



Workshop Tips Springs



> Competence from the technology leader



GKN PowerTrain Systems & Services is your preferred partner for driveline parts and systems, repair and maintenance, complete design and build of niche drivelines. We provide technology: systems and components for automotive, construction, agriculture, industrial, military, marine and alternative energy markets.

Driveline and suspension technology – comprehensive range of quality parts

In addition to the popular high-quality portfolio of driveshafts, individual joints and joint kits, boot kits, individual components and special tools, GKN PowerTrain Systems & Services offers the most extensive range of coil-springs for European, Japanese and Korean cars and light commercial vehicles. The SPIDAN catalogue covers almost 4,000 coil-springs, more than 220 leaf-springs for SUVs and light commercial vehicles and the complete range of nearly 100 hydropneumatic spheres for Citroën passenger cars.

SPIDAN suspension springs are the most reliable components for a better, safer driving experience and maximum safety. Modern CNC manufacture guarantees a consistently high quality product and a perfect fit in the spring seats.

➤ SPIDAN coil-springs: The perfect replacement part for each application

➤ Cylindrical springs

Conventional, cylindrical springs feature a linear spring rate.

AC shaped spring



CC shaped spring –
*spring ends have
different diameters so
care is needed when
fitting!*



➤ Side load springs

Through the curvature, the spring generates a lateral force. This improves the shock absorber's response behaviour and thus driving comfort. The curved design guarantees good vehicle steering even at low speeds.

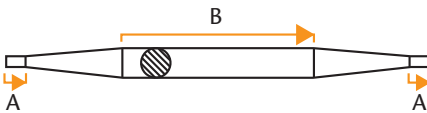




> Taper wire springs – springs made of inconstant wire

Key features:

- > The wire diameter reduces towards the spring ends



- > Under normal load and road conditions these thinner end coils guarantee a comfortable ride
- > Larger deflections as they may result from heavier vehicle loads or worse road conditions activate the stronger part of the spring
- > If required plastic sleeving on the end coils prevents damage to the spring surface coating and ensures gentle operation
- > Due to its heavily progressive spring rate taper wire springs adapt perfectly to increasing load for a stable roadholding



➤ The SPIDAN Miniblock spring – perfectly designed

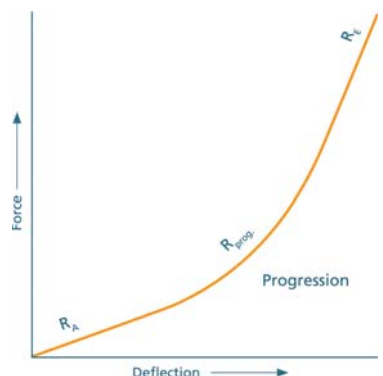


- Compact design, barrel shape like OE springs
- No coil-to-coil contact under normal operating conditions – no impact noise for the driver's comfort
- Perfectly shaped round wire ends guarantee exact fitting on the original spring pan
- Precision, taper wire design to give progressive spring rate



End-on view of a super-progressive taper wire Miniblock spring.

The Miniblock spring becomes progressively stronger the more it is compressed. Under heavy load conditions the end coils lie flat against the spring pans. Thus the number of active coils is reduced and the spring rate rises.

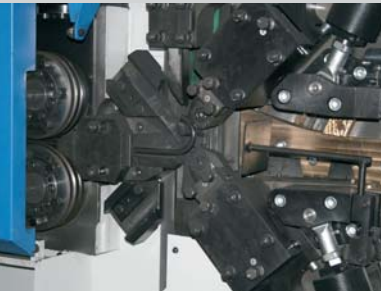


➤ From raw steel to a high performance quality product: SPIDAN coil-springs



1

Raw material: Springs steel for the production of coil-springs. Only highest quality chrome vanadium and silicon chrome alloy steels are used.



2

The automatic coiling machine winds up the spring steel to form a coil-spring.



3

Raw springs after coiling.



4

Springs with cut ends.



5

Small steel bullets used for shot peening. Carefully controlled shot peening process significantly increases the fatigue life of the spring.



6

Coil springs after the shot peening.



7

Phosphate coating to protect the spring steel from corrosion.



8

Heat treated with a tough epoxy powder coating protects the underlying spring steel from mechanical damage.

