05 - Driving system

Wheels and tires

Technical specifications

Torque Specifications

Name	Torque range	
	Metric(Nm)	British (Lb-ft)
Spare wheel regulator	120	89

General specifications

Wheel run-out (under half load)	Front wheel upward run-out	74.6mm
	Front wheel downward run-out	96.4mm
	Total travel	171mm
	Rear wheel upward run-out	95.8mm
	Rear wheel downward run-out	130.2mm
	Total travel	226mm
Tire pressure (no load)		230Kpa/230Kpa/250Kpa
Tire pressure(under full load)		230Kpa/230Kpa/250Kpa
Tire specification		225/55ZR18 102W
Rim model		17X6.5J;18X7J;16X6.5J;
Spare tire specification		215/65R16 102H

Precautions

1. Radial tires, belted tires or diagonal ply tires can not be mixed on the vehicles; otherwise they may cause a typical handling hazard, resulting in loss of control of the vehicle.
2. In use, must perform the regular transposition of wheels, so as to reduce the eccentric wear of front wheel tires and ensure the vehicle driving performance and prolong the service life of tires.
3. Must use the dedicated tires for Lifan vehicles, and it is not allowed to install different specifications or patterns of tires on one vehicle.
4. In use, must timely wash any mud and sand attached on the tires, to avoid wheel shaking at high speed and damage of tires.
5. Do not apply the oil or lubricant on bolts or nuts.
6. Observe the instructions for the jack operation.
7. Do not allow any body part to be under the jacked vehicle; otherwise it will result in the physical injury.
8. When the vehicle is lifted with the jacks, the engine can not be started or operated.
9. Park the vehicle on a flat and solid ground, tightly apply the parking brake and set the transmission in neutral position. If necessary, place the blocks below the tires to be replaced in the diagonal direction.
10. To stop the wheels, place the wheel stopper in the back of front wheel or the back of rear wheel.
11. Confirm that the jack is placed on the flat and solid ground, confirm that the jack is arranged on the right support point. When the vehicle is jacked, if the jack position is incorrect, the vehicle may be damaged or fall from the jack, resulting in injuries.
12. Do not jack the vehicle if there is person in the vehicle.

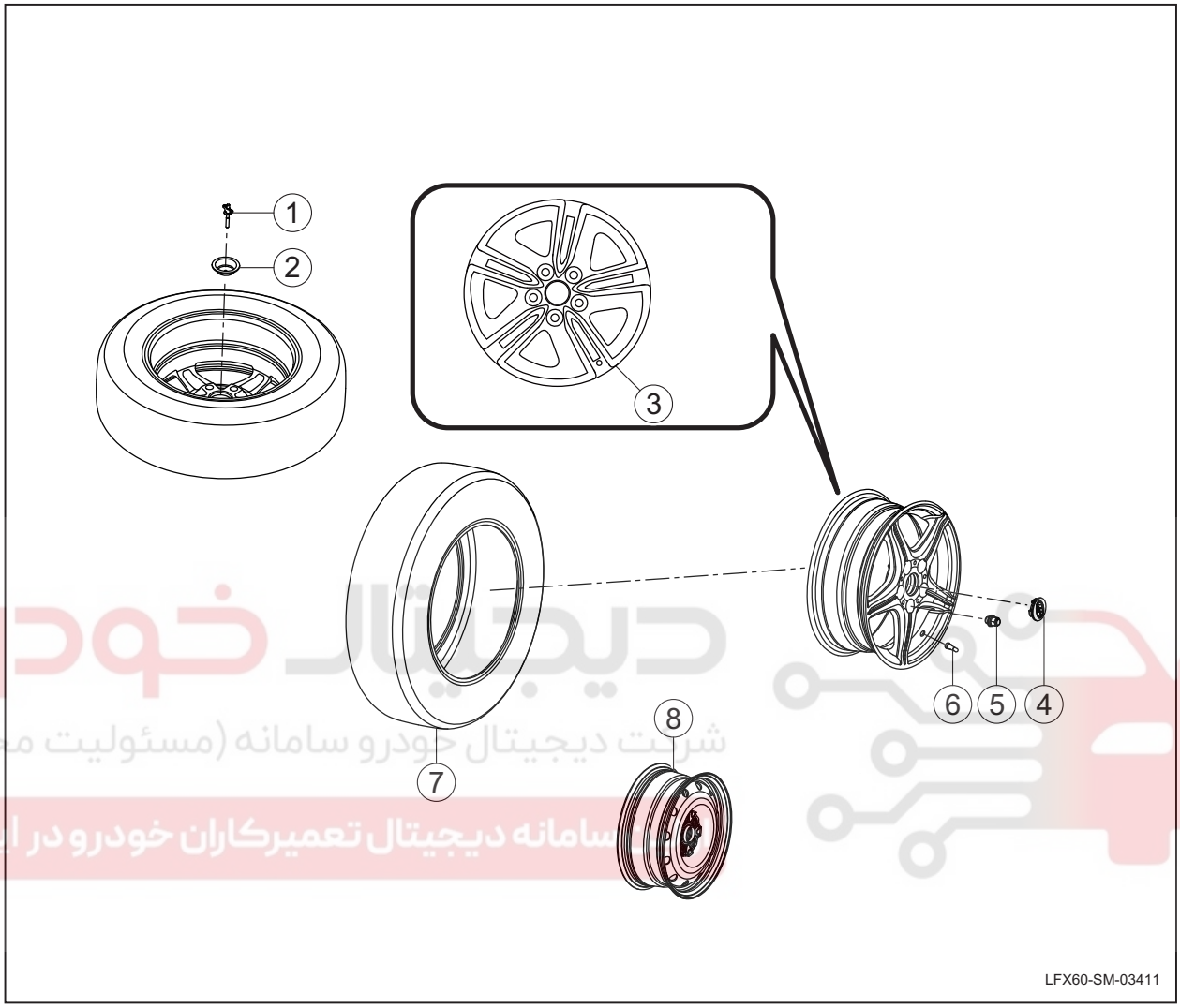
Preparation

Special Maintenance Tools

Structure and installation location

Part exploded view

Wheel and tire



No.	Part name
1	Spare tire screw rod assembly
2	Spare tire fixing plate assembly
3	Aluminium rim
4	Center logo

