

HOW TO USE THE GUIDE

Intermodal Recommended Practices

The IRPs are individual procedures relating to the inspection, repair and/or replacement of components on an intermodal chassis, and they have been grouped into 9 Sections based principally on the systems and components that exist on an intermodal chassis.

Each Section is numbered, 100 through 900, and titled based on the content, such as “Section 100 – General Procedures and Auxiliary Equipment.” Within the Section, the specific IRPs are titled and numbered as a subset of the section number, and begin with the letter “C” for chassis. For example, the first IRP in Section 100, is titled “C.101 – Chassis Safety and Inspection Procedures.”

Each IRP generally includes:

- Background and Context. Provides an explanation of the need for the IRP and a brief overview of the content.
- Terms and Definitions. A list of specific terms and their meaning within the context of the IRP, over and above those found in the Glossary (Appendix B). Provides terms and definitions that are specific to the procedures in the IRP.
- Recommended Tools, Supplies and Equipment. Lists the necessary items that should be available to mechanics in performing the procedure in the IRP.
- Procedures. Contains step-by-step instructions for performing each specific procedure.
- Additional Information. Lists resources that are relevant to the content in the IRP.

NOTE: The use of red italicized text is meant to draw particular attention to an important safety factor or other consideration that is critical to the procedures of the IRP.

Chassis Mechanics Tools, Supplies and Equipment List (Appendix A)

Completing the procedures in each IRP requires a variety of tools, supplies and equipment. While many of these items are common, others are specific to one or more IRP and are noted in the individual IRP. Appendix A offers a quick reference guide for the tools, supplies and equipment in all of the IRPs.

Chassis Mechanic Glossary of Terms (Appendix B)

Appendix B provides a list of general terms and definitions, many of which are referenced in the IRPs, or may be mentioned during the course of a mechanic’s duties.

Additional Resources (Appendix C)

Appendix C identifies and describes a number of organizations that may be helpful in offering resources for chassis mechanics, with web links to additional relevant information.

Permissions (Appendix D)

Many individuals and companies contributed content and images for development of this guide. Appendix D acknowledges the contribution, listing the images and organization or individual that provided them. Images are identified by their specific IRP and are numbered according to position within the IRP. For example, C.101.1 is Figure number 1 in IRP C.101.

TABLE OF CONTENTS

ACKNOWLEDGMENTS	v
SECTION 100 – General Procedures and Auxiliary Equipment	1
IRP C.101 CHASSIS – SAFETY AND INSPECTION PROCEDURES.....	3
IRP C.102 TELEMATICS SYSTEM – INSPECT AND REPAIR.....	9
IRP C.103 AUTOMATIC TIRE INFLATION SYSTEM – INSPECT AND REPAIR.....	13
IRP C.104 CREDENTIALS, MARKINGS AND LABELING – INSPECT	21
IRP C.105 FLOOD WATER DAMAGE – INSPECT AND REPAIR.....	27
SECTION 200 – Electrical and Lamps	31
IRP C.201 LAMPS AND REFLECTORS – INSPECT AND REPAIR.....	33
IRP C.202 WIRING AND ELECTRICAL HARNESS – REPAIR.....	39
IRP C.203 7-WAY RECEPTACLE – INSPECT, REPAIR AND REPLACE.....	45
IRP C.204 MODULAR WIRING HARNESS – INSTALL AND REPAIR	49
SECTION 300 – Tires and Wheels	55
IRP C.301 MOUNTED TIRE – REMOVE AND INSTALL.....	57
IRP C.302 TUBE-TYPE TIRE – DEMOUNT AND MOUNT	63
IRP C.303 TUBELESS TIRE – DEMOUNT AND MOUNT.....	69
IRP C.304 BIAS PLY TIRE – PUNCTURE REPAIR.....	75
SECTION 400 – Axles	83
IRP C.401 WHEEL-END – INSPECT, DISASSEMBLE AND ASSEMBLE.....	85
IRP C.402 WHEEL-END BEARING – PRE-LUBRICATE.....	95
IRP C.403 WHEEL-END BEARING – ADJUST	99
SECTION 500 – Couplers and Hitches	103
IRP C.501 UPPER COUPLER/KINGPIN – INSPECT, REPAIR AND REPLACE.....	105
IRP C.502 PINTLE HOOK COUPLER – INSPECT AND SERVICE	111
SECTION 600 – Frames	115
IRP C.601 CHASSIS FRAME – INSPECTION.....	117
IRP C.602 CHASSIS – GREASE AND LUBRICATE.....	119
IRP C.603 LANDING GEAR – REPLACE	123
IRP C.604 LANDING GEAR FOOTWEAR – REPLACE	127
IRP C.605 LANDING LEGS AND GEARBOX – INSPECT AND REPAIR.....	131
IRP C.606 MUD FLAP/SPLASH GUARDS AND BRACKETS – INSPECT, REPAIR AND REPLACE	139
IRP C.607 INTEGRAL LOCKING DEVICES – INSPECT, REPAIR AND REPLACE	143
IRP C.608 STRUCTURAL SLIDER ASSEMBLY – INSPECT AND REPAIR	147
IRP C.609 REAR IMPACT GUARD – REPAIR AND REPLACE	151