> SPIDAN safety recommendation

Coil-springs are responsible not only for a vehicle's roadholding, handling and comfort but also for its safety. Broken or worn out springs can negatively affect both suspension and braking performance. Coil-springs are dynamic components which are required to work in a harsh, underbody environment and they require more frequent inspection than is often assumed.



An accurate inspection of the spring is always recommended



Rust is an alarming signal and requires immediate attention! A rusty coil-spring is likely to break at any time and should be replaced immediately. Rust and damages to the surface can mostly be found at the lower coils of the spring.



- > During routine inspection always check the spring pans thoroughly
- > Clean the spring pans from dust and dirt to enhance the life span of the spring

Why do springs break?

- Rust is usually caused by debris thrown up by the road wheels and damaging the protecting surface
- Dust and dirt in the spring pans combined with water build up a grinding compound which steadily damages the spring surface
- Changing road and load conditions can cause cracking
- The spring's lifespan is also subject to weather and temperature
 - Extremely cold temperature makes the steel more fragile
 - Road salt combined with dirt and small stones damages the spring surface



> When to replace coil-springs

Always replace coil-springs in pairs! Driving with different springs directly affects the braking distance!



Worn springs reduce driving safety

- > All springs are subject to material fatigue
- > After a few years under frequent load, springs have been compressed several million times
- > Over time, coil-springs can become permanently compressed by one or two centimetres
- > Constant road grip by the tyres is no longer given on account of the shortened spring travel

Faulty springs must always be replaced

- > Broken springs
- > Bent springs
- > Sawn off springs

In any case SPIDAN recommends springs to be replaced after a maximum of 60.000 miles. Coil-spring replacement can conveniently be carried out whenever shock absorbers are replaced.

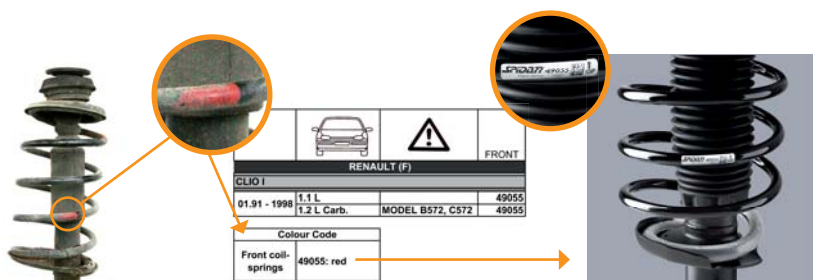
SPIDAN offers a 10-year warranty on springs when replaced in pairs.

> Easily choose the correct replacement spring

Only trust in SPIDAN OE quality level products when choosing the required replacement part.

1. The SPIDAN colour code

Original coil-springs are often marked with a colour code which has a direct relationship to the OE part number. The SPIDAN catalogue contains these colour codes and thus enables a rapid and accurate identification of the correct coil-spring part number.



2. The new spring label

Original SPIDAN coil-springs are clearly marked with

- > The company logo
- > SPIDAN part number
- > An arrow and "TOP" indicating the correct fitting direction
- > Batch traceability
- > 2D barcode



> Disassembly and assembly of McPherson suspension strut



1 > Disassembly

Loosen wheel nuts with the car standing on the floor. Raise the car up to working level and remove the wheel according to manufacturer's instructions. Block the brakes.



2

ATTENTION: Take care you don't damage the protective coating of the brake line!

Remove rubber washers from the nuts of the suspension strut's upper fixture. Unscrew nuts cautiously.



3

Loosen driveshaft at the differential side and secure it against falling off.



4

Loosen ball joints and upper fixture of the suspension strut. Unscrew the fastening screw of the ball joints (due to corrosion the screw might be stuck; use special tools to loosen it).

ATTENTION: Always follow the instructions and procedures recommended in the relevant workshop manual. At all times respect torque figures indicated by the vehicle or component manufacturer.

Safety instruction: Demounting of coil springs can be perilous and should therefore be performed by specialists only!



5

Drive out the bolts with a special tool to remove the ball joints from the knuckle. Under no circumstances use a chisel or similar and force apart the slotted socket of the ball joint! Place the knuckle down to the side.



6

Draw the line of the ABS speed sensor out of its bracket at the brake calliper.



7

Finally remove the connecting screw between suspension strut and lower suspension control arm.