No.	Part name
5	Wheel nut assembly
6	Valve assembly
7	Tire assembly
8	Wheel rim

General Inspection

General Inspection

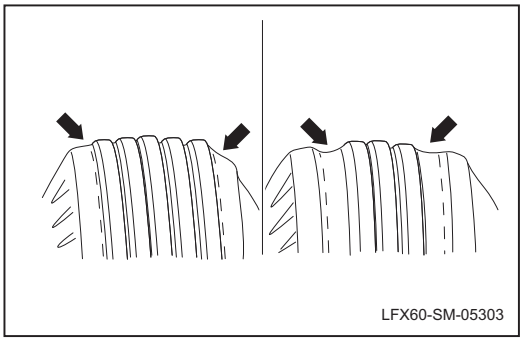
⚠ Warning:

- **Unless for emergency (the temporary use), do not use the tires of different types in the same vehicle, such as the radial tire, bias tire or bias cord tire.**
- **Do not start the vehicle while replacing the tire since the wheel landing may cause the vehicle to move.**
- **The tire sealant on the market is the inflammable substance.Please frequently remind the customer of not using such substance.**
- **Wear the safety goggles or mask when repairing the wheel and tire assembly.**
- **After replacing the wheel or the wheel bolts are loosened, tighten the wheel nuts again after the vehicle runs for 800km.**
- **If the wheel nuts are not tightened in the required mileage, the wheels may separate from the bodywork with the vehicle running.**
- **The axle shaft, wheel and tire are specified with the maximum load; do not overload.**
- **Do not grind the aluminum alloy wheel with the steel wool or clean it with the detergent.**
- **Before removing the tire valve core, reduce the tire pressure by pressing the valve core piston.**
- **Failing to observe the above instructions may result in the physical injury.**

Inspection of tire wear

The abnormal tire wear is usually caused by the excessive camber angle or excessive toe-in.In some cases, the incorrect toe-in setting or suspension component wear may result in the severe "cave" or "scalloping" tire wear. Sometimes, the incorrect toe-in setting may cause the other abnormal wear.

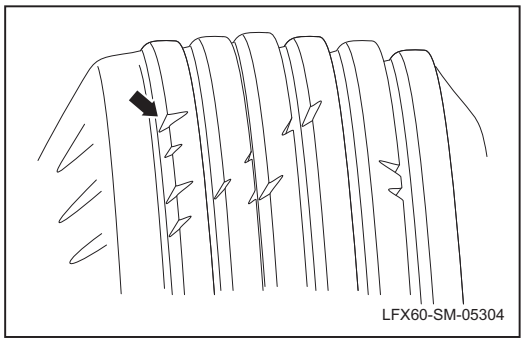
1. Quick wear of tire shoulder.



Causes of abrasion:

- Insufficient tire inflation.
- Do not carry out tire exchange.

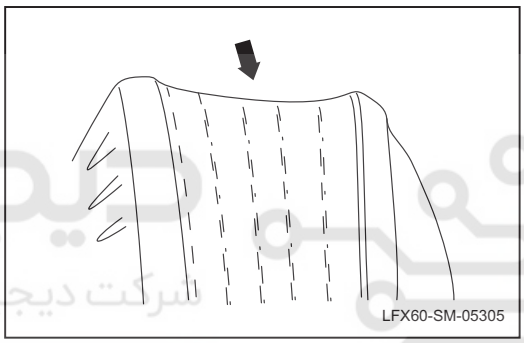
2. Tire tread flaw.



Causes of abrasion:

- Insufficient inflation.
- Too high vehicle speed.

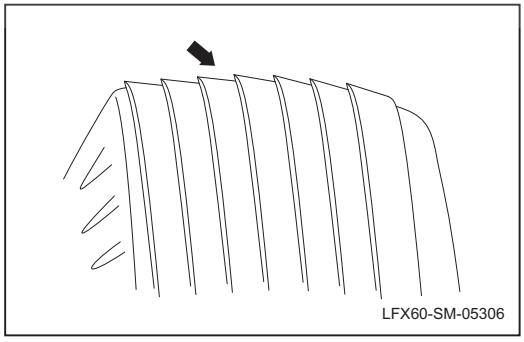
3. Quick central wear.



Causes of abrasion:

- Excessive tire inflation.
- Do not carry out tire exchange.

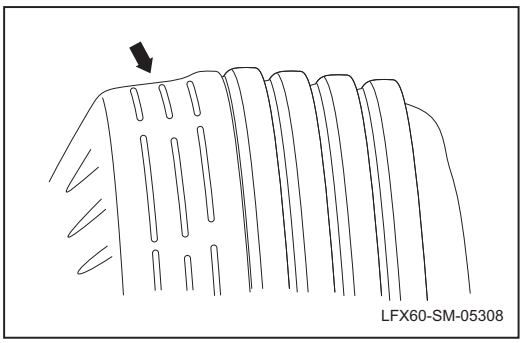
4. Feathery wear.



Causes of abrasion:

- Incorrect toe-in.

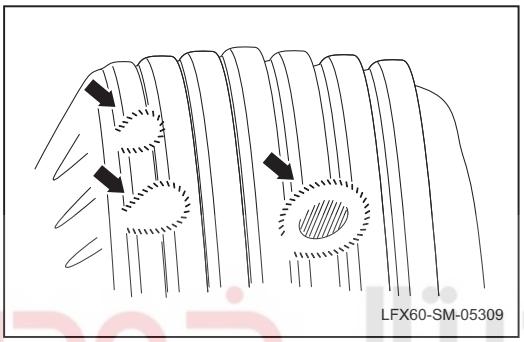
5. Single side wear.



Causes of abrasion:

- Excessive inclination.

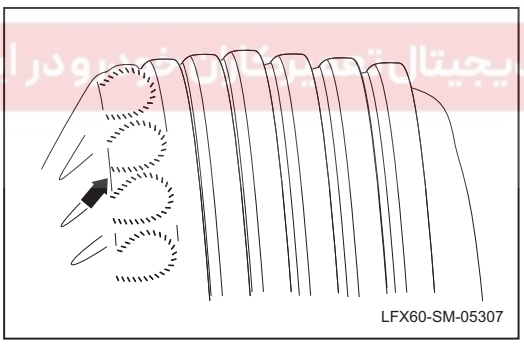
6. Patch pattern polishing.



Causes of abrasion:

- Wheel imbalance.
- Tire defect.

