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• Safety is a core value at CN

• CN is proud to have a safety culture firmly rooted in our day-to-day operations

• Safety is a team sport which thrives only when everyone works together

• As we do our part to be a safety leader, we ask you to do the same by following these steps to ensure we all go home safe

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You are being provided with this document as an aid in managing the assets you have in your track. The railroad will make at least one annual inspection of all the industrial tracks it serves. This is done to help our customers and ourselves to avoid derailments on your tracks.

If your tracks belong to the Railroad, we would be required to make at least monthly inspections and we would have to keep the track to at least a minimum standard established by federal regulations. Therefore, CN recommends that all industrial tracks be inspected once a month by a certified employee, either someone on staff or an outside contractor with railroad experience.

This document contains specific measurements and allowable defect limits. The values that are provided in this presentation are for tracks operating at 10 mph or less. If you have higher speed tracks more restrictive limits would apply.
In an effort to align our customers' safety philosophy with ours, CN welcomes customers to both the Winnipeg and Homewood campuses to participate in a set of free safety-focused classes.

Customers are given a hands-on experience on state-of-the-art rail safety training equipment in addition to a mix of theoretical classroom learning. Two of these courses cover concepts presented in this document in greater depth:

**Track – The Basics (1 day):** Gain fundamental knowledge of track components, nomenclature, basic maintenance activities as well as common defects and hazards.

**Track – In-Depth (3 days):** Learn all the basics as well as a comprehensive understanding of track inspection and maintenance.
Standard gauge is 56 ½ inches. This is measured 5/8 of an inch under the top of the ball of the rail. While there are specialized tools for measuring gauge, a tape measure will be sufficient.
When measuring **gauge**, look at the ties on the outside of the tie plate to see if there are signs of movement.

If there are signs of movement, that amount of movement must be added to your original gauge measurement to determine the maximum gauge under the weight of a train.

**Add movement to gauge measurement. Determines how wide the gauge really is at worst case scenario.**

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The gauge cannot be any less than **56 inches**.

Any gauge that has widened to **57 1/2 inches** should be scheduled for repair.

If you measure gauge **57 3/4 inches or greater** it is unsafe for traffic. You must take steps to ensure that it is repaired before the next train or movement.

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Special attention should be paid to curves and in switches where gauge is most likely to widen. Be on the lookout for signs that wide gauge may be present such as high spikes or poor ties.

Spikes are high and leaning showing that the track gauge is widening.
Alignment describes track that has shifted sideways from its original position.

Some things that might cause this condition on industrial tracks are:

- a sun kink, which is the track getting so hot from the sun that it expands and moves out of alignment, or

- a vehicle or piece of equipment striking the track.

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Alignment is measured by stretching a string out 62 feet along the rail and measuring the deviation at the middle.

If this is greater than 3.75 inches arrange to have the defect repaired but if it is over 5 inches stop all movements over the track until it is repaired.
There are three types of track surface conditions you should watch for: surface profile, cross level and warp.

**Surface profile** is measured similarly to alignment, but measuring the vertical deviation at the middle of a 62’ string.

If this measurement is **greater than 2 inches** arrange to have the defect repaired but if it is **over 3 inches** stop all movements over the track until it is repaired.

Similar to gauge, signs of movement must be considered when taking surface measurements. The amount of movement must be added to your original measurement to determine the worst case scenario under the weight of a train.
Crosslevel

While surface profile can be measured on each rail independently, the difference in elevation between the two rails is also critical. This is referred to as crosslevel.

The tool we use to make crosslevel measurements is called a track level.

On almost all industrial tracks, the track should be level if the track is straight. In a curve, the outside rail should be a half inch higher than the inside rail.

If the crosslevel deviates from design by greater than 1 inch arrange to have the defect repaired but if it is over 3 inches stop all movements over the track until it is repaired.
The final track surface defect is called **warp**. This is a condition where one end of the car is going down in a low spot on one side and the other end of the car is going down on the opposite side causing wheel lift. The warp measurement is the difference in cross level between any two points 62’ or less apart.

If the measured warp is **greater than 2.25 inches** arrange to have the defect repaired but if it is **over 3 inches** stop all movements over the track until it is repaired.
Ballast or the rocks around your track does three functions.

1. Helps transmit the load of our cars and locomotives.
2. Maintains the track surface and keeps the track from moving out of alignment.
3. Provides adequate drainage for the track.

