supports

WMP-Discovery2023_DR_CalAdvocates_021-Q003Atch02

TD-1001M-JA04

Effective: 08/31/2020, Rev: 2

Corrosion: (continued)

CAUTION

Some paint on older structures may contain lead. If uncertain, do not disturb or work on the paint. Only qualified persons using proper procedures are allowed to work on paint containing detectable amounts of lead.



Condition Codes:

Inspect the structure using the form to record issues. Determine the condition of each item. Consider all conditions to determine the appropriate Priority Code for any Notification, if required.

- 5 = Heavy Damage with Safety Concerns
- 4 = Heavy Damage
- 3 = Moderate Damage
- 2 = Light Damage
- 1 = No Visible Damage

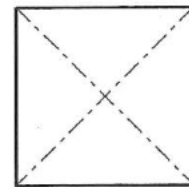
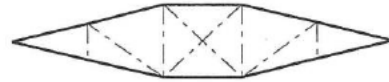
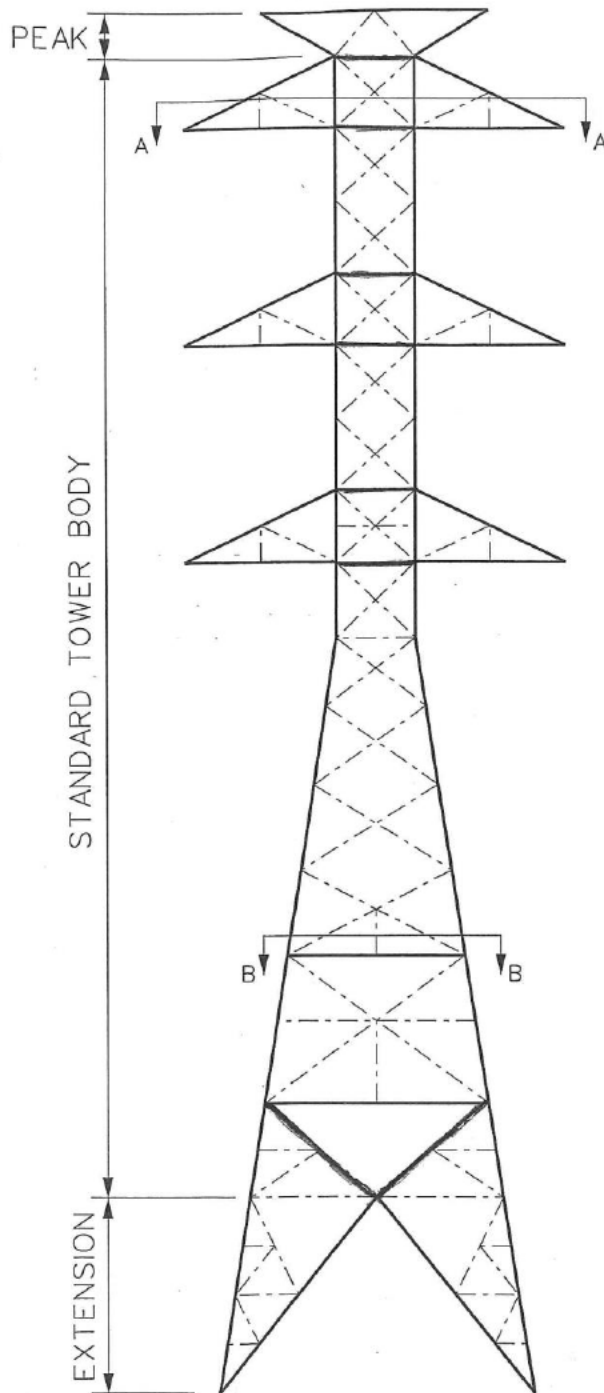


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LEGEND:

— PRIMARY MEMBERS

- - - SECONDARY MEMBERS

PG&E TOWER

**Example of Lattice Tower
Indicating Primary vs. Secondary
Members**

Corrosion and Structure Condition Levels and Impact

Condition 5

Severe corrosion with an **immediate** safety concern or potential to impact operations.

Critical/Main/Primary Member:

- Rust/Worn > 50% metal loss
- Cracked > 50%
- Broken/Missing
- Severe damage to main structural support members compromising structural integrity (stub, leg, crossarm)
- < 1/4" material remaining on plate
- Internal corrosion of tubular members

Damage to main structural support members, stub angle tower leg, or load bearing cross arm joints, that compromises structural integrity.

Action:

1. Request engineering assessment of the structural integrity.
2. Take photos of damage.
3. Choose Priority Code A.



NOTE

For hanger plate conditions, please refer to [TD-1001M-JA07, "Identifying Levels of Corrosion and Condition of Hardware and Insulators on Transmission Line Structures and Supports."](#)

Corrosion and Structure Condition Levels and Impact

Condition 5 (Continued)

Severe corrosion with an **immediate** safety concern or potential to impact operations.