7. Bulk wear of edge pattern.

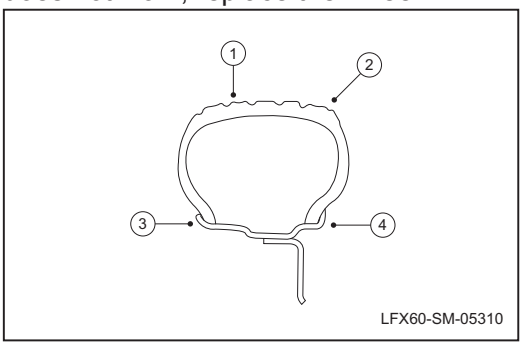


Causes of abrasion:

- Do not carry out tire exchange.
- Suspension component wear or improper adjustment.

Inspection of tire run-out

Measure the wheel run-out with the dial gauge on board or off board.In both case the installation surface should be correct.The measurement can be made with or without the tire installed.Measure the wheel end face run-out at the rim flange inside position 3 and outside position 4.Fix the dial gauge to the wheel position 1 and measure the tire radial run-out and measure the free longitudinal run-out at position 2.Slowly rotate the wheel by one turn and record the dial gauge reading.If the measurement does not meet the requirement, subject the tire to the dynamic balance.If this does not work, replace the wheel.



Inspection of tire vibration

The tire vibration diagnostic program starts from the road test.The road test and interview with the customer (if possible) can provide many information for locating the vibration source. The road test should be made on the level road surface.In the case of vibration, note and record the following items:

- The vehicle speed when the vibration occurs.
- Which type of vibration occurs in each gear at each speed.
- The mechanical vibration or audible vibration.

The variation of the following conditions will impact the vibration:

- Engine torque.
- Vehicle speed.
- Engine speed.

The vibration falls into torque sensitive type, vehicle speed sensitive type and engine speed sensitive type.Below description helps to distinguish the vibration source.

1. Torque sensitive type.

It means the vibration can be better or worse along with the accelerating, decelerating, constant speed, vehicle stationary or application of engine torque.

2. Vehicle speed sensitive type.

It means the vibration usually occurs at the same vehicle speed and is not impacted by the engine torque, speed or transmission gear.

3. Engine speed sensitive type.

It means the vibration will occur at different vehicle speed as the transmission engages the different gear.Sometimes, this can be distinguished by the engine speed increase or decrease with the transmission in neutral gear or by the stalling test with the transmission engaging a gear.

If the condition is too sensitive to the engine speed, it does not relate to the tire most likely.

If the tire noise is detected while no dithering or oscillation phenomenon during the road test, the noise is generated by the contact of tire

and road surface.The high tire noise normally means the tire is flat or the pressure is too low and the tire slaps the road to generate the noise.Different from the axle shaft noise, the tire noise can maintain the same in a certain vehicle speed range.For details, refer to the road test procedure.

Preliminary inspection before tire alignment

Check the following items before the tire alignment:

- Check whether the wheel and tire models are consistent.
- Check whether the tire inflation pressure is appropriate.
- Check whether the tire tread wear is normal.
- Check whether the wheel bearings are loose.
- Check the vehicle height under kerb weight state.
- Check whether the suspension components are normal.
- Check whether the steering components are normal.

Operating Principle

System description

The genuine wheel and tire are designed to offer the normal operation performance so long as the tire pressure reaches the required value no matter the load reaches the rated full load or not.The following items can impact the tire life:

- The correct tire pressure.
- The wheel alignment.
- The driving skill.

The following driving practice can increase the tire wear:

- Sharp turn.
- Too fast acceleration.
- Emergency braking.

Meaning of identifications on the sidewall of tire

The tire model, size, load index and applicable speed rating are indicated by the letter and number code stamped on the side wall.To interpret the code, refer to the tire identification table.For the purpose of illustration, the table uses the tire specification of P215/65R16 102H. For the all-weather tire, the side wall also is provided with M+S, M & S or MS (indicating the towing on the mud and snow field).The overload or light load marks XL or LL can be stamped on the side wall as well.If no XL or LL mark is found on the side wall, the tire can be determined as the standard load tire.

Tire identification table:

P	Tire type	P - passenger car
		T - spare tire
		C - commercial vehicle
		LT - light truck
215	End face width	In mm
65	Height to width ratio	End face height/ width
R	Structure type	R - radial
		B - bias
16	Wheel diameter	In inch
102	Load index	Consult the tire supplier
H	Speed grade	Refer to the tire speed rating table

Speed rating correspondence table:

Speed grade	Max.speed (km/h)
S	180
T	190
H	210
V	240
W	270
Y	300
ZR	Above 240

Tire inflation description

The inflation pressure for the tires of all models is subjected to the thoroughful calculation to guarantee the following items:

- Steering mobility.
- Driving comfort.
- Maximum wear resistance of tire tread.
- High impact resistance.
- Longer tire life.

Check the tire inflation pressure every month or before the long distance trip.To achive the best measurement results, please the meet the following conditions:

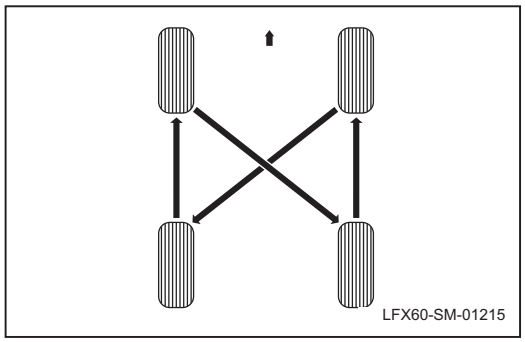
- The tires are in cold state.
- The driving distance is less than 1 mile (1.6km).
- The vehicle parks more than 3h.

Tire exchange description

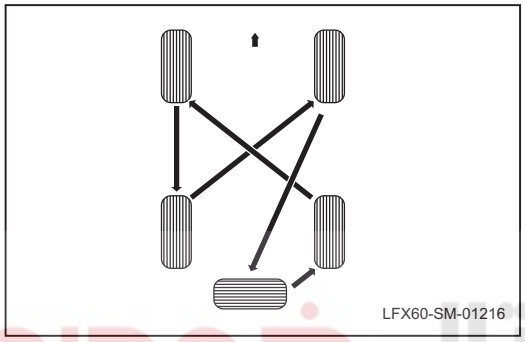
The tire wear of the front/rear tires varies from the load while the vehicle running.To avoid the single side wear of the tire, exchange the wheels periodically to make the tire wear uniform and consequently prolong the tire life.It is suggested that the tires should be exchanged every 5,000km to 8,000km driving to:

- Maintain the tire wear and tire fatigue uniform and ensure the stability and economical efficiency.
- Check the tire conditions, detect the tire damage in time and prevent the accidents.
- Use the optimal state tires for the steering wheels so as to enhance the vehicle stability and safety.

