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The Future in Motion


# ContiTech Industrial Hoses

## Highest requirements for drinking water hoses

Fluid Technology

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# ContiTech Industrial Hoses
## The best for drinking water

Water intended for human consumption is subject to the stringent provisions of the drinking water regulations (Trinkwasserverordnung), which also encompass the transport of drinking water. This results in very specific requirements – both hygienic and mechanical – for hoses and hose lines.
This document describes the exact regulations and test specifications for hoses intended for the transport of drinking water.

A person can survive three months without food, but just three days without water, making it the most important of our basic forms of sustenance. Provided, of course, that it is clean and not contaminated. In Germany, consumers can be sure that their drinking water is always pure and does not pose a health hazard. It can even hold its own against bottled mineral water. And these purity requirements apply not only to tap water at home, but wherever water is used for human consumption: in the food and beverage industry, in camping and recreation, for filling up drinking water tanks on trains, sea vessels and aircraft, in emergency supply lines in communal areas, in the deployment of the German government's relief organisation (Technisches Hilfswerk, THW) in the event of disaster, at trade fairs, markets, and festivals – right through to rinsing glasses at outdoor events. Purity is ensured by the "Ordinance on the quality of water for human consumption" (Verordnung über die Qualität von Wasser für den menschlichen Gebrauch, Trinkwasserverordnung, TrinkwV 2001).

Hoses and hose lines are a key component in today's drinking water installations, coming into play whenever a permanent installation for an indefinite period would not pay off or is technically unfeasible. Water hoses are also indispensable when it comes to cleaning machine and system units in the food and beverage industry. The drinking water regulations therefore precisely stipulate which materials may be used to set up and maintain lines and operate facilities for treating or distributing water.

**Drinking water regulations (Trinkwasserverordnung)**
With the drinking water regulations (TrinkwV 2001), the legislator has translated the provisions of the European Drinking Water Directive (98/83/EG) into national law. The purpose of the drinking water regulations is to protect human health against detrimental effects that may result from the potential contamination of water. According to the regulations, drinking water must be esculent and pure. The drinking water regulations also stipulate which materials may be used in contact with drinking water. According to Section 17, materials must not impede the protection of human health, either directly or indirectly, or negatively impact the odour or taste of the water. In addition, substances must not be allowed to come into contact with water in higher concentrations as far as can be avoided according to the generally recognised technological rules. Section 17 also states that facilities for the extraction, treatment, or distribution of drinking water are to be planned, constructed, and operated at least according to the generally recognised technological rules. In this way, the drinking water regulations establish a direct link with the generally recognised technological rules.

**Generally recognised technological rules**
The generally recognised technological rules for hoses include:

- Elastomer Guideline
- KTW Guideline
- DVGW W270
- DVGW VP549
- DVGW W291
- DVGW W543
- DIN 2000
- DIN 2001-1+2

If a hose fulfils the generally recognised technological rules, it complies with the drinking water regulations and can therefore be used as a drinking water hose. Compliance with the generally recognised technological rules must be checked by an accredited certifier and verified with a certificate. The generally recognised technological rules therefore act as the basic requirements for drinking water hoses and will therefore be briefly examined here:

**Elastomer Guideline**
Elastomers are tested in accordance with the Elastomer Guideline (formerly KTW 1.3.13), published by the German Federal Environment Agency. The basic requirements, additional requirements, and requirements for individual substances are examined here. The basic requirements include the external characteristics of the test water (changes in odour and taste, clarity, colour, foaming) and a chlorine demand test (TOC).

The additional requirements examine specific substances (e.g. zinc, secondary amines, nitrosamines, peroxide). The requirements for individual substances (DWPLL, QM, QMA) are stated in the accompanying positive list. To check a hose against the Elastomer Guideline, the testing institute (accredited certifier) must be provided with a full list of all components in all elastomer layers, including an illustration of the hose structure. All raw materials used in its production must be in line with the positive list. The requirements differ depending on the product group:

- Pipes (formerly category “A”)
- Pipes (formerly category “A”)
- Fittings for pipes (formerly category “C”)
- Seals for pipes (formerly categories “D1” and “D2”)
- Repair systems for tanks

Elastomer hoses fall into the “Pipes” product group (formerly category “A”) and are therefore subject to the most stringent requirements. In contrast, hoses for the connection of washing machines and dishwashers are subject to the hygienic requirements of the “Fittings for pipes” product group (formerly category “C”).

