


	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024


Certification Scheme ZP 8490
of DVGW CERT GmbH, Bonn

Polyethylene multilayer pipes according
to ISO 21004 for water supply

	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

Content:

1	Certification procedure.....	3
2	Accreditation.....	3
3	Certification mark.....	3
4	Type of certificate and test procedure.....	3
5	Scope.....	3
6	Testing laboratory.....	4
7	Requirements.....	4
7.1	Mechanical requirements.....	4
7.2	Hygienic requirements.....	4
8	Testing.....	5
8.1	Type Testing.....	5
8.2	Surveillance.....	7
8.2.1	Production control of the manufacturer.....	8
8.2.2	Audit testing of a 3rd party.....	8
9	Marking.....	9
10	References.....	10
11	Period of validity.....	12

	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

1 Certification procedure

Products Water national

2 Accreditation

Accreditation No. D-ZE-16028-01 exists for the procedure at the Deutsche Akkreditierungsstelle GmbH (DAkkS), Berlin.

3 Certification mark

DVGW CERT conformity mark.



Registration number scheme: CW-8490DO0001

CW = DVGW CERT conformity mark
8490 = product code, DO =2023, 0001 = serial no.

4 Type of certificate and test procedure

Confirmation of conformity (5 years duration)


5 Scope

This Certification scheme specifies type testing, factory production control and audit testing of polyethylene multilayer pipes according to ISO 21004 for water supply to achieve the DVGW CERT conformity mark.

Productgroup	Product-code	Product type	Dimension group ¹⁾	Pipe construction
Plastic pressure pipes for buried pipelines	8491	Multilayer pipe with functional metallic layer	$d_n \leq 63 \text{ mm}$	multilayer M pipe (metallic layer)
	8492		$75 \text{ mm} \leq d_n \leq 250 \text{ mm}$	
	8493		$d_n > 250 \text{ mm}$	
	8496	Multilayer pipe with functional polymeric layer	$d_n \leq 63 \text{ mm}$	multilayer P pipe (polymeric layer)
	8497		$75 \text{ mm} \leq d_n \leq 250 \text{ mm}$	
	8498		$d_n > 250 \text{ mm}$	

1) Nominal outside diameter d_n

Table 1: Product codes within the scope of the certification scheme

	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

Construction group A	Group comprising multilayer pipes in which <u>all the layers</u> considered to be stress-bearing are <u>made of polymeric materials</u> selected from the list of reference product standards. Adhesives layers are not considered as stress-bearing layers. (Construction group A can have additional non-stress bearing metallic barrier layers.)
Construction group B	Group comprising multilayer pipes in which <u>all the layers</u> considered to be stress-bearing are <u>made of polymeric materials</u> selected from the list of reference product standards and <u>including a stress-bearing metallic layer</u> . Adhesives layers are not considered as stress-bearing layers.

Table 2: Definition of construction groups according to ISO 21004

Material	Reference product standard for polyethylene
PE	ISO 4427-1, ISO 4427-2, ISO 4427-3, ISO 4427-5 EN 12201-1, EN 12201-2, EN 12201-3, EN 12201-5, CEN TS 12201-7
PE-X ^{a)}	ISO 15875-1, ISO 15875-2, ISO 15875-3, ISO 15875-5, ISO TS 15875-7
PE-RT ^{b)}	ISO 22391-1, ISO 22391-2, ISO 22391-3, ISO 22391-5, ISO TS 22391-7

a) For the purpose of this International Standard, the hot and cold water product standards are applicable.

b) For the purpose of this International Standard, PE-RT is considered as PE conforming with ISO 4427.

Table 3: List of reference product standards for polyethylene according to ISO 21004

The listed reference product standards specify the requirements of the pressure bearing pipe design and shall be met.

6 Testing laboratory

Testing laboratory accredited for the relevant test standard according to EN ISO/IEC 17025 and contractually bound to DVGW CERT GmbH.