Crosswise exchange of tires:



Exchange of tires when the spare tire is used:



Part instructions

Using the non-genuine wheels may result in the following conditions:

- The damage of wheel bearing, wheel fasteners and wheel.
- The tire failure due to the change of parts clearance.
- The vehicle damage due to the change of ground clearance.
- The poor steering stability due to the change of friction radius.
- The inaccurate indication of speedometer and odometer.

Replace the wheel if the following conditions occur.

- The wheel bolt hole is elongated.
- Severe wheel corrosion.
- Wheel bending or dent deformation.
- Excessive radial run-out of wheel.

Tire chain operating instructions

The tire chain manufacturer designates the applicable tire chain size for each type tire to ensure the installation appropriate.

- Ensure to purchase the correct tire chain.
- If the tire chain is too slack due to the incorrect size, do not insert the rubber setting block in the slack part or the gap.
- Observe the installation guide of the tire chain manufacturer.

Since the use of tire chain can generate the negative impact on the vehicle operation, the driver must be aware of the following aspects:

- Adjust the vehicle speed according to the road surface conditions.
- Avoid sharp turn.
- Avoid the wheel brake locking.

Diagnostic Information and Procedures

Diagnosis Instructions

Before the wheel and tire system fault diagnosis, learn about the operating principle of wheel and tire system fisrt.This helps to determine the correct fault diagnosis procedures and whether the conditions described by the customer are the nomral operation.

The wheel and tire system fault diagnosis must start from the inspection of wheel and tire system. Instruct the maintenance man to take the next logic procedures and complete the fault diagnosis. Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

Visual Inspection

1. Confirm the problem raised by the customer.
2. Check the evident mechanical faults.

Visual inspection table

Mechanical
• Tire wear mark • Whether there is tire flaw • Whether there is abnormal wear of tire • Whether there is wheel deformation • Tire nut • Tire bolt

3. Solve the problem finding before the next step inspection.
4. If the observed or raised problem is the evident and the cause has been found, ensure to fix this fault before proceeding with the next step.
5. If no problem is found through the visual check, confirm the fault and refer to the fault symptom list.

List of fault symptoms

Symptom	Possible point of failure	Recommended Measures
Excessive wear of tire edge	• Insufficient tire pressure	• Adjust the tire pressure
	• Vehicle turn at high speed	• Avoid the vehicle turn at high speed
	• Vehicle overload	• Do not overload.
	• Incorrect wheel alignment	• Carry out the wheel alignment
Excessive wear of tire crown	• Tire pressure too high	• Adjust the tire pressure
	• Frequent acceleration or braking	• Correct it if necessary
Tire or other excessive wear	• Incorrect tire pressure	• Adjust the tire pressure
	• Tire exchange required	• Exchange the tires
	• Incorrect wheel alignment	• Carry out the wheel alignment
	• Front suspension or rear suspension abnormal	• Replace the damaged components.
	• Wheel bearing looseness, wear	• Adjust or replace the bearing
	• Wheel or tire radial run-out excessive	• Repair or replacement of damaged components
Wheel rusting or corrosion	• Improper maintenance	• Clean and apply paint
Difficult wheel installation	• Incorrect method or parts not match, including the wheel bolts and nuts	• Use the correct parts
	• Parts rusting, wear, damage	• Clean or replace

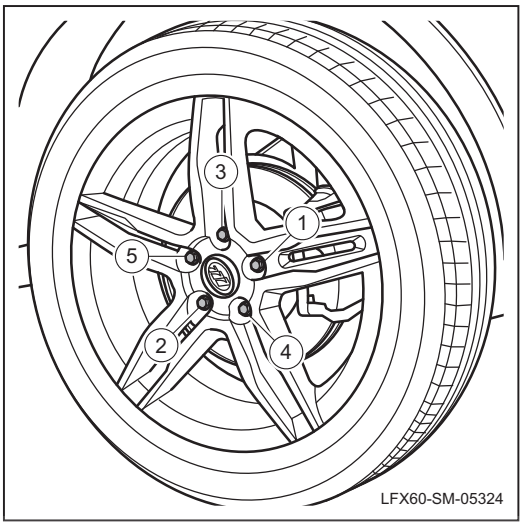
Symptom	Possible point of failure	Recommended Measures
Vehicle vibration caused by the wheel or tire	• Tire pressure too high	• Adjust the tire pressure
	• Wheel or tire out of balance	• Balance the tires and wheels
	• Abnormal tire wear	• Check the abnormal wear causes and replace tire if necessary
	• Tire admission of water	• Drain the water
	• Wheel bending	• Replace the wheel • Refer to: Replacement of the wheel.
	• Incorrect tire bead installation	• Rotate the wheel on the vehicle to check the tire and wheel conjunction.If any part is found swing upon the wheel rotation, it indicates the wheel and tire are not well assembled.Remove the tire and clean the conjunction.
	• Wheel or tire radial run-out excessive	• Measure the wheel or tire radial run-out with the dial gauge.If the radial run-out is out of the specified limit, further check the wheel bolt radial run-out and replace the bolt if the radial run-out exceeds the limit.
	• Wheel nut damage or wheel bolt hole enlarged	• Tighten or replace the damaged components
	• Foreign matter between the wheel mounting face and hub	• Clean the mounting face
	• Brake disc out of balance	• Check the brake disc for earth, debris or heavy dirt; check the brake disc for imbalance due to the excessive wear and damage
	• Wheel bearing looseness, damage	• Repair or replacement of damaged components
Wheel bolt thread damage	• Excessive torque	• Replace the damaged bolt and tighten the wheel nut to the required torque
Wheel nut damage	• Wheel looseness	• Replace the bolt and nut and tighten the wheel nut to the required torque
Wheel nut seizing	• Excessive torque of wheel nut	• •Replace the nut and tighten the wheel nut to the required torque
	• Corrosion	• In the case of slight corrosion, remove it with the iron brush; in the case of severe corrosion, install the new bolts and nuts.If the fault still occurs, lubricate the first 3 threads of the wheel bolts with the graphite-base lubricating oil.
	• Vehicle overload	• Do not overload.

