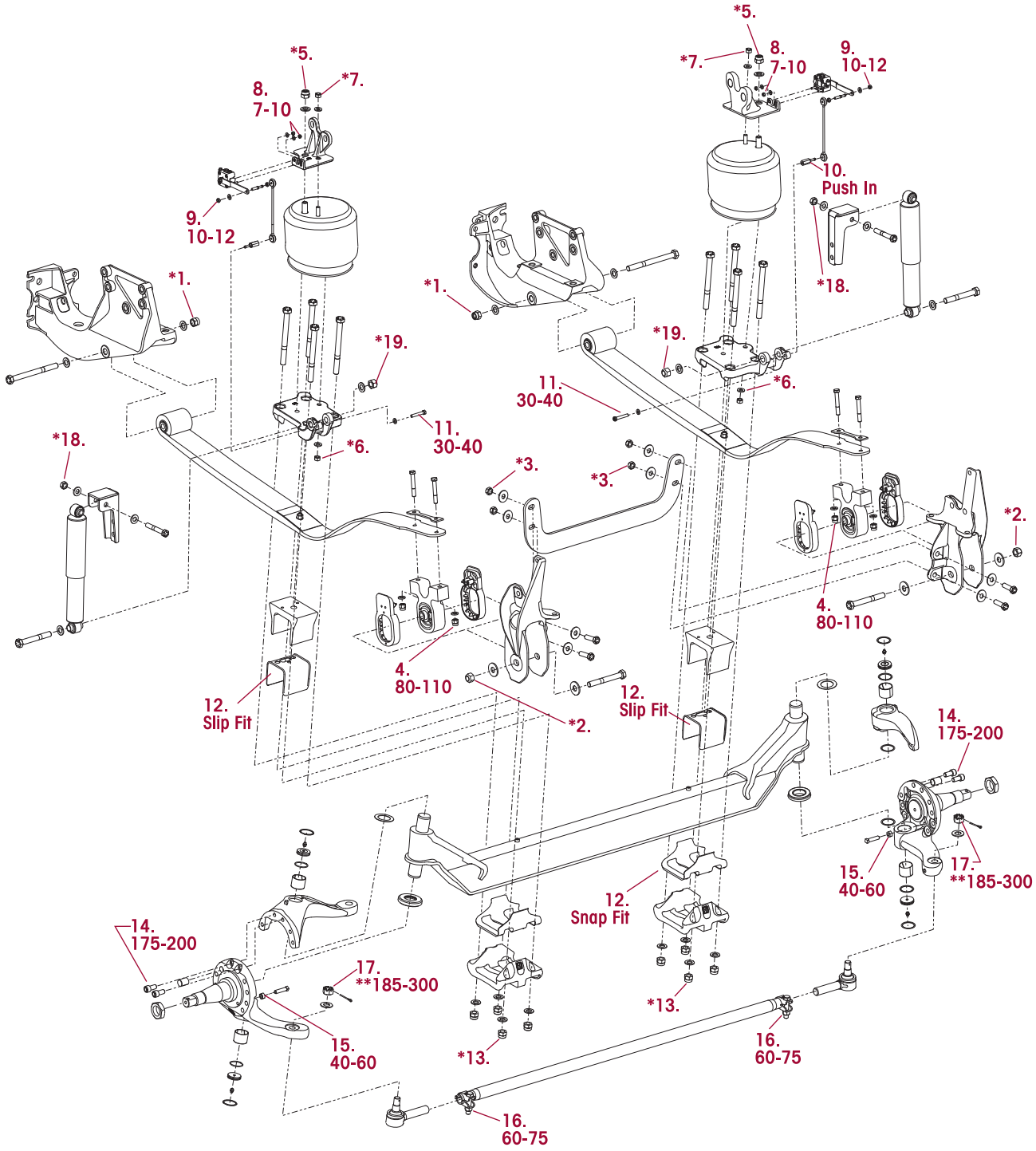
SECTION 11

Tightening Torque Specifications

Hendrickson Recommended Torque Values Provided In Foot Pounds



AIRTEK

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	QUANTITY	SIZE	TORQUE VALUE (in foot pounds)
1	Front Frame Hanger to Front Leaf Spring Eye	2	¾"	*
2	Rear Spring Hanger to Rear Spring Mount	2	¾"	*
3	Rear Spring Hanger to Belly Band	4	5/8"	*
4	Rear Spring Mount to Leaf Spring	2	½"	80-110
5	Air Spring to Air Spring Bracket	2	¾"	*
6	Air Spring to Top Pad	2	½"	*
7	Air Spring Bracket to Frame	2	5/8"	*
8	Height Control Valve to Air Spring Bracket	2	¼"	7-10
9	Linkage Rod to Height Control Valve Arm	1	5/16"	10-12
10	Linkage Rod to Link Mount	None	Grommet	Push In
11	Link Mount to Top Pad	1	3/8"	30-40