7 Requirements

7.1 Mechanical requirements

The mechanical requirements of ISO 21004 must be fulfilled, if applicable to the pipe.

7.2 Hygienic requirements

Materials in contact with drinking water must be hygienically harmless and must not impair the quality of the drinking water specified in the German Drinking Water Regulation (TrinkwV dated 20.06.2023).

Confirmations of conformity must be available for products that come into contact with drinking water according to the recommendation of the German Environment Agency (Umweltbundesamt UBA): "Conformity attestation of product hygiene suitability for drinking water".

If the products are made of materials for which no UBA Evaluation criteria documents have yet been published, test reports in accordance with UBA guidelines and DVGW worksheet W270 or DIN EN 16421 have to be submitted.

	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

8 Testing

8.1 Type Testing

For testing and certification, the manufacturer must submit complete product documentation (drawings with dimensions and tolerances; parts lists with material specifications, material certificates, installation instructions, operating instructions, marking, etc.) in German or in English. The test scope for the Initial Type Test (ITT) of polyethylene multilayer pipes according to ISO 21004 is listed in Table 4.


ISO 21004 clause	Requirement / Subject	Remark	Test-sample
4.1	Construction group	Declaration of the manufacturer	
4.2	Reference product standard acc. to Annex A	Declaration of the manufacturer	
4.3	PN Range	Declaration of the manufacturer	
4.4	Design coefficient	Declaration of the manufacturer	
4.5	Stiffness range (optionally)	Declaration of the manufacturer	
5.1	General material characteristics	Declaration of the manufacturer	
	- layer materials and layer function		
	- material characteristics of stress-bearing layers comply with reference product standard		
	- colour follows national identification requirements	Colour-check on provided pipe samples	one sample per dimension group
5.2	Effect on water quality	Conformity Attestation (P1) of the pipe according to chapter 7.2 of this certification scheme	smallest dimension
5.3	Resistance to weathering of outer layer material (radiant exposure > 3,5 GJ/m ²)	Tests acc. to ISO 21004 confirmed if materials are approved / mentioned on KRV materials list.	
6.2	Long-term hydrostatic strength: Procedure I for multi-layer P pipes only (MRS)	Tests acc. to ISO 1167 / ISO 9080 / ISO 17456 addition rule for each individual pressure-bearing polymer layer	

Table 4: Scope of type testing (part 1)

	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

ISO 21004 clause	Requirement / Subject	Remark	Test-sample
6.3	Long-term hydrostatic strength: Procedure II for multilayer M and P pipes (MRP)	Tests acc. to ISO 1167 / ISO 9080 / burst tests Assessment (LTHS) of core pipe (inside layer) acc. to EN 12201-2 is sufficient. Other layers are considered as non-stress-bearing layers.	
7	Geometrical characteristics - outside diameter (total + each layer) - out-of-roundness - wall thickness (total + each layer)	Dimensional table incl. tolerances for each layer provided by the manufacturer. Tests acc. to ISO 161-1 / ISO 161-2 / ISO 3126	one sample per dimension group
(ISO 4427-2) 6.1	Appearance	smooth and clean surfaces / no scoring, cavities and other surface defects	one sample per dimension group
8.1	Mechanical characteristics - control points for pressure characteristics	Tests acc. to ISO 1167: 100 h / 20 °C / 12 MPa and 1000 h / 80 °C / 5.0 MPa (If the core pipe is the only stress bearing layer and complies with EN 12201-2 or ISO 4427 the test pressure is calculated from dimensions of the core pipe.)	smallest wall-thickness and d _n 110 (3 pipes each)
8.2	Mechanical characteristics - adhesion of the layers	Tests acc. to ISO 17454 for multilayer M pipes or ISO 13968 / ISO 9969 for multilayer P pipes	one dimension: d _n 110
10.2.2	Butt fusion jointing - hydrostatic strength test	Tests acc. to ISO 11414 / ISO 1167: 1000 h / 80 °C / 5.0 MPa (butt fusion joint prepared under normal conditions)	one dimension
	Butt fusion jointing - tensile strength tests for butt-fused joints	Tests acc. to ISO 13953: Test temperature: 23°C Test to failure: ductile: pass / brittle: fail	tensile specimens from one dimension
10.2.3	Electrofusion jointing - leaktightness under long-term internal pressure	Tests acc. to ISO 11413 / ISO 1167: 1000 h / 80 °C / 5.0 MPa (electrofusion joint prepared under normal conditions)	one dimension
	Electrofusion jointing - cohesive resistance for electrofusion socket fittings	Tests acc. to ISO 13954 or ISO 13955: Test temperature: 23°C Length of initiation rupture ≤ L ₂ /3 in brittle failure	acc. to table 5 of CEN/TS 12201-7
	Electrofusion jointing - Cohesive resistance for electrofusion saddle fittings	Tests acc. to ISO 13956: Test temperature: 23°C Surface rupture ≤ 25 %, brittle failure	samples acc. to table 5 of CEN/TS 12201-7