Removal and Installation

Replacement of wheel

Removal

1. Remove the wheel.



(a). Loosen the wheel nuts in the sequence of 1 - 2 -3 - 4-5, as shown in the figure.

(b). Lift the vehicle. **Refer to the vehicle lift and support.**

(c). Remove the wheel nut.

Torque: 120Nm

(d). Take down the wheel.

Installation

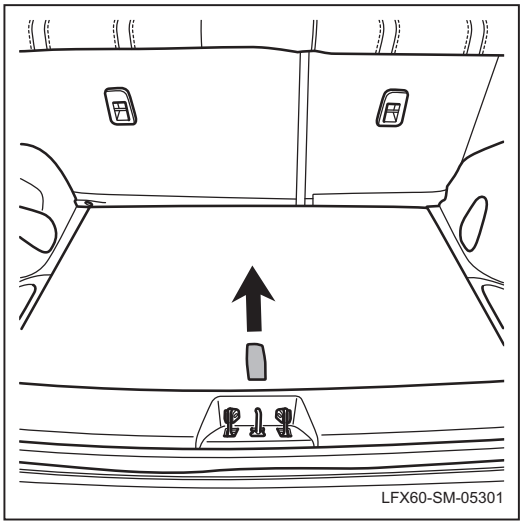
1. Install the wheel.

(a). The installation sequence is the reverse of the disassembly order.

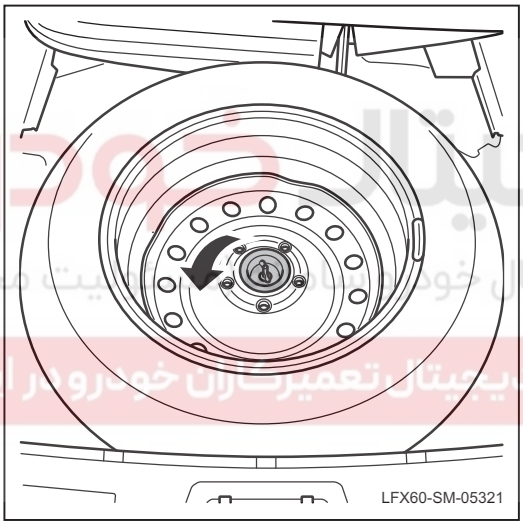
Replacement of spare tires

Removal

1. Replace the spare tire.



(a). Open hatchback.
(b). Remove the spare tire cover plate.



(c). Remove the spare tire fixing cover.
(d). Remove the spare tire.

Installation

1. Install the spare tire.

(a). The installation sequence is the reverse of the disassembly order.

05 - driving system

Four-wheel alignment

Technical Specifications

General specification

Name		Specification	
Front wheel alignment parameters	Front wheel toe	-2±2mm (total)	-1±1mm (single side)
		-0°16′ ± 16′ (total)	-0°8′ ± 8′ (single side)
	Front wheel outer incination angle	-0°42′ ± 48′ (no load)	
	Kingpin rear inclination	-2°44′ ± 30′ (no load)	
	Kingpin outer inclination angle	-11°2′ ± 30′ (no load)	
Rear wheel alignment parameters	Rear wheel toe	-0.84 ± 2mm (total)	-0.42 ± 1mm (single side)
		-0°6′ 43″± 16′ (total)	-0°3′ 22″± 8′ (single side)
	Rear wheel outer inclination	-0°42′ ± 30′(adjustable)	

Precautions

Precautions

1. Check the front and rear suspensions of car for damages or deformations.
2. Check the wheel bearing gap, and replace the front wheel bearing if necessary.
3. Check the conditions of rims and tires.
4. Check the steering linkage and ball joint for loosening.
5. Park the car (without luggage or person) on flat ground, shake the wheels, and check its front suspension for loosening.
6. Check the assembly bushing for wears.
7. Check the damping force of shock absorber. If it's unqualified, replace it.

Preparation

Special maintenance tools

General Inspection

General Inspection

Preparation

Note:

Misalignment of four wheel locations will cause the direction deviation, wrong return of steering wheel, tire leaning-grind or Heel-and-Toe Wears, etc

1. Tire size and pressure shall conform to the provisions of original manufacturer.
2. The rim deformation shall be within the specified range.
3. The ball joint of suspension system should have no loosening.

Note:

Manually hold the wheel, move it up and down, left and right, to check its swing.

4. Good braking performance.

Site requirements

1. The surface of inspected site should be flat and horizontal as possible.
2. Place both torque angle indicators separately into the reserved holes with the same thickness of torque angle indicator.

Note:

If there is no reserve pits, after the two front wheels are placed on the angle gauge, the two rear wheels should be padded with a flat board with the same thickness of the angle gauge.

Correct placement of car

1. Lift the car, place its both front wheels on the torque angle indicator, and make the extension line of kingpin centerline basically through the center of torque angle indicator.
2. Turn the steering wheel, and make the car straight.

Operating Principle

System overview

Front wheel toe

- The toe-in should be checked and adjusted with a special four-wheel locating tester.
- According to the demands of tester, prepare for the adjustment before locating the wheels, and adopt a steering wheel limiter available on the market to fix the steering wheel in straight forward position (the steering wheel must be at ±5 from its center position, and the lower clamping flange bolt of steering shaft must be horizontal).
- Turn the toe-in adjusting lever to adjust its length until it reaches the specified value when required.
- Tighten the locking nut, reinstall the jacket circlip, and check whether the locking nut is tightened or the jacket is in correct position.
- After adjusting the toe-in of front wheel, check whether the steering wheel is horizontal, otherwise the locking nut of steering wheel should be loosened,and the steering wheel should be adjusted to horizontal position to make the locking nut of steering wheel tightened to specified torque.

Check of front wheel steering angle

- After replacing the tie rod joint or adjusting the toe-in, check its steering angle. If the steering angle of front wheel is unqualified, check and adjust the length of left or right tie rod.