SECTION 700 – Suspensions	155
IRP C.701 SUSPENSION TORQUE ARM/RADIUS ROD – INSPECT AND REPLACE	157
IRP C.702 SUSPENSION HANGERS AND EQUALIZERS – INSPECT AND REPLACE	159
IRP C.703 SUSPENSION BUSHING – INSPECT AND REPLACE	163
IRP C.704 SLIDING SUSPENSION SUB-FRAME ASSEMBLY – REPLACE.....	167
IRP C.705 SUSPENSION SLIDER (BOGIE) – INSPECT AND REPAIR.....	171
IRP C.706 SUSPENSION FASTENER – INSPECT AND REPLACE	179
IRP C.707 SPRINGS/SEATS/SADDLES and U-BOLTS – INSPECT AND REPLACE	181
IRP C.708 AXLE – ALIGNMENT	185
SECTION 800 – Brakes	189
IRP C.801 CHASSIS AIR BRAKE SYSTEM – IDENTIFY AND TEST	191
IRP C.802 AIR LINE, FITTING and HOSE – REPAIR	195
IRP C.803 BRAKE CONTROL VALVE – REPLACE	201
IRP C.804 AIR TANK AND DRAIN – INSPECT AND REPLACE.....	205
IRP C.805 FOUNDATION BRAKES – INSPECT AND REPAIR	209
IRP C.806 BRAKE STROKE – INSPECT AND ADJUST	215
IRP C.807 AIR BRAKE CHAMBER – INSPECT AND REPLACE	221
IRP C.808 BRAKE ADJUSTER – INSPECT AND REPLACE.....	227
IRP C.809 FIELD-REPLACEABLE PUSHROD – REPLACE.....	233
IRP C.810 ANTI-LOCK BRAKE SYSTEM (ABS) – IDENTIFY, INSPECT AND TEST	237
IRP C.811 ANTI-LOCK BRAKE SYSTEM (ABS) ECU OR MODULATOR VALVE – REPLACE.....	243
IRP C.812 ANTI-LOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR – TEST AND REPLACE	247
SECTION 900 – Welding/Fabrication	251
IRP C.901 CHASSIS STRUCTURE – WELDING PROCESSES AND TERMINOLOGY.....	253
IRP C.902 CHASSIS STRUCTURE – WELD AND FABRICATE	259
IRP C.903 CHASSIS STRUCTURE – STRAIGHTEN/BEND	267
IRP C.904 MAIN FRAME RAIL – STRAIGHTEN	271
IRP C.905 OXY-ACETYLENE – CUTTING/HEATING.....	273
IRP C.906 CARBON ARC – CUTTING/GOUGING	277
APPENDIX A – CHASSIS MECHANIC’S TOOLS, SUPPLIES AND EQUIPMENT LIST	281
APPENDIX B – CHASSIS MECHANIC’S GLOSSARY OF TERMS	288
APPENDIX C – ADDITIONAL RESOURCES	292
APPENDIX D – PERMISSIONS	295

IRP C.101 – CHASSIS – SAFETY AND INSPECTION PROCEDURES

PREFACE

This Intermodal Recommended Practice is subject to the disclaimer in the Introduction of *The IANA Guide to Chassis Inspection and Repair*. Users are encouraged to read the disclaimer before considering using any portion of this Intermodal Recommended Practice.