12	Axle Wrap Liners for Clamp Group	4	Formed	Slip Fit
	CAUTION: DO NOT ASSEMBLE CLAMP GROUP WITHOUT AXLE WRAP LINERS. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.			
13	Clamp Group Hardware	8	¾"	*
	WARNING: ENSURE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.			
14	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	5/8"	175-200
15	Knuckle / Axle Wheel Stop Bolt	2	5/8" Jam Nut	40-60
16	Tie Rod Tube to Tie Rod Ends	2	5/8"	60-75
17	Tie Rod Ends / Drag Link to Steering Knuckle	2	7/8" Castle Nut	**185-300
18	Upper Shocks Eye Bolts	2	5/8"	*
19	Lower Shocks Eye Bolts	2	¾"	*
20	Upper Shock Mounting Bracket to Frame (not shown)	2	5/8"	*

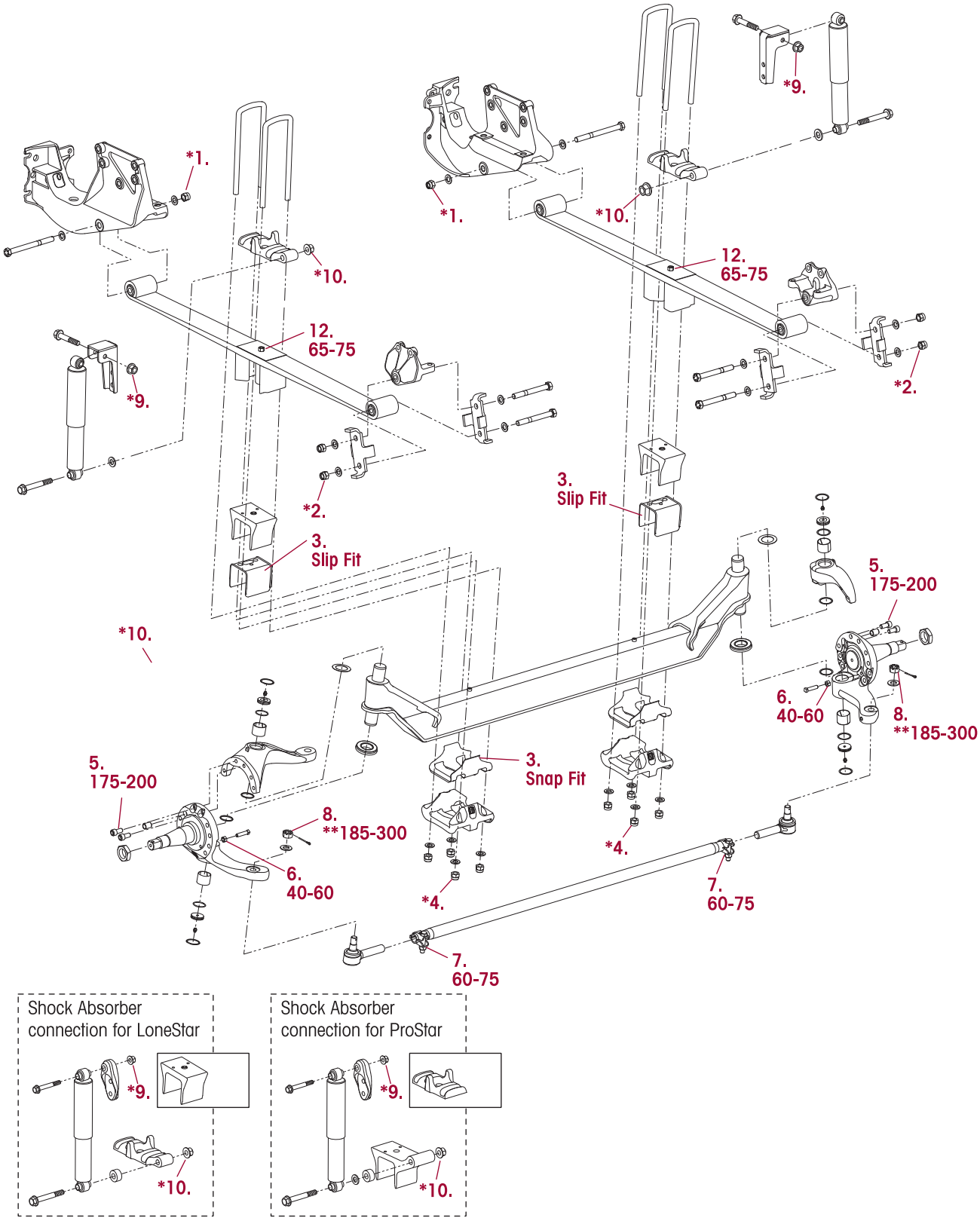
• All hardware ¼" and greater is Grade 8 with no additional lubrication.