Caster angle

- The kingpin caster angle should be ensured in design structure, and needn't be adjusted during the use.
- The main function of its caster angle is to make the car driving right ahead. If its caster angle is positive, the inner side of car will drop upon steering the front wheel, which can make the chassis lifted, thus the load on steering knuckle will be increased. If the caster angles of both wheels are the same, the car will return right ahead after steering it. It can increase the stability of steering wheel to increase its positive caster angle, but its acting force will be increased while steering; it can reduce the stability of steering wheel to reduce its positive caster angle, but its force will be reduced while steering. Its caster angle can't influence the tire wears, and it's used to stabilize the driving direction of car and it can return automatically while steering. If the car is equipped with a traditional mechanical steering gear, its caster angle will become small and even near to a negative value, thus it's easy to steer the car. If the car is equipped with a power steering gear, its caster angle is usually set to a higher positive caster angle, thus it will make the driver sensible to steer the car, its steering force will be increased in case of increasing its positive caster angle, but the straight driving stability of car can be increased.

Camber angle

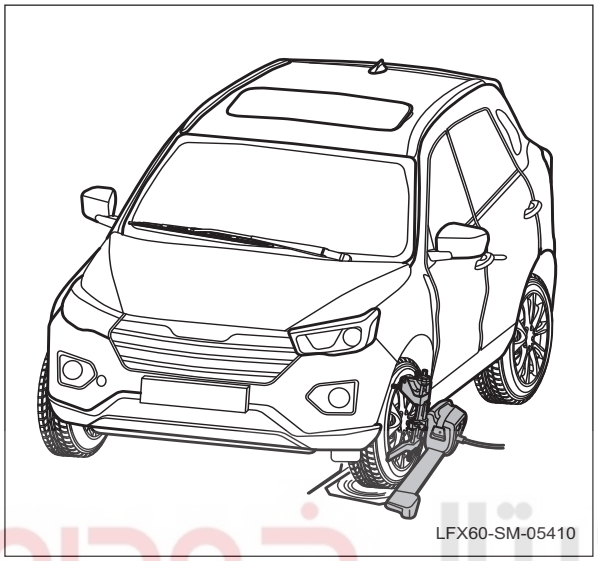
- Under the normal conditions, it's not required to adjust the camber angle after assembling the independent suspension and wheel steering knuckle. In case of finding out that the camber angle of wheel is deviated from its tolerance range for any other reason, adopt the connecting bolts of independent suspension and steering knuckle for calibration.
- Before the calibration, first check (visually check) the parts of driving system for damages, and replace the damaged parts.
- In case of finding out the camber angle of front wheel outside the tolerance, loosen the connecting bolts of front shock absorber and steering knuckle, and move the wheel for calibration.

Diagnostic Information and Procedures

fault detection

△Tips:
In order to prevent the front wheel from rolling while turning the steering wheel, make the front wheel braked.

1. Instrument installation and test sequence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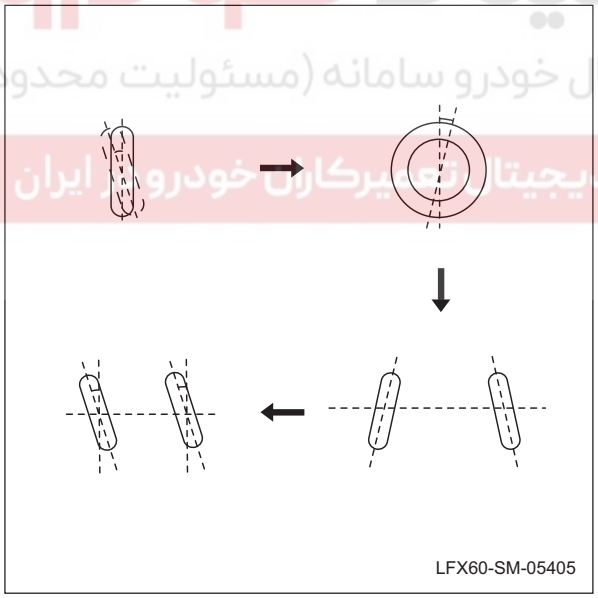
(a). Install the instruments.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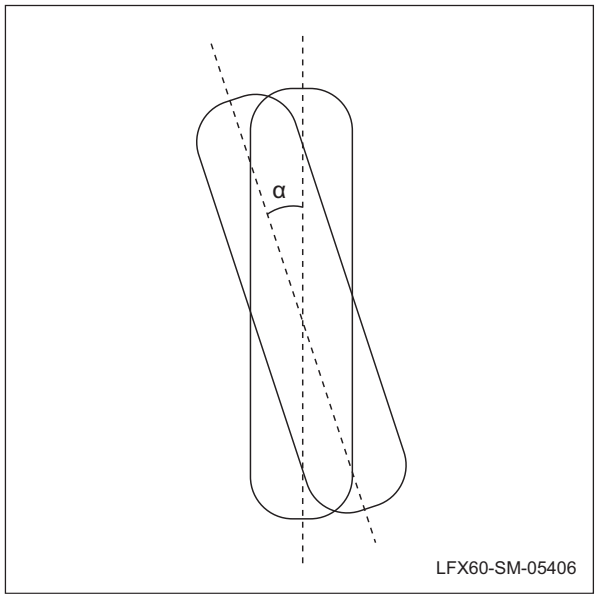
(b). Test and adjustment sequence of four-wheel location: kingpin caster angle, kingpin inclination angle, front wheel camber angle and front wheel toe-in.

△Tips:
If any parameter of four-wheel location needs to be adjusted, make a full adjustment as per the above sequence.

Test of front wheel camber angle

1. Test the camber angle of front wheel.



(a). Rotate the steering wheel to make it in the horizontal position approximately.

(b). Test the camber angle data of front wheel.

△**Tips:**

Under the normal conditions, it's not required to adjust the camber angle after assembling the independent suspension and wheel steering knuckle. In case of finding out that the camber angle of wheel is deviated from its tolerance range for any other reason, first check (visually check) the parts of driving system for damages, and replace the damaged parts before the calibration.

(c). In case of finding out the camber angle of front wheel outside the tolerance, loosen the connecting bolts of front shock absorber and steering knuckle for adjustment.

