

**BRAKE HOSES
AND CABLES**



SAFELY ON THE ROAD

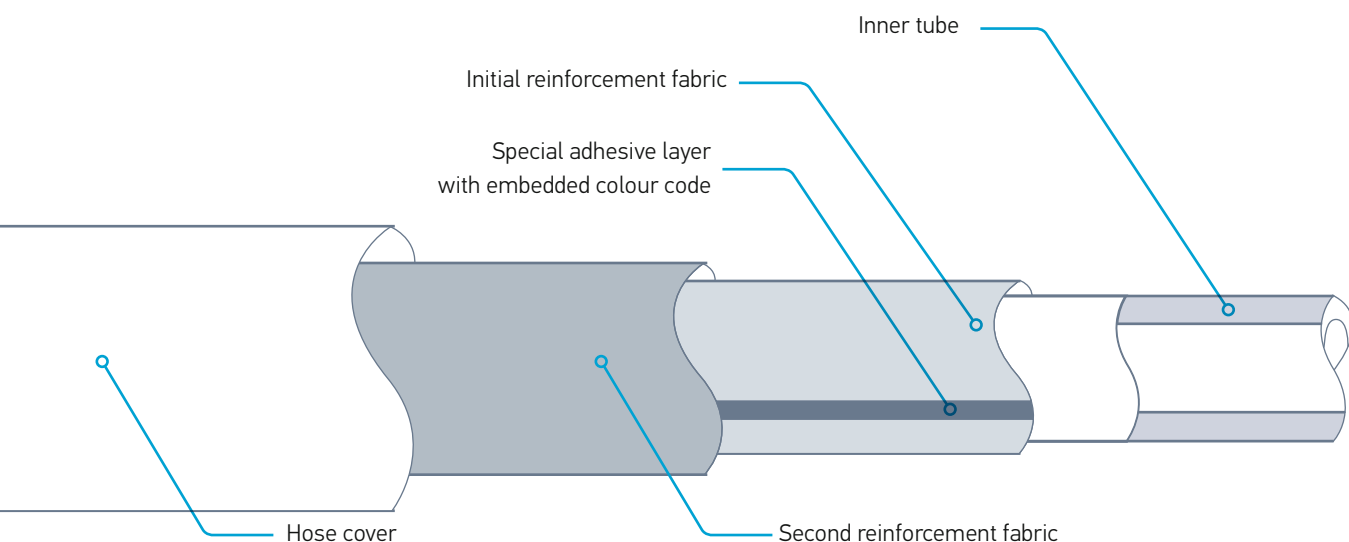
TOP-CLASS BRAKE HOSES

The products in the brake range from HELLA PAGID are notable for their safety, durability and performance; our brake hoses are no exception. We attach the highest importance to ensuring that our brake hoses not only fulfil the specifications of SAEJ1401, but exceed them.

Overall, our product range currently includes more than 900 brake hoses in OE quality. They are all supplied in protective plastic packaging. They are characterised by excellent pulse strength, long service life and very robust fitting connections made of stainless or zinc-coated steel or brass. All the hoses are easy to fit in a time-saving "plug and play" process.

The difference is in the detail

Modern production systems, first-class materials and perfectly coordinated design form the basis for the quality of our brake hoses. The inner tube and the hose cover are made of a special rubber compound optimised for all commercially available brake fluids. Two additional braided layers provide the whole hose with substantial reinforcement so that it can withstand even very high pressure loads. Often only a single braided layer, or two weaker layers are used for brake hoses of inferior quality, which is not ideal for transmitting brake pressure. This situation can have a negative effect on electronic control systems (such as ABS and ESP) as the pressure parameters set by the system are no longer correct. In contrast, brake hoses from HELLA PAGID offer maximum safety.





DID YOU KNOW ...

... that brake hoses from HELLA Pagid can withstand pressures up to 250 bar? That is more than 80 times as much as the water pressure from a domestic tap, which is 3 bar.

Production process with integrated quality control

The manufacture of HELLA PAGID brake hoses undergoes constant monitoring to ensure compliance with the relevant high quality standards set for them.

First class performance thanks to continuous testing

Exceptionally high quality standards require special test procedures. With regular checks and inspections, we can always be certain that brake hoses from HELLA PAGID are completely safe, reliable and durable. The tests used on a permanent basis include

- bend test
- brake fluid compatibility test
- leak test
- bursting pressure test
- centrifugal test (see illustration)
- static ozone resistance
- hot impulse test

Universal resistance

We use various tests to demonstrate maximum resistance to external and internal influences. This is extremely important because functional safety, stability and durability of brake hoses depend on their being robust and resilient. Brake hoses are affected by

- Movement in the steering and suspension systems
- Pressure pulses
- Weather conditions (ozone, heat, cold)
- Other external factors (oil, grease, water, salt, underfloor sealant etc.)