Critical/Main/Primary Member:

- Rust/Worn > 50% metal loss
- Cracked > 50%
- Broken/Missing
- Severe damage to main structural support members compromising structural integrity (stub, leg, crossarm)
- < 1/4" material remaining on plate
- Internal corrosion of tubular members

Damage to main structural support members, stub angle tower leg, or load bearing cross arm joints, that compromises structural integrity.

Action:

1. Request engineering assessment of the structural integrity.
2. Take photos of damage.
3. Choose Priority Code A.



A leg of the tower is bowed under pressure from the wire and is cracked. The tower has been guyed to help the strain of the tower.

NOTE

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Corrosion and Structure Condition Levels and Impact

Condition 5 (Continued)

Severe corrosion with an **immediate** safety concern or potential to impact operations.

Critical/Main/Primary Member:

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- Severe damage to main structural support members compromising structural integrity (stub, leg, crossarm)
- < 1/4" material remaining on plate
- Internal corrosion of tubular members

Damage to main structural support members, stub angle tower leg, or load bearing cross arm joints, that compromises structural integrity.

Action:

1. Request engineering assessment of the structural integrity.
2. Take photos of damage.
3. Choose Priority Code A.

Severe damage to stub/leg interface compromising structural integrity.



Differential Aeration has caused excessive corrosion in the primary leg member with significant material loss. Daylight visible.



NOTE

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Corrosion and Structure Condition Levels and Impact

Condition 4

Heavy damage. Severe corrosion with **possible** near term impact to safety, facility integrity or operations.

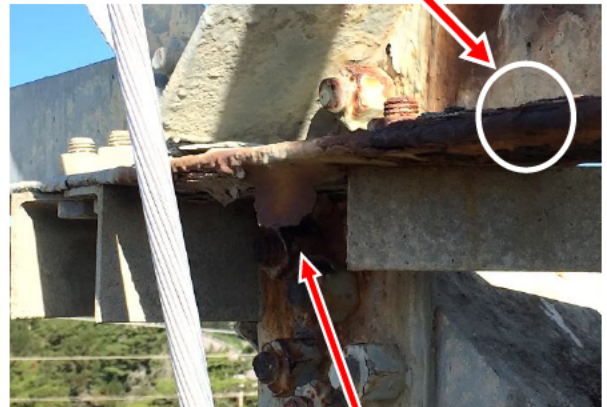
- Moderate damage to main structural support members compromising structural integrity (stub, leg, crossarm)
- H-Frame crossbrace broken
- Missing bolts on single bolt connection on critical member
- Broken/Missing secondary member
- Cracked 30% - 50%
- $\frac{1}{4}$ " – $\frac{1}{2}$ " material remaining on plate

Action:

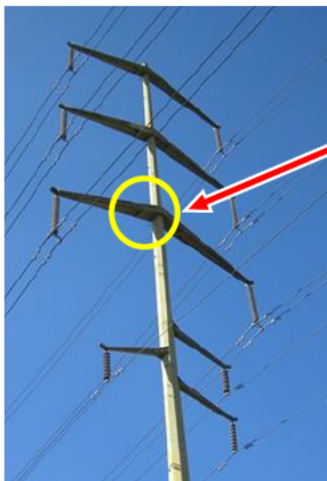
1. Request engineering assessment of the structural integrity.
2. Take photos of damage.
3. Choose Priority Code B.



Moderate corrosion



Compromised bolts



Internal corrosion



NOTE

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Corrosion and Structure Condition Levels and Impact

Condition 4 (Continued)

Heavy damage. Severe corrosion with **possible** near term impact to safety, facility integrity or operations.

- Moderate damage to main structural support members compromising structural integrity (stub, leg, crossarm)
- H-Frame crossbrace broken
- Missing bolts on single bolt connection on critical member
- Broken/Missing secondary member
- Cracked 30% - 50%
- $\frac{1}{4}$ " - $\frac{1}{2}$ " material remaining on plate

Action:

1. Request engineering assessment of the structural integrity.
2. Take photos of damage.
3. Choose Priority Code B.



Bent primary member



Broken secondary member

NOTE

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Corrosion and Structure Condition Levels and Impact

Condition 4 (Continued)

Heavy damage. Severe corrosion with **possible** near term impact to safety, facility integrity or operations.

- Moderate damage to main structural support members compromising structural integrity (stub, leg, crossarm)
- H-Frame crossbrace broken
- Missing bolts on single bolt connection on critical member
- Broken/Missing secondary member
- Cracked 30% - 50%
- $\frac{1}{4}$ " – $\frac{1}{2}$ " material remaining on plate

Action:

1. Request engineering assessment of the structural integrity.
2. Take photos of damage.
3. Choose Priority Code B.



NOTE

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Corrosion and Structure Condition Levels and Impact

Condition 3

Moderate damage or moderate corrosion with possible longer term impact to safety, facility integrity or operations.