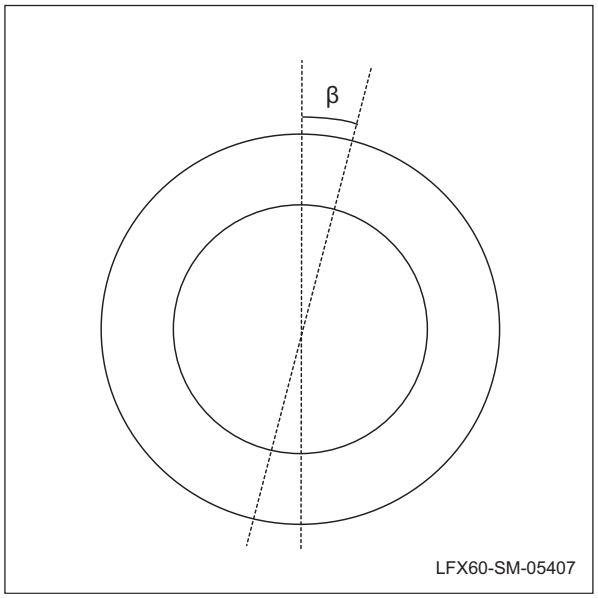
Front wheel camber angle:-0°2′±48′(no load)

△**Tips:**

If its tested value is unqualified, it's required to adjust and test the suspension system.

Check of kingpin inclination angle

1. Check of kingpin inclination angle.

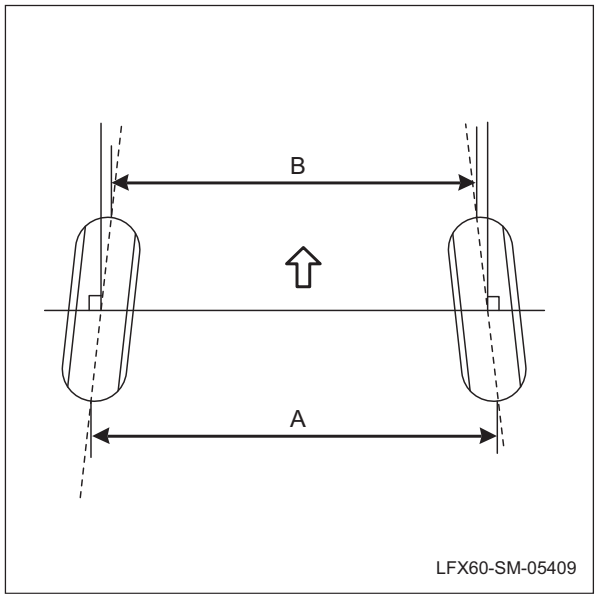


(a). Turn the steering wheel, and the instrument screen will display the test report after finishing turning it.
Kingpin caster angle:-2°44′ ± 30′ (no load)

△**Tips**:
If the test results do not meet the requirement, check the suspension system.

Adjustment of kingpin inclination angle

1. Adjustment of kingpin inclination angle.



(a). Loosen the fixing bolts of front steering knuckle and shock absorber.

(b). Adopt the four-wheel locating adjustment bolts to adjust the front-wheel caster angle and kingpin inclination angle to correct values.

(c). Tighten the fixing bolts.

Kingpin inclination angle:-11°2′ ± 30′ (no load)

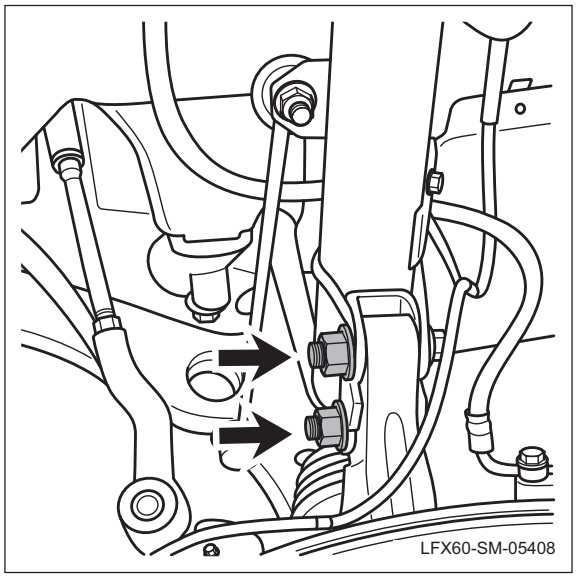
△**Tips:**

If the test results do not meet the requirement, check the suspension system.

05

Test and adjustment of front wheel toe-in

1. Adjust the toe-in of front wheel.

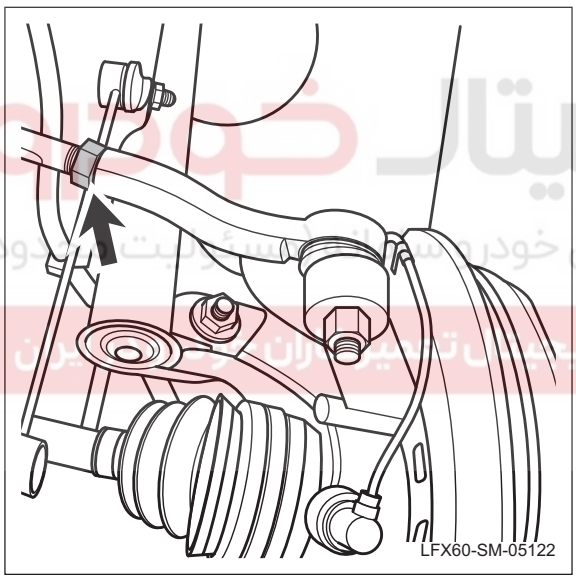


(a). Make the car in straight driving position.
(b). Adopt an instrument to test the toe-in of front wheel.

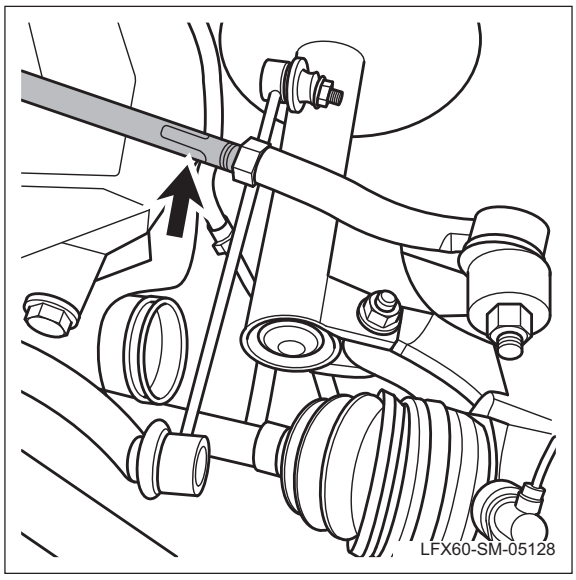
△**Tips:**

Check the toe-in, and adjust it if its toe-in is technically unqualified.

Front wheel toe-in: -0°16′±16′(total)



(c). Loosen the locking nut of steering tie rod.