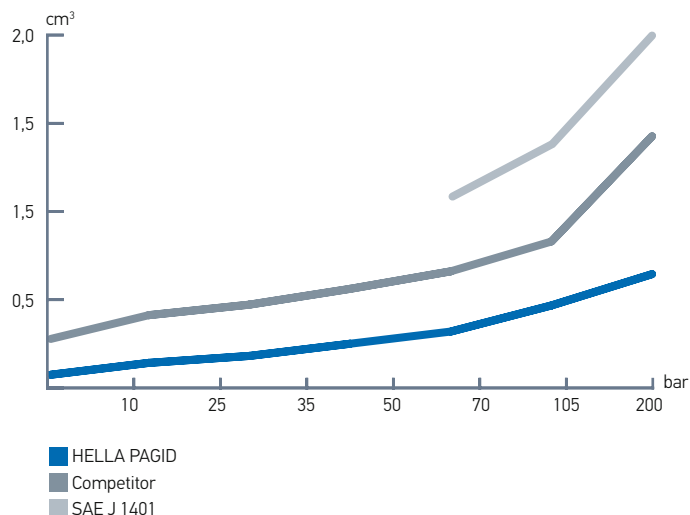


Centrifugal test to determine the service life of the hose under dynamic loads.

Our brake hoses surpass all SAEJ1401 specifications by far, ensuring that we live up to our claim of providing the very highest levels of quality and safety.

Inferior quality brake hoses often have a much higher volume capacity than brake hoses of higher quality. This situation can have a negative effect on electronic control systems (such as ABS and ESP) as the pressure parameters set by the system are no longer correct.

You should therefore put your trust in brake hoses from Hella Pagid for maximum safety.



ATTENTION: DANGER ZONE!

A brake hose can only be guaranteed to work faultlessly if it is in perfect condition. Visual inspection is often enough to reveal damage which can then be remedied rapidly. The following illustrations of faults typical of brake hoses clearly show where the defects are.



Bubbles forming where the fitting and the braided hose join

Cause:

Damage or weakening of the internal structure of the braided material



Cracking

Cause:

Aging, incorrect installation or mechanical overload



External damage, rust

Cause:

Damaged insulating layer caused by incorrect installation or mechanical overload. Damaged insulating layer caused by environmental influences.



KEEPING ON TOP OF HAZARDS

HIGH EFFICIENCY BRAKE CABLES

Handbrake cables from HELLA PAGID impress with their reliable power transmission and outstanding tensile strength and stability. The range currently consists of more than 1000 brake cables supplemented by over 200 clutch cables with and without automatic adjustment.

Fitting accuracy, first-class materials and the most stringent quality checks carried out only in European plants set brake cables from HELLA PAGID apart from the rest. Cable diameters and numbers of turns, along with the fittings and the fixing points in brake cables from HELLA PAGID, are 100% compatible with OE products. The same applies to the accessories, allowing the cables to be easily fitted in a time-saving "plug and play" process. They are supplied in space-saving protective bags with hooks.



OE

The rubber buffers are attached to the metal sleeves in a spray-on process.



HELLA PAGID

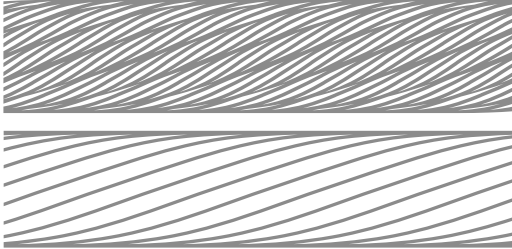
This is the same method as used by OEMs and similarly offers maximum convenience.



COMPETITION

Not a secure connection between the metal sleeve and the rubber buffer. This can result in noise development and a poor response characteristic.

Dependent on the application



Top: Steel cable comprising several cable strands

Bottom: Steel cable comprising braided wires

Excellent quality in two variants

There are two main types of steel cable:

1. Steel cable made up of several cable strands, each individual strand composed of braided wires. This variant is extremely flexible (see top illustration).
2. Steel cable consisting of braided wires. These are particularly strong (see bottom illustration).

Both variants are guaranteed to be robust, durable, highly efficient and have a low tendency to wear. These qualities are essential because they make the cables more resistant to the following:

- Mechanical stress caused by tensile force generated during braking or movement in the axles or suspension of the vehicle
- Weather influences: Heat, cold or ozone
- External influences: water, road salt and oil

Safety knows no compromise

Only tested, high-quality materials are used to manufacture HELLA PAGID brake and clutch cables. They are also always fully geared towards the vehicle and the system.

To keep wear on the steel to a minimum, HELLA PAGID cables are either sheathed in a layer of polyamide and then placed in a tube or a metal hose or coated in a special grease to allow them to move more smoothly. This reduces friction to a minimum and maximises durability and stability.



DO YOU KNOW?

... that a 4 mm thick handbrake cable not only stops a car rolling but can also lift 25 water tank!

Faults and their possible causes

It goes without saying that a vehicle is only operational and road-safe with a parking brake that functions perfectly. Handbrake cables from HELLA PAGID undergo permanent checking and testing and therefore offer maximum safety. Nevertheless under unfavourable conditions or with incorrect handling, malfunctions can occur which must be dealt with immediately.

The following defects can occur:

- No or little braking effect
- Compromised ease of motion
- Uneven braking effect
- The parking brake cannot be released

Possible causes of malfunctions

- Undesired elongation of the hand-brake cables
- Changed elasticity as a result of overloading and hyperextension of the cable
- Humidity and frost can cause the cables to freeze
- Damaged sleeves or dust-protection collars can lead to direct exposure to water or dirt that can corrode and jam the cables
- Mechanical damage to sleeves or the wire cable caused by incorrect installation or overload

Attention: Cable replacement!

As a general rule, both brake cables should also be replaced at the same time.

This is because it is only possible to adjust the brakes easily and safely when the friction coefficients are equal.

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