PURPOSE AND OBJECTIVES

This IRP guides chassis equipment mechanics on methods for securing a chassis to safely perform inspection and repairs.

1. BACKGROUND AND CONTEXT

OSHA requirements apply to many aspects of chassis repair work. Employer and employee OSHA requirements must be adhered to at all times while performing work on chassis equipment. Additional facility or workplace requirements may also apply and may be supplemental to the content of this IRP.

Any work involving exposure to or use of hazardous materials requires mechanics to be trained and to follow procedures outlined in Safety Data Sheets related to the material.

This IRP provides a consistent way to define the manner in which a chassis is secured and provides guidance on the level of chassis securement that is suitable for various types of service.

Specific chassis securement modes are described in this IRP to help mechanics and workplaces develop standard safety procedures and to support procedures described in other IANA IRPs.

A mechanic working on a chassis that is coupled to a power unit with the driver present **MUST** ensure that he/she has the driver's full attention and makes eye contact with the driver when speaking. The driver **MUST** remain fully aware of the mechanic's presence at all times and must avoid distractions (e.g., cell phone or other electronic device).

2. TERMS AND DEFINITIONS

The Chassis Mechanic's Glossary of Terms (Appendix B) applies to this IRP. The additional terms and definitions listed below also apply to this IRP.

Level 0 Securement: The chassis is secured with its parking brakes.

Level 0-C Securement: The chassis is coupled to a tractor and secured only with the parking brakes.

Level 1 Securement: The chassis is secured with wheel chocks that prevent forward and rearward movement.

Level 1-C Securement: The chassis is coupled to a tractor and secured with wheel chocks that prevent forward and rearward movement.

Level 2 Securement: Work zone protection barrier is positioned at the front of the chassis, near the king pin and under the front bolster. The chassis is secured with wheel chocks and chassis weight is on the landing gear, the axles and tires.

Level 3 Securement: Work zone protection barrier is positioned at the front of the chassis, near the king pin and under the front bolster. The chassis is supported by the landing gear, and stands specifically designed and rated for the task are placed under the axles.

Level 4 Securement: Work zone protection barrier is positioned at the front of the chassis, near the king pin and under the front bolster. The front of the chassis is supported by the landing gear, or stands specifically designed and rated for the task, placed under the frame. The rear of the chassis is supported by the axles and tires, or stands specifically designed and rated for the task.



Figure 1: A typical work zone protection barrier; these barriers provide a visual sign that other vehicles should avoid the area.

SECUREMENT LEVELS		
LEVEL #	SECUREMENT METHOD	TYPE OF WORK THAT CAN BE PERFORMED
0 or 0L*	The chassis is secured with its parking brakes.	<ul style="list-style-type: none"> • Outside walk-around inspection, repair that can be completed without getting under the chassis • For example, lights and electrical, gladhand, integral lock, landing gear, or mud flap.
0-C or 0-CL*	The chassis is coupled to a tractor and secured only with the parking brakes.**	<ul style="list-style-type: none"> • Work described above, providing the engine is shut off and all parking brakes are applied.
1 or 1-L*	The chassis is secured with wheel chocks that prevent forward and rearward movement.	<ul style="list-style-type: none"> • All work described above; plus, • Inspection under the chassis.
1-C or 1-CL*	The chassis is coupled to a tractor and secured with wheel chocks that prevent forward and rearward movement.**	<ul style="list-style-type: none"> • All work described above; plus, • Inspection under the chassis. • Repairs that take less than 30 minutes to complete.
2 or 2L*	Work zone protection barrier. Chassis secured with wheel chocks and chassis weight on the landing gear, the axles and tires.	<ul style="list-style-type: none"> • All work described above; plus, • Repair work that does not require wheel removal or lifting of the chassis.
3 or 3L*	Work zone protection barrier. Chassis supported by the landing gear, and stands specifically designed and rated for the task placed under the axles.	<ul style="list-style-type: none"> • All work described above; plus, • Wheel removal.
4 or 4L*	Work zone protection barrier. Chassis secured. The front of the chassis supported by the landing gear, or stands specifically designed and rated for the task, placed under the frame. The rear of the chassis supported by the axles and tires, or stands specifically designed and rated for the task.	<ul style="list-style-type: none"> • All work described above; plus, • Lifting the chassis for suspension or frame repair.

