

A close-up photograph of the end of a CNG cylinder, showing a polished metal rim and a textured, orange-brown inner surface. The image is partially obscured by a blue and white graphic overlay on the right side of the page.

**MCS**

International GmbH

# **CNG CYLINDERS**

**High-Tech for Storage, Transportation  
and Power**



# MCS International GmbH

## Number One Worldwide

**MCS International GmbH** (formerly **Mannesmann Cylinder Systems**) has produced high pressure gas cylinders and vessels for over 100 years and has been active in the CNG market from the onset. We have years of experience and technical know-how in production and quality assurance. Due to continuous product development MCS International GmbH remains a leading company worldwide.

At the beginning of the 1990's a new innovative product was developed in conjunction with Mannesmann Forschungsinstitut: the composite cylinder for the storage of compressed natural gas to power vehicles.

Composite cylinders consist of two material combinations:

**Steel composite cylinders (Type II)** have a seamless liner of chrome molybdenum steel with carbon fibre wrap.

**Full composite cylinders (Type IV)** consist of a plastic liner also with a carbon fibre wrap.

A feature of these cylinders is their favourable weight: volume ratio.

An increase in environmental awareness - especially in highly populated

areas - has led to the demand for alternative fuel concepts in road transport.

Compressed natural gas is an economical and energy rich fuel. Natural gas is used as an alternative fuel to



power internal combustion vehicle engines throughout the world.

Pollutant emissions from natural gas powered vehicles are reduced to a minimum. Vehicles that are already in service can be converted relatively easily.

We are the only company in the world to produce full steel (Type I),

steel composite (Type II) and full composite cylinders, as well as tube trailers under one roof. The cylinders are used as gas tanks for natural gas powered cars, buses or trucks. Full steel and steel composite can also be mounted on trailers.

We pay great attention to the quality and safety aspects of all our products. The inspection of all products is conducted by an authorised inspection organisation to worldwide standards.

We are, of course, certified to DIN EN ISO 9001.



## CNG - For A Cleaner Future



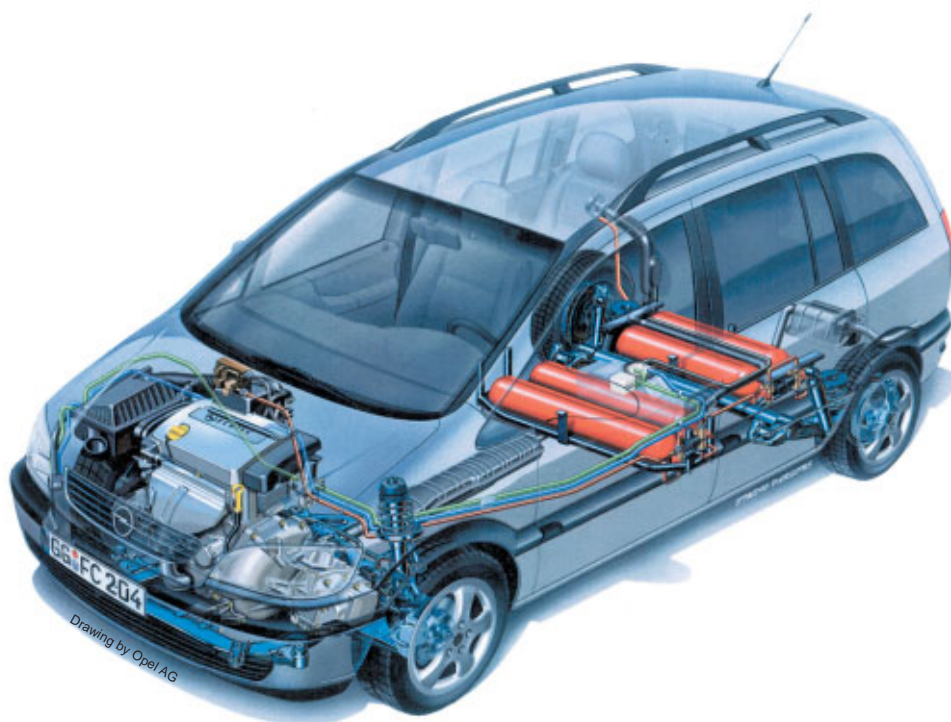
Cars are usually fitted with full steel cylinders (Type I) with 200 bar operating pressure. **MCS** supplies to various worldwide standards such as

ECE R110. The cylinder used varies according to vehicle type. The cylinders are often combined into a tank unit. Depending on the vehicle type a total volume of 100 l is, for instance, sufficient to cover a range of some 350 km. The tank units are normally integrated in the chassis, the inside of the vehicle is not affected.

If required, **MCS** can supply complete tank unit modules including frame and valve as well as high pressure accessories.

When weight is a significant factor, the weight optimised composite cylinders (Type II and Type IV) can be used to power cars.

We work with major vehicle manufacturers on the development of new CNG vehicles from the initial stages, and we are always prepared to assist in new projects.





# Buses & Minibuses

## Economic Success Factor

Steel composite (Type II), or full composite (Type IV) cylinders are recommended for the multi-cylinder fuel tank units for natural gas powered municipal buses or minibuses.