**KTW Guideline**
The KTW Guideline is a test specification for plastics published by the Federal Environment Agency. If an elastomer hose contains a layer of plastic, this must comply with the KTW Guideline. The plastic used must be in line with the positive list of EU 10/2011. Here too, the requirements differ depending on the product group:

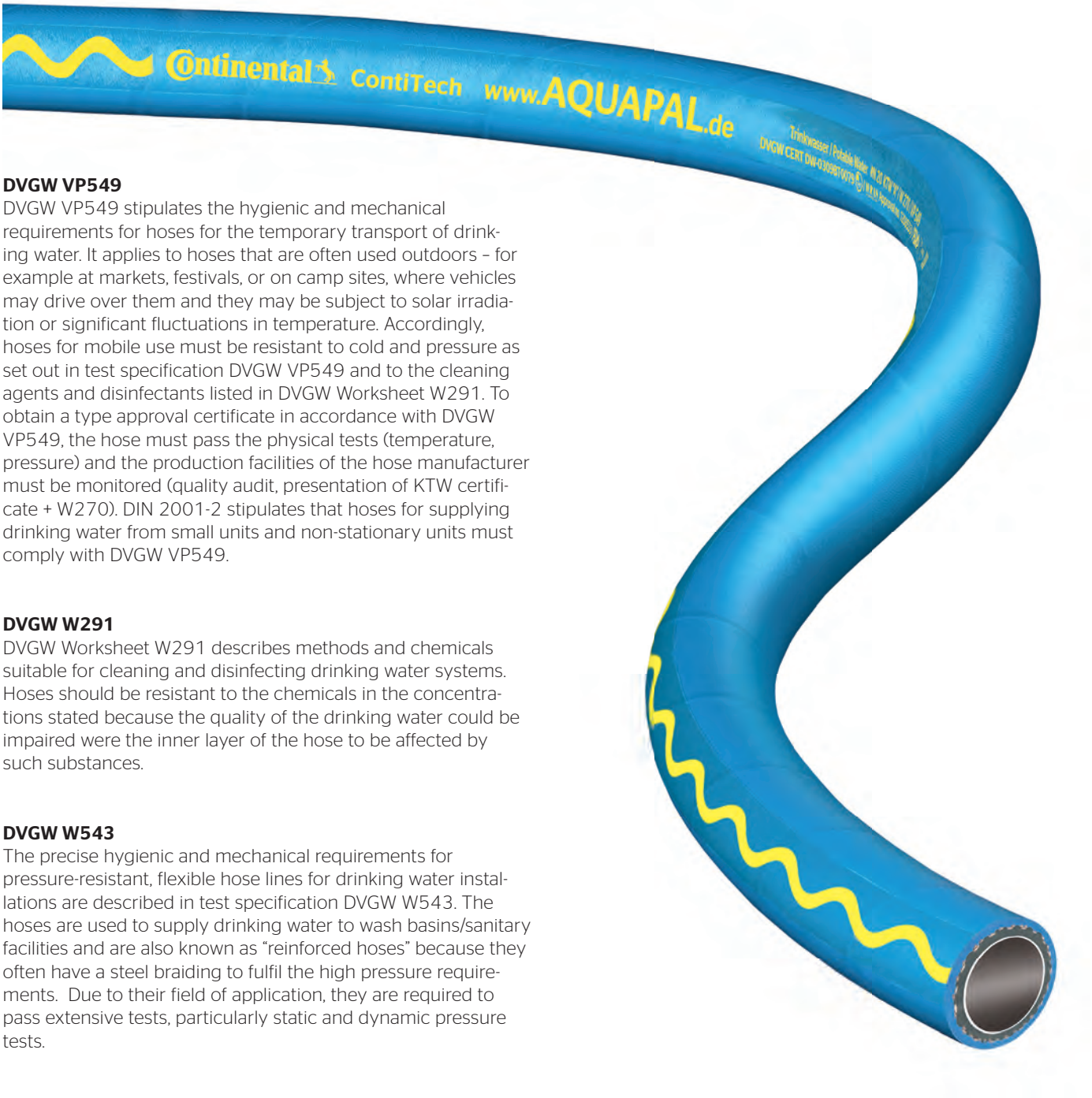
- Pipes
- Fittings for pipes
- Seals for pipes
- Tanks and repair systems

The basic requirements (external characteristics of the test water and TOC value) and formulation-dependent requirements for individual substances (DWPLL, QM, QMA) are examined. Hoses fall into the “Pipes” product group and are subject to the most stringent requirements.