NOTE:

* All hardware information highlighted in gray in the matrix denotes recommended torque for fasteners originally supplied by the vehicle manufacturer. Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount. If Hendrickson supplied fasteners are used, tighten to Hendrickson torque values, if International (vehicle manufacturer) fasteners are used, follow International torque specifications listed above or the vehicle manufacturer's manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

** Torque to 185 foot lbs., advance nut to next hex face to install cotter pin. **DO NOT** back off nut for cotter pin installation.

Hendrickson Recommended Torque Values Provided In Foot Pounds



SOFTEK Monoleaf

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	QTY.	SIZE	TORQUE FT./LBS.
1	Front Frame Hanger to Front Leaf Spring Eye	2	¾"	*
2	Rear Spring Hanger to Rear Spring Mount	4	¾"	*
3	Axle Wrap Liners for Clamp Group	4	Formed	Slip Fit
	CAUTION: DO NOT ASSEMBLE CLAMP GROUP WITHOUT AXLE WRAP LINERS. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.			
4	Clamp Group Hardware	8	¾"	*
	WARNING: ENSURE CLAMP GROUP IS ALIGNED PROPERLY PRIOR TO TIGHTENING HARDWARE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.			
5	Knuckle Attachment Bolt (Socket Head Cap Screw)	4	⅝"	175-200
6	Knuckle / Axle Wheel Stop Bolt	2	⅝" Jam Nut	40-60
7	Tie Rod Tube to Tie Rod Ends	2	⅝"	60-75
8	Tie Rod Ends / Drag Link to Steering Knuckle	2	⅞" Castle Nut	**185-300
9	Upper Shocks Eye Bolts	2	⅝"	*
10	Lower Shocks Eye Bolts	2	¾"	*
11	Upper Shock Mounting Bracket to Frame (not shown)	2	⅝"	*
12	Leaf Spring Center Bolt Nut	2	½"	65-75

• All hardware ¼" and greater is Grade 8 with no additional lubrication.

NOTE:

* All hardware information highlighted in gray in the matrix denotes recommended torque for fasteners originally supplied by the vehicle manufacturer. Frame fasteners are furnished and installed by the vehicle manufacturer. Vehicle manufacturer may use an equivalent HUCK fastener at frame mount. If Hendrickson supplied fasteners are used, tighten to Hendrickson torque values, if International (vehicle manufacturer) fasteners are used, follow International torque specifications listed above or the vehicle manufacturer's manual. Hendrickson is not responsible for maintaining vehicle manufacturer's torque values.

** Torque to 185 foot lbs., advance nut to next hex face to install cotter pin. **DO NOT** back off nut for cotter pin installation.

