

Clothing for protection against high pressure water jets – new DIN 19430 standard



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It is often not appreciated that the water jet even of a simple high-pressure washer with an operating pressure of approx. 100 bar can seriously injure a person. Injuries may be caused by the water jet itself and also by defective hose lines. The water, which is not sterile, may be injected deep into human tissue together with other minute particles, such as blasted off paint or varnish, and spread unchecked through the tissue and away from the point of injection.

For the reporting years from 2010 to 2019, the DGUV's accident statistics show an annual average of approximately 280 reportable occupational accidents involving high-pressure washers¹. These included accidents with very serious injuries and one fatal accident.

Since a standardized basis for testing and certification did not exist, test specification GS-IFA-P15 governing protective clothing against high-pressure water jets was developed in 2017 at the initiative of the Protective clothing Subcommittee of the German Social Accident Insurance (DGUV) in conjunction with the Institute for Occupational Safety and Health of the DGUV (IFA). The test specification served as the basis for development of the new DIN 19430 standard, Protective clothing – Clothing for protection against high-pressure water jets – Requirements and test methods.

Classification of protective clothing

The operator of a high-pressure water spray gun may be exposed to very high forces. DGUV Rule 100-500 states a maximum permissible value of 150 N in the axial direction for the recoil forces of manually guided tools. Where the operator uses a recoil brace, the limit for the recoil forces is 250 N. The different maximum recoil forces are taken into account in the new standard in the classification of protective clothing into performance levels. The classification is based on the three relevant nozzle types (see table):

- Flat nozzle: fan-shaped jet

- Point nozzle: punctual, concentrated water jet
- Rotating nozzle: rotating head with at least two point nozzles

Material properties, care and criteria for replacement

Clothing for protection against high-pressure water jets should on the one hand be waterproof and have high resistance to tears, and on the other be breathable and light. The choice of clothing depends on the conditions of use and the required duration of wear. The performance of the protective clothing is tested and classified in accordance with DIN 19430, for example for its resistance to penetration by steam and its tear strength.

Care and wear are the factors determining the service life of PPE. High-quality clothing (often impregnated) should always be professionally cleaned. The manufacturer's care instructions must be followed precisely. Clothing with holes, tears or ripped seams must be replaced immediately.

Labelling and manufacturer's information

A label showing the required information for the user of the PPE must be attached permanently to each protective overall. Examples of such information are:

- Number of possible wash cycles and instructions for care
- Statement of the standards against which the product has been tested and certified, with the corresponding pictograms and the classes/performance levels attained
- Date of manufacture or expiry date
- CE mark and number of the notified body responsible for monitoring product conformity

In the manufacturer's information, the manufacturer must provide information on proper storage, use, care, service life, criteria for replacement, and the location where the declaration of conformity may be obtained, and must explain the meaning of the performance levels and classes.

DIN 19430 constitutes an important step towards harmonizing different manufacturers' descriptions of the level of protection provided by clothing for protection against high-pressure water jets. Performance levels indicate a comprehensible level of protection and facilitate selection of suitable PPE by the user. The information on the maximum continuous duration of wear assists in evaluation of workers' exposure during risk assessments.

DIN 19430 provides a sound basis for a future European or international standard for the testing and certification of clothing for protection against high-pressure water jets.

Nozzle Performance level	Flat nozzle			Rotating nozzle					Point nozzle				
150 N	F ₁₅₀ -200	F ₁₅₀ -500	F ₁₅₀ -1000	R ₁₅₀ -200	R ₁₅₀ -500	R ₁₅₀ -1000	R ₁₅₀ -2000	R ₁₅₀ -3000	P ₁₅₀ -200	P ₁₅₀ -500	P ₁₅₀ -1000	P ₁₅₀ -2000	P ₁₅₀ -2500
250 N	F ₂₅₀ -200	F ₂₅₀ -500	F ₂₅₀ -1000	R ₂₅₀ -200	R ₂₅₀ -500	R ₂₅₀ -1000	R ₂₅₀ -2000	R ₂₅₀ -3000	P ₂₅₀ -200	P ₂₅₀ -500	P ₂₅₀ -1000	P ₂₅₀ -2000	P ₂₅₀ -2500
Pressure (bar)	200	500	1000	200	500	1000	2000	3000	200	500	1000	2000	2500

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¹ Unit Statistics, DGUV: reporting years 2010-2019 for reportable and fatal occupational accidents, selected high pressure and spraying equipment, 4 January 2021