It is hard to maintain your track and can be dangerous to train crews getting off equipment if the ballast gets fouled, muddy and does not drain.

Maintaining ditches and pipes help extend ballast life.
Muddy locations are prone to creating surface conditions which affect the integrity of the track.

Areas with a lot of mud are also prone to:
- Broken bars
- Broken rails
- Tie deterioration
- Vegetation issues
Crossties hold gauge, and help to maintain track surface. On an industrial track as a **bare minimum** at least every fourth tie should be a good tie.

Gauge or surface defects may be the result of poor crossties.

You must have at **least one good crosstie** within 24 inches of a rail joint.
Crossties

Ties are considered defective when they are broken through and/or split to the point ballast can work through.

Split Tie

Broken Tie
Defective Rails

Rails may break in service.

When a rail is broken, it must be changed before another car or locomotive may pass over it.

Quality visual inspections may identify hairline cracks before the rail breaks.
Rail Flaw Detection (RFD) Testing is performed frequently on CN tracks. These inspections test for internal defects in the rail that cannot be found visually. This testing is recommended for all customer tracks. Below are some RFD Test contacts you may consider:

Troy Elbert
Phone Number: 816-901-4037
Website: [http://herzogservices.com/request-a-quote](http://herzogservices.com/request-a-quote)

Mark Alves
Phone Number: 203-791-4542
Website: [http://www.sperryrail.com/contact.html](http://www.sperryrail.com/contact.html)

Ray Hooker
Phone Number: 414-491-4464
Website: [http://www.nordco.com](http://www.nordco.com)
Most rail defects are detectable by the RFD test systems prior to a rail break and can prevent outages.

Dangerous Vertical Split Head defects can cause derailments when the rail is not RFD tested on a regular frequency.
Joint bars hold the ends of rails together.

If a joint bar is cracked or broken it must be replaced.

Joints should be fully bolted with all bolts tight. Movements must be stopped if there is not at least one bolt in each rail end.

If the rail at a joint is mismatched more then ¼ inch movement must be stopped.
A turnout is where one track separates from another. It is often one of the weakest links in the track structure because of the moveable parts.

The Railroad maintains the initial turnout where an industry track leaves the mainline. For some industries there is not another turnout on the track while others may have several.
Switch Point

One of the most common turnout defects is a gapped switch point. A gapped point can allow a car to go down the wrong route which will cause the car to derail.

No Gap is Allowed on a Switch Point

A badly worn, chipped or broken point will allow a wheel to climb the point also causing a derailment. If a point is chipped or broken so the width is greater than 1/8” arrange to have the defect repaired but if it is over 3/16” stop all movements over the track until it is repaired.
Switch point protectors and switch point guards can be used to prevent switch point derailments and extend switch point life by deflecting the wheel away from the switch point.

When selecting a switch point protector or switch point guard, ensure the planned product is compatible with the installation location. See the matrix below for a list of approved products and approved curvature, speed, and traffic volumes.

<table>
<thead>
<tr>
<th>Approved Product Name</th>
<th>Maximum Curvature</th>
<th>Maximum Speed</th>
<th>Traffic Volume Restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nolan SPP Switch Point Protector</td>
<td>Approved for all curves (no restrictions)</td>
<td>Not to exceed 15 mph</td>
<td>Approved for low volume traffic locations (less than 25 cars/week) only</td>
</tr>
<tr>
<td>Nortrak Panguard Switch Point Protector</td>
<td>Approved for curves up to and including 20 degrees</td>
<td>Not to exceed 10 mph</td>
<td>Approved for low and high volume traffic locations</td>
</tr>
<tr>
<td>Western Cullen Hayes Switch Point Guard</td>
<td>Approved for curves up to and including 2 degrees</td>
<td>Not to exceed 15 mph</td>
<td>Approved for low and high volume traffic locations</td>
</tr>
<tr>
<td>Nortrak Switch Point Guard</td>
<td>Approved for up to and including 2 degree curves</td>
<td>Not to exceed 15 mph</td>
<td>Approved for low and high volume traffic locations</td>
</tr>
</tbody>
</table>
Point Protector Styles

Nolan SPP

Nortrak

Nortrak Panguard

Western Cullen Hayes

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Switch components

Switch clips connect the two switch point together and to the switch stand. The should be inspected regularly for cracks. Painting the switch clips white makes it easier to spot developing cracks.

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It is very important that the switch stand be firmly attached to the ties. A loose switch stand can make the points gap.