8

When the ball joints are loosed and screws are removed the suspension strut can easily be taken out. Attention: Take special care not to damage the boots of driveshaft or steering rack!

> Continuation of
disassembly and assembly of
McPherson suspension strut



9 > Demounting of suspension strut

Clamp the suspension strut's fork head in a special socket or in a vice using special jaws.



10

Mark both spring pan and suspension strut to make sure you find the correct position for the parts for mounting.



11

ATTENTION: Take special care when you apply the spring compressor. The coils must be comprised securely so that the spring compressor can't slip off! Under all circumstances follow the instructions of the manufacturer of the spring compressor. Risk of injury!

Pre-stress the coil spring until the upper spring seat is free.



12

Safety instruction: The coil spring is deeply precompressed. Only loosen the central nut when you are sure that the coil spring is clamped safely in the spring compressor. Risk of injury!

Loosen and remove central nut.



13

Remove the suspension strut socket, the plate and the upper spring pan and wishbone.



14

Remove the protection cover.



15

Then take away the spring compressor with the coil spring. Check the shock absorber and clean the spring pans. Replace damaged or defective parts by new parts.



16

Take special care the spring pan does not slip out of the position marked in step 10.

Place the pre-stressed SPIDAN spring on the lower pad.

> Continuation of disassembly and assembly of McPherson suspension strut



17

Check colour code and SPIDAN number of the replacement coil spring. Consider fitting direction indicated on the spring (TOP↑)!



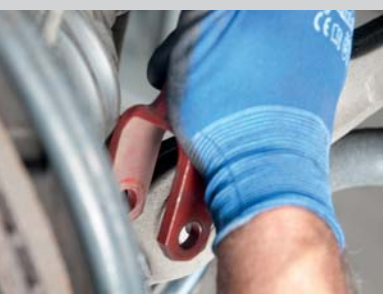
18

Mount all parts in reverse order: upper spring pan, plate and suspension strut socket. Fasten a new central nut according to the manufacturer's instructions. Release the coil spring carefully and take special care that the spring's end faces the stop collar of the spring pad.



19 > Assembly

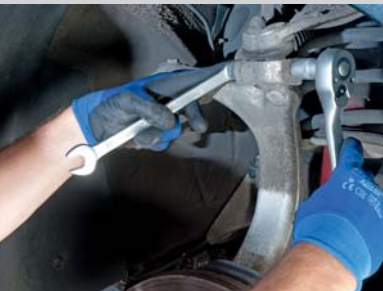
Insert the suspension strut and fasten the upper mounting nut considering the correct torque.



20

Safety instruction: Take care not to damage the protective coating of the brake line!

Then fix the suspension strut to the suspension control arm. Always use new nuts and screws!



21

Now insert both ball joints into the suspension control arm and mount them with new screws and nuts. Consider the torque indicated by the manufacturer. Never use a pneumatic wrench!



22

Mount all parts in reverse order. Always use new screws and always follow the manufacturer's instructions regarding torque! Finally tighten both nuts of the suspension strut in the suspension turret according to the manufacturer's instructions. Reposition the rubber washers.



23

Consider torque when remounting the wheel. Check alignment of the front axle and align the wheels as appropriate. Take the car for a test drive.

Safety instruction:
Always replace coil
springs in pairs!

ATTENTION: Always take care of your own
safety and the safety of others. Please work
safely and wear safety equipment. Parts or
tools falling down may cause serious injury.

> Demounting of suspension strut with side-load spring



1

Clamp the suspension strut's fork head in a special socket or in a vice using special jaws.



2

Place both jaws of the spring compressor as close as possible towards the end of the coil spring. Pre-stress the spring to release the spring pan. Attention: The coils must be compressed securely so that the spring compressor can't slip off!



3

Safety instruction: The coil spring is deeply precompressed. Only loosen the central nut when you are sure that the coil spring is clamped safely in the spring compressor. Risk of injury!

Loosen and remove central nut.



4

Take off the suspension spring socket.

ATTENTION: Always follow the instructions and procedures recommended in the relevant workshop manual. At all times respect torque figures indicated by the vehicle or component manufacturer.

Safety instruction: Demounting of coil springs can be perilous and should therefore be performed by specialists only!



5

Then remove the upper spring pan and the protection cover.



6

Now the pre-stressed side-load spring can be taken off.