Steel composite cylinders are available in a standard volume range of 60l - 165l. A combination of different sized cylinders can be used to achieve the required total volume.

The following example shows a possible unit configuration:

### Tank unit with 7 cylinders

Total volume 1.055 l

5 cylinders each of 165 l plus

2 cylinders each of 115 l

The cylinders only weigh some 653 kg (without frame).

Such units are used for municipal buses and are mounted under a hood on the roof.

Due to the low weight, tank units of full composite cylinders are suited for larger storage volumes and thus longer ranges.

Full composite tank units consist, according to service requirements, of 5 to 9 cylinders each with 190 l capacity, thus the total volume of these units is between 950 l to 1.710 l, whereby the weight of a 190 l cylinder is only about 52 kg.

Both steel composite and full composite cylinders are equipped with melting fuses at each end, thus offering double safety should the

fuses need to be activated. These cylinders have a service pressure of 200 bar.

**MCS** can, of course, supply ready to install tank units including frame and piping along with all high pressure accessories.



# Trucks



## CNG - In Permanent Use



As a rule the cylinders used for natural gas powered trucks are larger than those for cars. Full steel cylinders (Type I) and steel composite cylinders (Type II) are installed in trucks.

The following are examples of tank units:

**8 x 75 l full steel cylinders** (Type I) installed on the side of the chassis frame - 4 cylinders on each side.

**4 x 165 l steel composite cylinders** (Type II) mounted on the chassis frame sides - 2 cylinders per side.

**4 x 140 l steel composite cylinders** (Type II). These cylinders are vertically mounted behind the cab.



The **MCS** product range encompasses full steel cylinders with various diameters, whereby the cylinder lengths can vary according to given requirements.

Steel composite cylinders are available in a standard volume range of 60 l - 165 l. The cylinders - both full steel and steel composite - have hemispherical ends with female valve threads, one end for the valve, the other for the safety plug. The service pressure is 200 bar.

The additional safety aspects of the **MCS** double neck cylinders offer significant advantages. Both ends are equipped with burst discs as well as melting fuses with silver seals. In emergencies it is ensured that both safety devices open concurrently and the cylinder can be emptied quickly in a controlled manner. There is also additional safety should the devices fail at one end. The double neck cylinders can be attached to the frame in the neck area, this offers further advantages.

**MCS**, of course, also supplies ready to install tank units including frame and piping.



# Gas Transportation

## Play It Safe



The design and manufacture of these vessels is according to DIN EN ISO 11120/ADR/GGVS. The operating pressure is 200 bar. The vessels can, of course, be supplied to DOT or other standards and with different service pressures.

### Composite Trailer

Especially large storage volumes can be obtained when the trailer is equipped with weight optimised steel composite cylinders.

A composite trailer for hydrogen transportation carries approximately 228 vertically mounted 165 l steel composite cylinders. The total storage capacity is around 37.600 l.

For natural gas (CNG) transportation the trailer is equipped with about 180 vertically mounted 165 l steel

composite cylinders. The total storage volume is some 29.700 l. Composite trailers can, of course, be used in the mother-daughter application as cascades.

The design and manufacture of these vessels is according to DIN EN 12257/ADR/GGVS.

If required, **MCS** can supply complete trailers including valve cabinet and piping designed for a maximum authorised weight of 40 t in accordance with German traffic regulations. Vehicles for other countries in line with relevant national regulations can, of course, also be supplied.

### Tube Trailer

The tube trailer is equipped with conventional steel pressure vessels.

For hydrogen transportation 10 vessels are mounted on a trailer. The storage capacity is approximately 23.800 l.

To transport natural gas (CNG) the trailer is equipped with 9 vessels. The total volume is around 21.400 l. These trailers are used for mother and daughter stations, whereby the CNG is conveyed from the main (mother) gas station to various smaller (daughter) units. Tube trailers can also be used as a natural gas supply source for small communities not served by a natural gas pipeline.



# CNG - Filling Stations



## Energy On Demand

For stationary storage of natural gas (CNG) at 300 bar service pressure **MCS** manufactures cylinders specifically designed for use in natural gas filling stations. These cylinders are approved in accordance with DGRL 97/23/EC (PED).

They are full steel cylinders and are often supplied with a convex base at one end and a neck with female valve thread at the other end.

Cylinders with double necks are, of course, also available. These cylinders have a capacity range of 50 l to 80 l, with 267 mm diameter.

In some countries gas storage units consisting of several large vessels (up to 3000 l) are used to store gas at filling stations. MCS is well known worldwide as a supplier of such storage units.

We are the principal supplier of gas storage units for 1.000 filling stations currently under construction in Germany, as well as for hundreds of filling stations in Asia.

If required, **MCS** can supply storage units complete with piping, valves and gauges.



*We are working for your future*

We are working for  
your future.

**MCS**  
**International GmbH**  
Karlstrasse 23-25  
46535 Dinslaken  
Germany

phone +49 (0) 20 64 . 433-0  
fax +49 (0) 20 64 . 433-356

email [info@mcs-international-gmbh.de](mailto:info@mcs-international-gmbh.de)  
web [www.mcs-international-gmbh.de](http://www.mcs-international-gmbh.de)