SECTION 12
Troubleshooting Guide

AIRTEK TROUBLESHOOTING GUIDE		
CONDITION	**POSSIBLE CAUSE**	**CORRECTION**
Worn or damaged kingpins and kingpin bushings	Dirt in system– contaminated lubricant	Polish and inspect kingpin, replace bushing and seals, then follow specified lubrication procedures
	Incorrect lubricant	Lubricate axle with specified lubricant
	Axle not lubricated at scheduled frequency	Lubricant axle at scheduled frequency
	Incorrect lubrication procedures	Use correct lubrication procedures
	Lubrication interval not compatible with operating conditions	Change lubrication interval to match operating conditions
	Worn or missing seals	Replace worn or missing seals
Vibration or shimmy of front axle during operation	Caster out of specification	Check ride height and adjust caster to specification
	Wheels and/or tires out of balance	Balance or replace wheels and/or tires
	Worn shock absorbers	Replace shock absorbers
	Worn thrust washers and rear hanger clamps	Replace thrust washers and rear hanger clamps
	Broken engine mount	Replace engine mount
	Wheel bearing adjustment	Adjust wheel bearing to the vehicle manufacturers specifications.
Excessive wear on tires or uneven tire tread wear	Tires have incorrect air pressure	Adjust tire pressure to manufacturer's specification.
	Tires out of balance	Balance or replace tires
	Incorrect tandem axle alignment	Align tandem axles
	Incorrect toe setting	Adjust toe-in to manufacturer's specification
	Incorrect steering arm geometry	Repair steering system as necessary
	Worn kingpin bushings	Replace kingpin bushings
	Excessive wheel bearing end play	Check specified wheel nut torque, replace worn or damaged wheel bearings
	Wheel bearing adjustment	Adjust wheel bearing to the vehicle manufacturers specifications.
Vehicle is hard to steer	Low pressure in the power steering system	Repair power steering system
	Steering linkage needs lubrication	Lubricate steering linkage
	Steering knuckles are binding	Check vertical clearance
	Incorrect steering arm geometry	Repair steering system as necessary
	Caster out of specification	Check ride height and adjust caster to specification
	Tie rod ends hard to move	Replace tie rod ends
	Worn thrust bearing	Replace thrust bearing
	Steering gear box internal problem	Perform steering gear troubleshooting procedures per steering gear manufacturing guidelines.

AIRTEK TROUBLESHOOTING GUIDE (CONTINUED)		
CONDITION	**POSSIBLE CAUSE**	**CORRECTION**
Tie rod ends are worn and require replacement	Tie rod ends need lubrication	Lubricate tie rod end. Make sure lubrication schedule is followed.
	Severe operating conditions	Increase frequency of inspection and lubrication intervals
	Damaged boot on tie rod end	Replace tie rod end
Bent or broken cross tube, tie rod end ball stud or tie rod end NOTE: Damaged components require replacement	Pump/gear relief valve pressure setting exceeds system specifications	Adjust power steering system to manufacturer's specified pressure
	Steering gear poppets improperly set or malfunctioning	Check for proper operation or adjust poppets to OEM specifications
	Axle stops improperly set	Set axle stops to OEM specifications
	Severe duty cycle service	Increase frequency of inspection and lubrication intervals
Worn or broken steering ball stud	Drag link fasteners lightened past specified torque	Tighten drag link fasteners to the specified torque
	Lack of lubrication or incorrect lubricant	Lubricate linkage with specified lubricant
	Power steering stops out of adjustment	Adjust steering stops to OEM specifications
Suspension has harsh or bumpy ride	Air spring not inflated	Check air supply to air spring, repair as necessary
	Air spring ride height out of specification	Adjust ride height to proper specification
	Broken or worn leaf spring	Replace leaf spring
	Front suspension overloaded	Redistribute steer axle load
Restricted steering radius	Steering stops not adjusted correctly	Adjust steering stops to achieve correct wheel cut
Vehicle leans	Ride height incorrect	Adjust ride height to specification
	Air spring(s) are not inflated	Repair source of air pressure loss
	Leaf spring broken	Replace leaf spring
	Excessive weight bias	Contact the vehicle manufacturer or Hendrickson Tech Services
Vehicle wanders	Caster out of specifications	Check ride height prior and adjust caster to specification
	Incorrect toe setting	Adjust toe to specification
	Fifth wheel not greased	Grease fifth wheel
	Air in the power steering system	Remove air form the power steering systems
	Rear ride height out of adjustment	Adjust ride height to specification
	Front ride height out of adjustment	Adjust ride height to specification