* "L" indicates the chassis has a container loaded. **Never apply heat (i.e., rose bud, torch, welding, etc.) to a chassis that is mounted with a loaded container.**

** When the chassis is coupled to a tractor, the driver of the tractor MUST be instructed that:

- The truck is not to be started and brakes must remain applied until directed otherwise by the mechanic.
- While work is being performed, the driver must either remain outside or inside the power unit. The driver is not permitted to enter or exit the power unit without permission from the mechanic.
- The driver must stay outside of the work zone.

Table 1: Chassis securement levels

3. RECOMMENDED TOOLS, SUPPLIES AND EQUIPMENT

Refer to the Chassis Mechanic's Tools, Supplies and Equipment List (Appendix A). The following specific tools, supplies and/or equipment should be available to the mechanic when completing the procedures described in this IRP.

1. Tools
 - Basic chassis mechanic tool kit
2. Supplies
 - Equipment status tags
3. Shop tools and equipment
 - 12 volt, 20 amp power source with 7-way cable and switches to power all lighting circuits
 - Compressed air supply
 - Jack, lifting or hoisting equipment
 - Chassis and axle support stands
 - Wheel chocks
 - Creeper
 - Portable light



Figure 2: A chassis secured to level 4, supported on a stand specifically designed to support a chassis.



Figure 3: Stands specifically designed to support chassis axles as required for securing to level 3 and 4.

4. PROCEDURES

SECURING A CHASSIS

IRPs require different levels of securement, based on the specific nature of the repair work addressed within the IRP.

Each IRP describes the level of securement required to perform the inspection and/or repair of that particular IRP, based on the securement procedures described in this IRP.

SECURING THE WORK SPACE

When performing inspections outside of a repair shop, special precautions must be taken to make the work space safe for the mechanic. Mechanics must be as visible as possible when working in a yard. This requires wearing high visibility clothing.

Since mechanics are often behind or under a chassis, securing the surrounding space is also necessary to avoid hazards posed by nearby activities. Use the service vehicle and safety cones to make the work space safe.

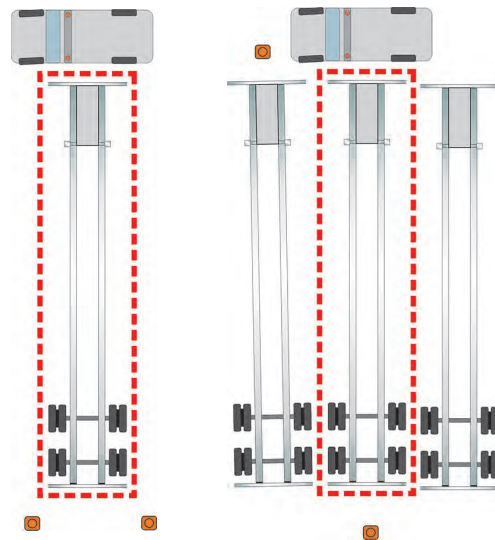


Figure 4: When performing minor repairs or inspecting a chassis, place work zone protection barriers as shown.