Stands must be equipped with a target in good condition.

Switch stands must be equipped with a lock or keeper.
Most frogs are made with a material called manganese steel.

This steel will crack and chip over time.

Although these are not desirable conditions they are usually not dangerous until big chunks break out or the frog cracks all the way through.

If a frog point is chipped, broken, or worn more than 5/8” down and 6” back, then the frog should be repaired or replaced.
Derails are required to protect cars from rolling out of the industry track and on to the railway.

They should be painted bright yellow to ensure visibility and secured on good ties. In Canada, a derail sign is required.

Derails must be locked in the derailing position when unattended.

Derail handles are required to ensure the safety of employees operating the derail.
Keep your tracks clean and flangeways established and protected.

Ballast should not be between rails at all and crossings should be made from approved material. Debris can inhibit your ability to inspect and maintain your track.
Ensure your operation does not create a hazardous situation around your track.

- Be mindful of what constitutes a hazard for employees riding on the side of a car.

- Temporary Obstructions (natural or otherwise):
  - Must never be closer than 6ft from the rail
  - Should never be closer than 15ft
  - Excessive brush growing close to the cars may endanger someone riding on the side of the car.

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Vegetation must be kept to a minimum.

Excessive brush and weeds should not be allowed.

Look out for growth that is:

- Contacting equipment or wires
- Creating a fire hazard
- Restricting drainage
- Fouling ballast
- Creating a tripping hazard
Adequate gate securement when open is essential in preventing incidents.

Gates moving when being serviced by CN can cause a hazardous situation to employees and can lead to extensive damages.
Snow and ice build-up is the number one cause of derailments in industrial tracks. Proper snow clearing is necessary to ensure safe operations.

- Remove any snow piles that interfere with visibility and rail vehicle traffic
- Snow should be placed at least 12 feet away from tracks and crossings
- Excessive snow on tracks can warrant a refusal of service from a train crew if entering the track cannot be done safely
Flangeways need to be clear of snow and ice

Be particularly vigilant at locations where equipment or vehicles operate over the tracks as crossings are more prone to ice build-up in the flangeways.
Snow Removal – Switches

If you have a turnout on your property, it is your responsibility to keep the point area clear of ice and snow.

Snow can hold a point open enough to cause it to gap and cause a derailment. Proper switch maintenance before winter can also reduce the risk of injuries.
How to clean a switch

1. Sweep away any snow and debris from between the open switch point and the stock rail

2. Clean away all snow in the 4-ft area (in between rails in the switch point area)

3. Clean out snow on the outsides of the stock rails, the tie cribs, those with switch rods and the head block ties

4. Sweep the open point once more to ensure that it is clean, throw the switch and clean the reverse side

5. Throw the switch to ensure proper point fit in both positions and that the switch throws smoothly and without excessive force.
Ensure all derailed have been cleared from under the snow and are visible.

When clearing snow, ensure the area around the derail allows for proper operation of the derail. A derail not completely flipped open can sit high and strike equipment, causing damage and in some cases, even a derailment.
Injuries occur every year due to employees slipping and falling in winter conditions.

Ensure icy walkways, particularly trackside, are sanded and/or salted

Light snowfall can easily hide debris where crews normally walk. Ensure the area is clear before the first snowfall.
At CN, safety is a core value, and it underscores every activity that we undertake. Our goals are to keep our employees, our customer’s goods and our communities safe.

Every railcar that gets moved, every brake that gets applied, every container that gets loaded, can have an impact. We ask all our employees to play their role as a safety leader, and today, we ask the same of you.

**IMPORTANT** Report all derailments, leak or suspected leak of any tank car or other dangerous commodity, equipment or materials within the main track or siding envelope (8m/25ft from nearest rail), derails left unlocked or in non–derailing position, damage to any switch, derail, sign, rail/track structure, damage to any railcar, including ladders, doors, couplers and any other condition or situation which might cause injury, damage or derailment.

**CN Emergency** 1-800-661-3963

**CN Police** 1-800-465-9239

**CN Service Delivery Centre** 1-866-926-7245

Learn more:

[www.cn.ca/safety](http://www.cn.ca/safety)

[www.cn.ca/winter](http://www.cn.ca/winter)
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Understanding the Reality of Winter

Watch the video at: https://player.vimeo.com/video/141806740

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Preparing for Winter Together Video

Watch the video at:
https://vimeo.com/user10659353/review/116546667/00e6762328

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