SOFTEK MONOLEAF TROUBLESHOOTING GUIDE		
CONDITION	**POSSIBLE CAUSE**	**CORRECTION**
Worn or damaged kingpins and kingpin bushings	Dirt in system– contaminated lubricant	Polish and inspect kingpin, replace bushing and seals, then follow specified lubrication procedures
	Incorrect lubricant	Lubricate axle with specified lubricant
	Axle not lubricated at scheduled frequency	Lubricant axle at scheduled frequency
	Incorrect lubrication procedures	Use correct lubrication procedures
	Lubrication interval not compatible with operating conditions	Change lubrication interval to match operating conditions
	Worn or missing seals	Replace worn or missing seals
Vibration or shimmy of front axle during operation	Caster out of specification	Adjust caster to specification
	Wheels and/or tires out of balance	Balance or replace wheels and/or tires
	Worn shock absorbers	Replace shock absorbers
	Wheel bearing adjustment	Adjust wheel bearing to the vehicle manufacturer's specifications.
Excessive wear on tires or uneven tire tread wear	Tires have incorrect air pressure	Adjust tire pressure to manufacturer's specification.
	Tires out of balance	Balance or replace tires
	Incorrect axle alignment	Align axles
	Incorrect toe setting	Adjust toe-in to manufacturer's specification
	Incorrect steering arm geometry	Repair steering system as necessary
	Excessive wheel bearing end play	Check specified wheel nut torque, replace worn or damaged wheel bearings
	Wheel bearing adjustment	Adjust wheel bearing to the vehicle manufacturer's specifications.
Vehicle is hard to steer	Low pressure in the power steering system	Repair power steering system
	Steering linkage needs lubrication	Lubricate steering linkage
	Steering knuckles are binding	Check vertical clearance
	Incorrect steering ar geometry	Repair steering system as necessary
	Caster out of specification	Adjust caster to specification
	Tie rod ends hard to move	Replace tie rod ends
	Worn thrust bearing	Replace thrust bearing

SECTION 13

Alignment Specifications

AIRTEK AND SOFTEK FOR INTERNATIONAL TRUCK VEHICLES*

FRONT SUSPENSION ALIGNMENT SPECIFICATIONS						
CAMBER[1]	DESIGN SPECIFICATION		RANGE			
	AIRTEK	SOFTEK	AIRTEK		SOFTEK	
			MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
LEFT	0.00°±1.0°	0.0°±1.0°	-1.0°	+1.0°	-1.0°	+1.0°
RIGHT	-0.25°±1.0°	-0.25°±1.0°	-1.25°	+0.75°	-1.25°	+0.75°
CROSS	0.25°±1.0°	0.0°	-0.75°	+1.25°	—	+2.0°

CAMBER NOTES:

1 The camber angle is not adjustable. **DO NOT** bend axle or otherwise try to adjust camber. If found out of specification, notify Hendrickson Tech Services for further information.

CASTER[1,2]	DESIGN SPECIFICATION		RANGE			
	AIRTEK	SOFTEK	AIRTEK		SOFTEK	
			MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
LEFT	6.0°±1.0°	5.0°±1.0°	+5.0°	+7.0°	+4.0°	+6.0°
RIGHT	6.0°±1.0°	5.0°±1.0°	+5.0°	+7.0°	+4.0°	+6.0°
CROSS[3]	0.0°	0.0°	—	+1.5°	—	+1.5°

CASTER NOTES:

1 Caster is determined with the vehicle at specified ride height for air suspension or at rated load for mechanical suspension systems. It is critical that the vehicle front and rear ride height is within specifications prior to performing a caster measurement or adjustment. See Hendrickson ride height specifications and procedure.

2 In most cases actual vehicle caster is defined with the frame rails at zero slope. Refer to the vehicle manufacturer's specifications for correct frame rail slope. (Both the alignment surface and the vehicle's frame rails should be level during execution of alignment procedures). For vehicles with a positive frame rake (higher in rear) add the frame slope (in degrees) to the caster reading to determine true vehicle caster.

3 **The Cross caster angle is not adjustable** – **DO NOT** bend axle or otherwise try to adjust cross caster. If found out of specifications notify Hendrickson Tech Services for further information. Changes to caster can be attained by using caster shims as provided by the vehicle manufacturer or chassis and body manufacturer. Caster shims must match, side to side, to reduce uneven loading to the suspension components. **The use of two different angle caster shims will not correct cross caster.**

4 **Example of caster adjustment:** 4.5° RH/5° LH, would require one, 1.0 shim on each side to increase caster and achieve 5.50° RH/6.00° LH, which is in specification. **DO NOT** attempt to use uneven shims.

Hendrickson recommends the following TMC[2] practices:

	DESIGN SPECIFICATION[1]	RANGE	
		MINIMUM	MAXIMUM
TOTAL TOE[2]	1/16" ± 1/32" (0.06" ± 0.03")	1/32" (0.03")	3/32" (0.09")

TOE-IN NOTES:

1 Toe-in is to be set and adjusted in the normal vehicle unladed configuration. Actual vehicle curb weight on the ground. Toe should be checked at the tires front and rear tread center, at a distance above ground equal to the tire's rolling radius.

2 In most instances total toe is set by the vehicle manufacturer or body builder. Consult the vehicle manufacturer for specifications.

* For International 2-Leaf mechanical suspension equipped with STEERTEK axle, refer to vehicle manufacturer's specifications.