**The structure of a ContiTech hose in cross-section using the example of the AQUAPAL®: special, transparent, plastomer, and plasticiser-free inner layer; reinforcement made from synthetic thread and NBR outer layer, abrasion-resistant and resistant to UV radiation, grease, and oil. Three-year guarantee.**

**DVGW W270**
During tests in accordance with DVGW W270, hoses are examined for microbial safety. The test examines whether the number of microorganisms on the inner surface of the hose increases when the material has longer periods of contact with drinking water. For this purpose, water is passed through the hose for several months and any potential microbial growth (biofilm) is subsequently scraped off. The amount of biofilm must not exceed a certain limit. Plasticisers in particular can stimulate the formation of biofilm and should therefore be used only sparingly or not at all. Tests in accordance with DVGW W270 must be performed on the finished hose and not (as previously) on sample sheets.

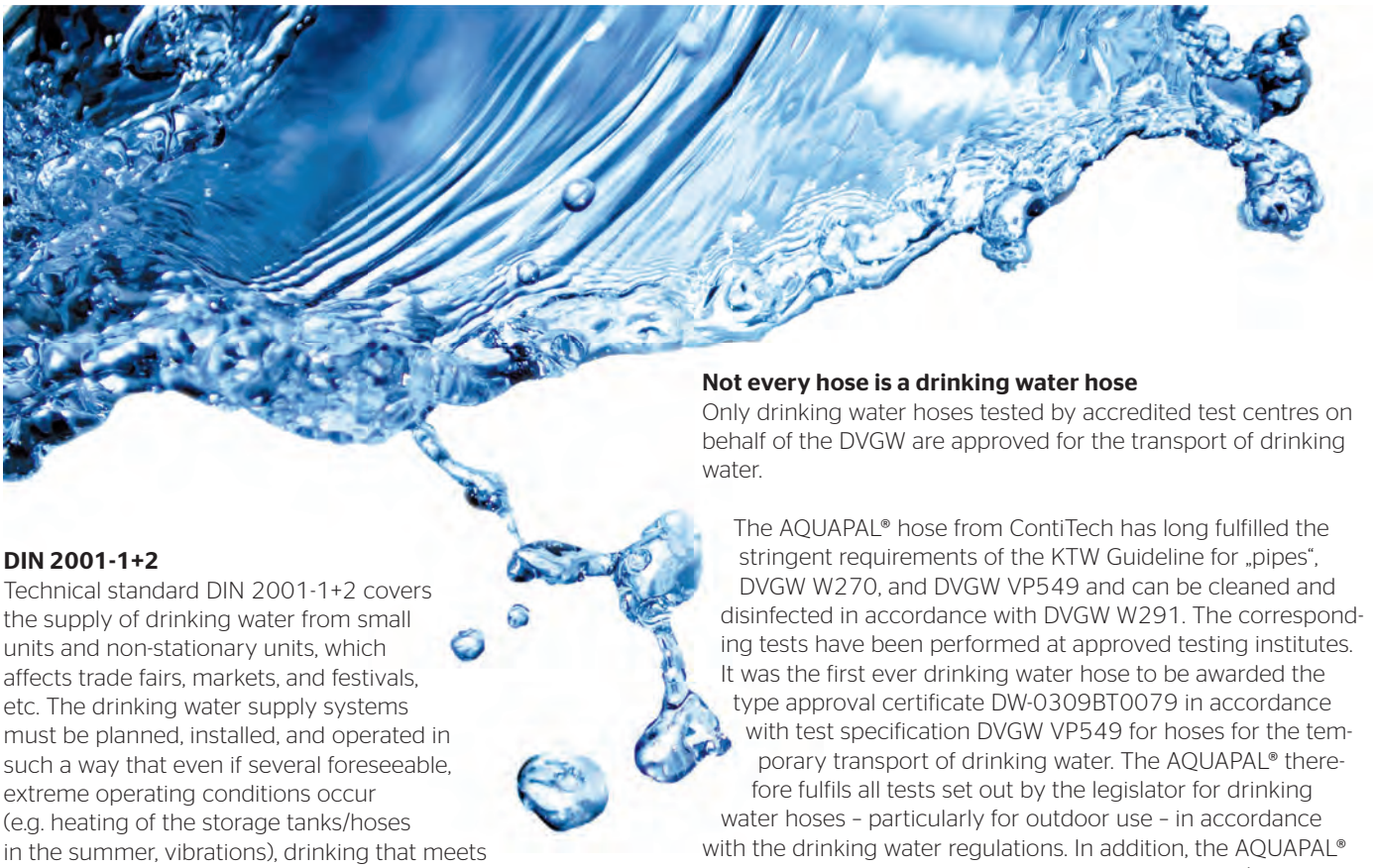
**DIN 2000**
DIN 2000, which is a recognised technological rule for the transport of water and contains principles for the central supply of drinking water, states that drinking water should be palatable, colourless, clear, cool, odourless, and have an impeccable taste. Page 7, Point 6.6.1, which relates to microbiological and hygienic requirements for materials, states that when it comes to system parts that come into contact with water, construction materials, paints, seals, etc. that will not have a detrimental effect on the quality of the water are to be used. The KTW recommendations and DVGW W270 are to be taken into account here.