Table 4: Scope of type testing (part 2)


	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

ISO 21004 clause	Requirement / Subject	Remark	Test-sample
10.2.5	Mechanical jointing - leaktightness under long-term hydrostatic internal pressure	Tests acc. to ISO 1167: 1 000 h / 20 °C / 1,5 PN followed by 1 000 h / 40 °C / 1,1 PN No failure during test period	one sample per dimension group
	Mechanical jointing - leaktightness under internal pressure when subjected bending	Tests acc. to ISO 3503: 23 °C / 1 h / 1,5 PN No leaks	one sample per dimension group
	Mechanical jointing - external pressure	Tests acc. to ISO 3459: 23 °C: 1 h / 0.01 MPa followed by 1 h / 0.08 MPa No leaks	one sample per dimension group
	Mechanical jointing - resistance to pull out under constant longitudinal force	Tests acc. to ISO 3501: 23 °C / 1 h / 1,5 PN-A° No pull-out or separation of the pipe from the fitting	one sample per dimension group
11	Marking	Check on provided pipe samples, see also chapter 9 of this certification scheme	one sample per dimension group

Table 4: Scope of type testing (part 3)

8.2 Surveillance

The definitions described in the rules of procedure for the “Certification of Products in the Non-harmonised Area (40014-11-N-GB)” of DVGW CERT GmbH apply. The Procedure “control testing” of clause 6 “Production surveillance procedures” should merely be used for this certification scheme.

	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

8.2.1 Production control of the manufacturer

The manufacturer must perform production control test in such a way that a reliable assessment of production is given. The production control tests to be conducted are listed in Table 5.

Standard	Requirement / Subject	Remark	Frequency / Test-samples
ISO 21004 5.2	Effect on water quality	TON or TOC as part of Confirmation Attestation Hygiene	once per month / material of the inside layer
ISO 21004 7	Geometrical characteristics - outside diameter (total + each layer) - out-of-roundness - wall thickness (total + each layer)	Tests acc. to ISO 161-1 / ISO 161-2 / ISO 3126	start of production + at least every 8 h per machine ²⁾
ISO 4427-2 6.1	Appearance	smooth and clean surfaces / no scoring, cavities and other surface defects	start of production + at least every 8 h per machine ²⁾
EN 12201-2 6.2	Colour	Pipes intended for the conveyance of water for human consumption: Blue monolayer pipes or black monolayer pipes with blue stripes. An outer coextruded or the peelable layer shall be either blue or black with blue stripes. Pipes intended for drainage and sewerage under pressure: see above and replace blue by brown.	start of production + at least every 8 h per machine ²⁾
ISO 21004 8.1	Mechanical characteristics - control points for pressure characteristics	Tests acc. to ISO 21004: 165 h / 80 °C / 5.4 MPa (If core pipe is the only stress bearing layer and complies with EN 12201-2 or ISO 4427 the test pressure is calculated from dimensions of the core pipe)	one pipe per batch, additionally every 7 days ²⁾ (only valid for dimension group 1 and 2)
ISO 21004 11	Marking	see also chapter 9 of this certification scheme	start of production + at least every 8 h per machine ²⁾

2) following CEN/TS 12201-7

Table 5: Scope of manufactures production control tests

8.2.2 Audit testing of a 3rd party

Part of 3rd party control is the review the manufacturer's production control based on the manufacturer's organisation and records.