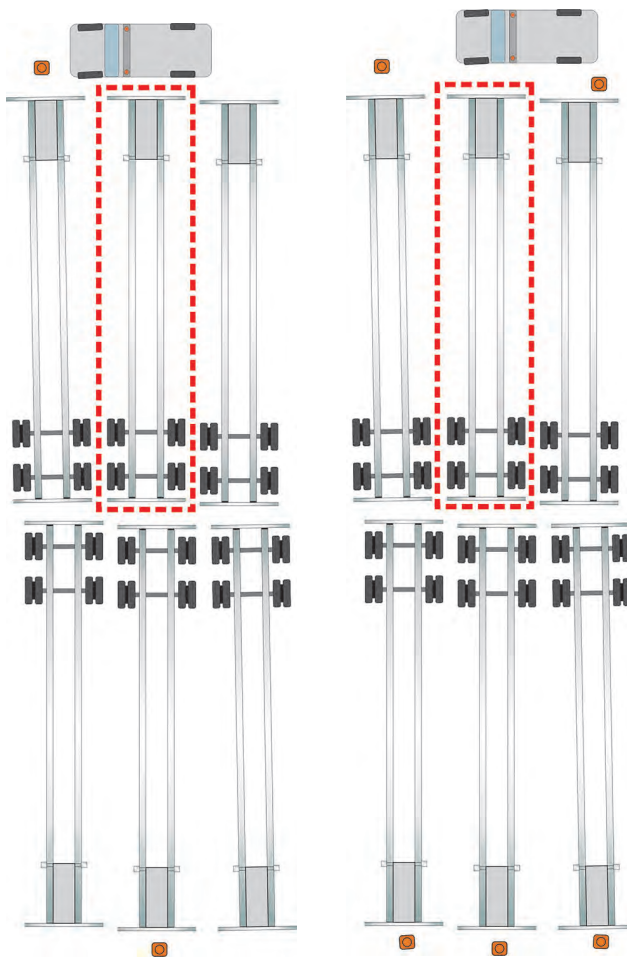


Figure 5: When performing minor repairs or inspecting a chassis parked among other chassis, place work zone protection barriers as shown on the left. When performing major repairs, place work zone protection barriers as shown on the right. The chassis being repaired or inspected is outlined in red.

SYSTEMATIC INSPECTION AND REPAIR

The Federal Motor Carrier Safety Administration requires every intermodal equipment provider to systematically inspect, repair and maintain intermodal equipment. The purpose of systematic inspection and repair is to ensure that intermodal chassis are in safe and proper operating condition. These requirements are contained in 49 CFR §390.40.

Every IEP must refrain from placing intermodal equipment in service on the public highways if that equipment has been found to pose an imminent hazard.

An imminent hazard means a condition of a chassis operation that substantially increases the likelihood of serious injury or death, if not discontinued immediately.

PERIODIC INSPECTION

FMCSA requires annual inspection of intermodal chassis equipment. The inspection is conducted to the criteria contained in 49 CFR Appendix G to Subchapter B of Chapter III – Minimum Periodic Inspection Standards.

The criteria that are relevant to inspecting chassis equipment are listed below. **A chassis must be free of all of the listed conditions to pass such an inspection.**

BRAKE SYSTEM

- A brake is inoperative
- A brake is missing
- A brake has a missing or broken mechanical component including:
 - shoe
 - lining
 - pad
 - spring
 - anchor pin
 - spider
 - cam roller
 - push-rod
 - brake chamber mounting bolt
- A brake has a loose chamber, spider or camshaft support bracket

BRAKE LINING AND PAD

- Lining or pad is cracked, separated or not firmly attached to the shoe
- Lining or pad is saturated with oil or grease
- Lining thickness of any drum brake shoe is less than 1/4" at the center of the shoe
- Lining thickness of any disc brake pad is less than 1/8"

BRAKE DRUM AND ROTOR

- A brake drum has a crack that opens upon brake application
- Any portion of a brake drum or rotor is missing or in danger of falling away