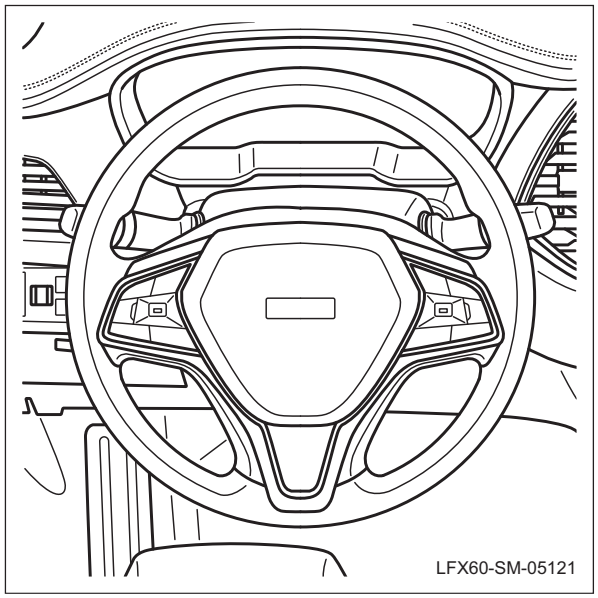
(d). Turn the steering tie rod until the instrument displays correct toe-in.
(e). Tighten the locking nut of steering tie rod after adjusting it.

△**Tips:**

- **Adjust the wheel on the other side reversely at the same amplitude to get the correct toe-in value.**
- **Clamp the steering tie rod in case of tightening the locking nut of steering tie rod.**

Test of front wheel maximum steering angle

1. Test the large steering angle of front wheel.



(a). Keep the vehicle placement status for the wheel alignment test.

(b). Depress the brake pedal, to brake the wheels.

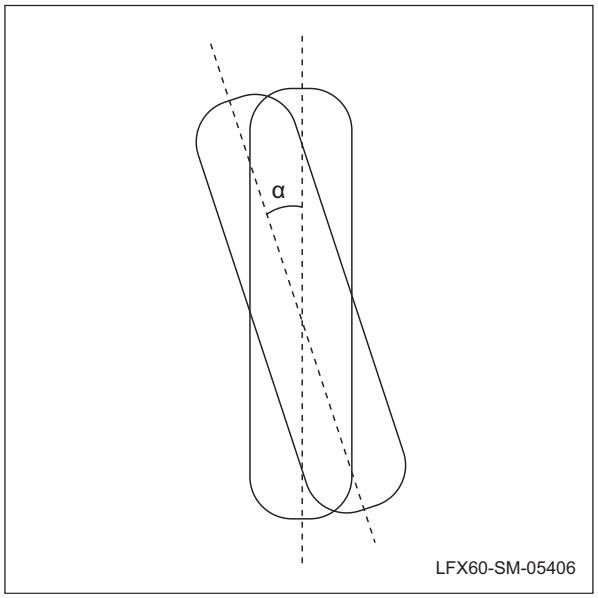
(c). Turn the steering wheel to the left and right limit positions, to measure the maximum steering angle of the both front wheels.

△**Tips:**

If the maximum steering angle to be measured does not meet the requirements, must check the suspension system parts for bending or damage.

Test and adjustment of rear wheel camber angle

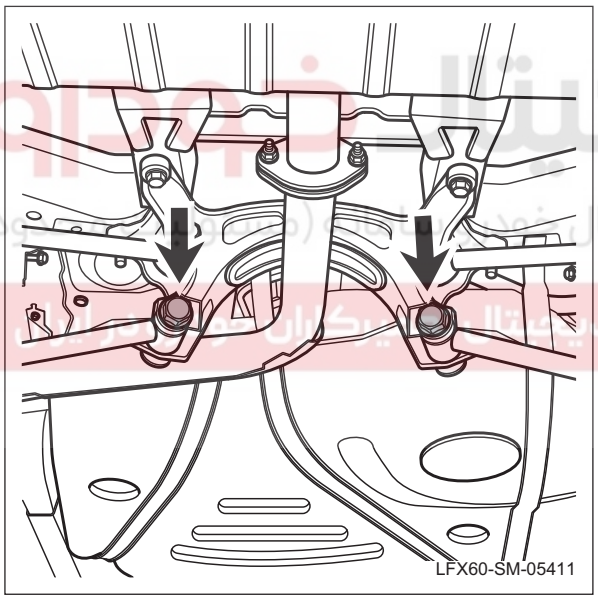
1. Test and adjustment of rear wheel camber angle.



(a). Rotate the steering wheel to make it in the horizontal position approximately.

(b). Read the front wheel camber from the instrument display.

Rear wheel camber angle: -0°42′ ± 30′



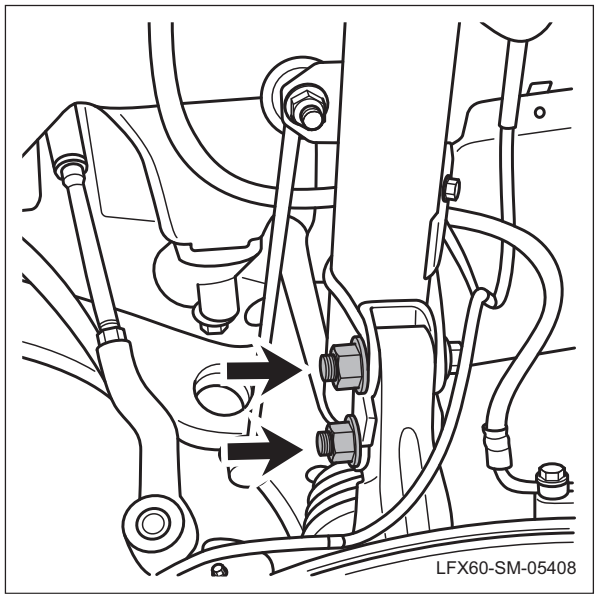
(c). Adjusting bolt of rear wheel camber angle

△Tips:

If its tested value is unqualified, the suspension system needs to be adjusted or tested.

Check the rear wheel toe

1. Check the rear wheel toe.



(a). Rotate the steering wheel to make it in the horizontal position approximately.

(b). Read the front wheel camber from the instrument display.

Rear wheel toe: -0°6′ 43″± 16′

△**Tips:**

If the test results do not meet the requirement, check the suspension system.