**DVGW VP549**
DVGW VP549 stipulates the hygienic and mechanical requirements for hoses for the temporary transport of drinking water. It applies to hoses that are often used outdoors – for example at markets, festivals, or on camp sites, where vehicles may drive over them and they may be subject to solar irradiation or significant fluctuations in temperature. Accordingly, hoses for mobile use must be resistant to cold and pressure as set out in test specification DVGW VP549 and to the cleaning agents and disinfectants listed in DVGW Worksheet W291. To obtain a type approval certificate in accordance with DVGW VP549, the hose must pass the physical tests (temperature, pressure) and the production facilities of the hose manufacturer must be monitored (quality audit, presentation of KTW certificate + W270). DIN 2001-2 stipulates that hoses for supplying drinking water from small units and non-stationary units must comply with DVGW VP549.

**DVGW W291**
DVGW Worksheet W291 describes methods and chemicals suitable for cleaning and disinfecting drinking water systems. Hoses should be resistant to the chemicals in the concentrations stated because the quality of the drinking water could be impaired were the inner layer of the hose to be affected by such substances.

**DVGW W543**
The precise hygienic and mechanical requirements for pressure-resistant, flexible hose lines for drinking water installations are described in test specification DVGW W543. The hoses are used to supply drinking water to wash basins/sanitary facilities and are also known as “reinforced hoses” because they often have a steel braiding to fulfil the high pressure requirements.  Due to their field of application, they are required to pass extensive tests, particularly static and dynamic pressure tests.



**DIN 2001-1+2**

Technical standard DIN 2001-1+2 covers the supply of drinking water from small units and non-stationary units, which affects trade fairs, markets, and festivals, etc. The drinking water supply systems must be planned, installed, and operated in such a way that even if several foreseeable, extreme operating conditions occur (e.g. heating of the storage tanks/hoses in the summer, vibrations), drinking that meets the requirements of the drinking water regulations will be supplied. In accordance with DIN 2001-1+2, only materials that do not have a detrimental effect on the quality of the water and meet the generally recognised technological rules must be used for hoses. This encompasses testing in accordance with the KTW Guideline and Elastomer Guideline, DVGW W270, and DVGW VP549. The mark of a recognised test centre (e.g. DIN DVGW or DVGW mark) indicates that these prerequisites have been fulfilled. Materials must also be resistant to cleaning agents and disinfectants in accordance with DVGW W291. Following extended periods without a flow of drinking water (> 1 week), hose lines must be disinfected as set out in DVGW W291 and then rinsed with drinking water. The hoses and hose lines must be used for drinking water only. To ensure that the hoses are not mistakenly used for other purposes, permanent labelling must be added by the manufacturer in accordance with DVGW VP549. Before connection, hose lines and piping must be thoroughly rinsed with drinking water. During the set-up, dismantling, transport, and storage of rigid lines and hose lines for units temporarily connected to supply lines, the ends of the lines must be closed off with suitable parts to prevent contamination. Once dismantled, hoses must be emptied completely and closed immediately at both ends using suitable parts. Following exterior cleaning, hoses must be stored in a clean and dry location and protected against contamination.