- Rust 30% - 50% material loss
- Pack-rust at joints, crevices or overlaps
- Cracked 10% - 30%
- Worn 30% - 50% material loss
- Buckled/Bent secondary member
- Out of plumb (send to engineering for evaluation)

Action:

1. Take photos of damage.
2. Identify which members impacted.
3. Choose Priority Code E.



Localized corrosion.
Some metal loss.



Paint delamination with or
without rust under peeled paint



Greater than 30% metal loss.

NOTE

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Corrosion and Structure Condition Levels and Impact

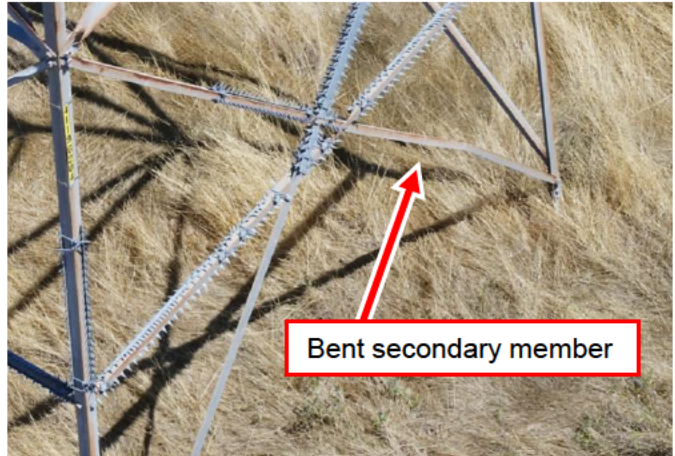
Condition 3 (Continued)

Moderate damage or moderate corrosion with **possible** longer term impact to safety, facility integrity or operations.

- Rust 30% - 50% material loss
- Pack-rust at joints, crevices or overlaps
- Cracked 10% - 30%
- Worn 30% - 50% material loss
- Buckled/Bent secondary member
- Out of plumb (send to engineering for evaluation)

Action:

1. Take photos of damage.
2. Identify which members impacted.
3. Choose Priority Code E.



Rust on LDSP with approximately 30% material loss



NOTE

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Corrosion and Structure Condition Levels and Impact

Condition 2

Light damage or light corrosion with no expected near term impact to facility integrity or operations, but should be monitored to check on the rate of advancement.

- Bolts not punched
- Paint/Galvanizing finish deteriorating and little rust or metal loss. Noticeable paint/coatings defects such as blistering, cracking, peeling, or small chips.

Action:

1. Continue monitoring.
2. Take photos.
3. Choose Priority Code F.

Blistered and chipped of paint

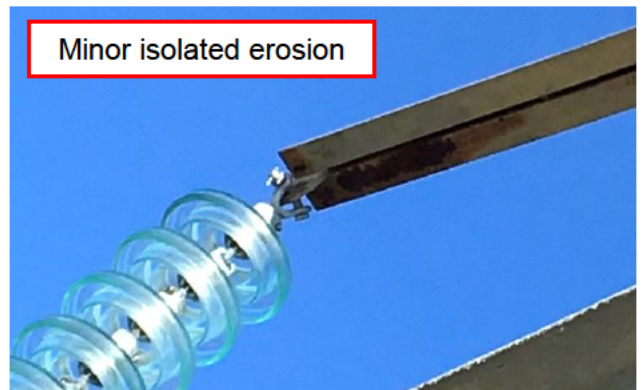


Isolated erosion, cracking, peeling



Development of localized corrosion

Minor isolated erosion



NOTE

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Corrosion and Structure Condition Levels and Impact

Condition 1

No visible damage

Action:

1. None.
2. Take photos.
3. Continue monitoring.
4. No Priority Code.



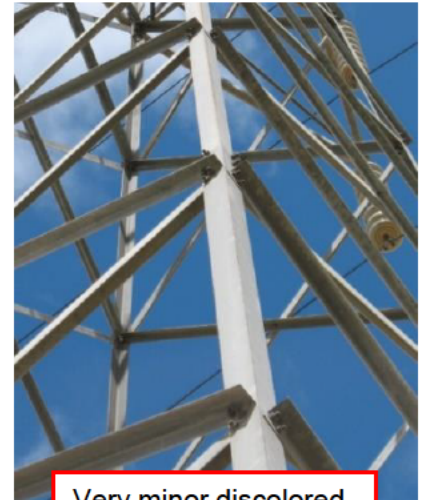
No mechanical damage



Very minor corrosion and aged paint



No visible issues, but aged galvanizing



Very minor discolored galvanized steel

NOTE

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