7

Clean the spring pans. Check all parts thoroughly prior to mounting. Worn strut bearings, torn boots or porous bump stops must be replaced immediately.



8

Release the spring compressor carefully. Then replace the defective spring by an original SPIDAN coil spring. Make sure you apply the only matching replacement part (check colour code, article number). Consider fitting direction indicated on the spring (TOP↑)!

➤ Continuation of demounting of suspension strut with side-load spring

Safety instruction: The coil spring is deeply precompressed. Take special care that the side-load spring does not slip out of the spring compressor until it is completely released. Risk of injury!



9

Now place the pre-compressed SPIDAN replacement spring onto the spring pan. Position the lower spring end close to the stop collar. Bear in mind that the side-load spring will wind a bit further when it's released.



10

Afterwards mount the upper spring pan and all parts that you've demounted before. Tighten the self-retaining collar nut according to the manufacturer's instructions using a torque spanner. Attention: Always use a new collar nut!



11

Finally release the side-load spring carefully. Pay attention to the spring end winding towards the stop collar. Ensure that the spring end gets in contact with the stop collar.



12

As maybe necessary the side load spring must be compressed again and readjusted until the spring end fits closely to the stop collar.

➤ Disassembly and assembly of a Miniblock spring

ATTENTION: Always follow the instructions and procedures recommended in the relevant workshop manual. At all times respect torque figures indicated by the vehicle or component manufacturer.



1 ➤ Disassembly

Safety instruction: Demounting of coil springs can be perilous and should therefore be performed by specialists only!

Raise the car up to working level. Loosen and replace the lower screw of the shock absorber.



2

By raising the car the miniblock spring will be relieved. Do so until there is enough space to take out the spring. Depending on the vehicle type it can be necessary to remove more components as well as the second shock absorber in order to achieve enough distance for the spring's relief.



3

ATTENTION: Always take care of your own safety and the safety of others. Please work safely and wear safety equipment. Parts or tools falling down may cause serious injury.

The Miniblock spring must be completely relieved.



4

Now press the spring against the underbody of the vehicle. Draw it away from the suspension control arm then take it out. Replace the spring categorically by the correct SPIDAN Miniblock spring! Its design matches perfectly with the original coil spring and it fits perfectly into both original spring pads.

➤ Continuation of disassembly and assembly of a Miniblock spring

Heavy-duty springs for estate cars or vehicles with tow coupling must only be replaced by heavy-duty springs!



5 ➤ Assembly

Clean the spring pads and check them for damages. If necessary replace them. When fastening the Miniblock spring to the upper spring support make sure the spring end fits correctly. The spring end must touch the stop collar. At some models the spring has to be screwed into the spring pad.



6 This picture shows the correct positioning of the Miniblock spring on the spring pad. The upper spring support is fitted with a zinc coating which prevents from rusting. If the used spring pad shows an oxidised zinc coating it should be replaced immediately.



7

Also take special care of the correct positioning when fastening the lower spring support.



8

Prior to assembly clean the locating surfaces of the spring supports in order to avoid small stones or debris getting between the components.

ATTENTION: Always take care of your own safety and the safety of others. Please work safely and wear safety equipment. Parts or tools falling down may cause serious injury.



9

Initially place the upper spring support into the socket in the underbody. Then slide the lower spring support over the bead on the suspension control arm. Attention: The spring supports must not slip out of position!



10

Check correct fit of the Miniblock spring and the spring supports. This vehicle's suspension arm, for example, has got a special stop collar for the spring support.



11

Miniblock springs that are mounted correctly don't contact other vehicle parts but the rubber pads. Now lower the car taking care that the trunnion of the wheel suspension interlocks with the spring support and the lower coils.



12

Mount the shock absorber and all other parts that have been loosened or removed in reverse order. Always consider the instructions and torques indicated by the car manufacturer. If necessary check and adjust the wheel alignment.

➤ The spring is a safety-related spare part

A suspension unit that works well fulfils important safety tasks!

- Guarantees contact between tyres and the road surface
- Avoids surprising and annoying external influences on the driver
- Avoids overdrive or underdrive when driving round bends
- Guarantees course stability during braking
- Avoids changes in wheel load during acceleration and driving round bends
- Avoids abrupt changes in vehicle driving characteristics
- Avoids resonance vibrations



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