**Not every hose is a drinking water hose**

Only drinking water hoses tested by accredited test centres on behalf of the DVGW are approved for the transport of drinking water.

The AQUAPAL® hose from ContiTech has long fulfilled the stringent requirements of the KTW Guideline for „pipes“, DVGW W270, and DVGW VP549 and can be cleaned and disinfected in accordance with DVGW W291. The corresponding tests have been performed at approved testing institutes. It was the first ever drinking water hose to be awarded the type approval certificate DW-0309BT0079 in accordance with test specification DVGW VP549 for hoses for the temporary transport of drinking water. The AQUAPAL® therefore fulfils all tests set out by the legislator for drinking water hoses – particularly for outdoor use – in accordance with the drinking water regulations. In addition, the AQUAPAL® fulfils the British WRAS legislation on drinking water (approval number 1208533; for cold and warm water approval), which also qualifies it for international use. The high-quality, special plastomer inner layer is free from plasticisers, anti-adhesive, has a completely neutral odour and taste, and fulfils the requirements of EU 10/2011 and the FDA. Its excellent flexibility in a broad temperature range and its weatherproof and grease-resistant outer rubber make it an ideal drinking water hose for almost all fields of application..

**Leading through experience and materials expertise**

ContiTech AG is one of Germany's leading manufacturers of high-quality hoses. With over 70 years of experience in developing and manufacturing elastomer-based hoses for the food and beverage industry and drinking water hoses, the company has great expertise in materials, technology, and design.
This expertise means that ContiTech is permanently represented on the national and international standards committees that develop test specifications such as DVGW VP549 and define them as standards.

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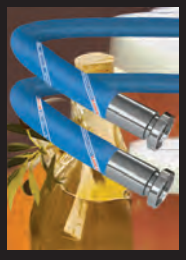
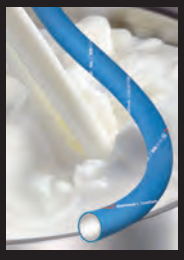
Learn more about the contents of this brochure.

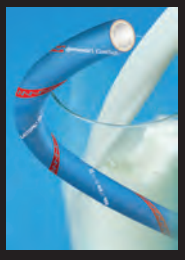
## ContiTech. Engineering Next Level

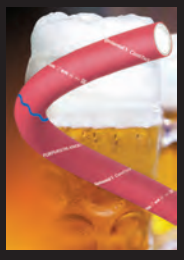
As a division of the Continental Group, ContiTech is a recognised innovation and technology leader in natural rubber and plastics. As an industry partner with a firm future ahead of us, we engineer solutions both with and for our customers around the world. Our bespoke solutions are specially tailored to meet the needs of the market. With extensive expertise in materials and processes, we are able to develop cutting-edge technologies while ensuring we make responsible use of resources. We are quick to respond to important technological trends, such as function integration, lightweight engineering and the reduction of complexity, and offer a range of relevant products and services. That way, when you need us, you'll find we're already there.

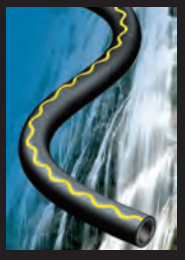
ContiTech industrial hose program


Hoses for the food and beverage industry


Hoses for milk collecting vehicles


Multipurpose hoses for the food, pharmaceutical and cosmetic industry


Hoses for the brewing, beverage and liquor industry


Water hoses for industrial and commercial use


High-performance compressed air hoses

**Together with the technical trade,**
**we are developing further hose solutions for your specific application.**

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