Samples for audit testing are usually taken at the manufacturer's production site. If the sample is taken at the retailer's or customer's premises, it must come from the manufacturer's original packaging.

	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024


The audit tests to be conducted are listed in Table 6.

Standard	Requirement / Subject	Remark	Frequency / Test-samples
ISO 21004 5.2	Effect on water quality	basic requirements as part of Confirmation Attestation Hygiene	annually
ISO 21004 7	Geometrical characteristics - outside diameter (total + each layer) - out-of-roundness - wall thickness (total + each layer)	Tests acc. to ISO 161-1 / ISO 161-2 / ISO 3126 /	one sample / dimension group / year
ISO 4427-2 6.1	Appearance	smooth and clean surfaces / no scoring, cavities and other surface defects	one sample per dimension group / year
EN 12201-2 6.2	Colour	Pipes intended for the conveyance of water for human consumption: Blue monolayer pipes or black monolayer pipes with blue stripes. An outer coextruded or the peelable layer shall be either blue or black with blue stripes. Pipes intended for drainage and sewerage under pressure: see above and replace blue by brown.	one sample per dimension group / year
ISO 21004 8.1	Mechanical characteristics - control points for pressure characteristics	Tests acc. to ISO 21004: 1000 h / 80 °C / 5.0 MPa (If core pipe is the only stress bearing layer and complies with EN 12201-2 or ISO 4427 the test pressure is calculated from dimensions of the core pipe)	one sample per dimension group / year
ISO 21004 8.2	Mechanical characteristics - adhesion of the layers	Tests acc. to ISO 17454 for multilayer M pipes or ISO 13968 / ISO 9969 for multilayer P pipes	one dimension / 2 years
ISO 21004 11	Marking	see also chapter 9 of this certification scheme	one sample per dimension group / year

Table 6: Scope of audit testing

9 Marking

Marking according to the requirements of the referenced product standard and the DVGW CERT rules of procedure for the certification of products in the non-harmonised area.


	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

10 References

- Rules of Procedure of DVGW CERT GmbH
Rules of Procedure for the Certification of Products in the Non-harmonised Area” <40014>
- Recommendation of the German Environmental Agency (Umweltbundesamt UBA)
Conformity attestation of product hygiene suitability for drinking water
- EN 12201-series
Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 2: Pipes
 - - Part 1: General
 - - Part 2: Pipes (date of issue: 2013-12)
 - - Part 3: Fittings
 - - Part 5: Fitness for purpose of the system
 - - Part 7 (of CEN/TS 12201-7): Guidance for the assessment of conformity
- ISO 1167-
Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure
 - - Part 1: General method
 - - Part 2: Preparation of pipe test pieces
 - - Part 3: Preparation of components
 - - Part 4: Preparation of assemblies
- ISO 21004:2006-11
Plastics piping systems - Multilayer pipes and their joints, based on thermoplastics, for water supply
- ISO 3501
Plastics piping systems - Mechanical joints between fittings and pressure pipes - Test method for resistance to pull-out under constant longitudinal force
- ISO 3503
Plastics piping systems - Mechanical joints between fittings and pressure pipes - Test method for leaktightness under internal pressure of assemblies subjected to bending
- ISO 4427-
Plastics piping systems for water supply and for drainage and sewerage under pressure - Polyethylene (PE)
 - - Part 1: General
 - - Part 2: Pipes (date of issue: 2019)
 - - Part 3: Fittings
 - - Part 5: Fitness for purpose of the system
- ISO 9080
Plastics piping and ducting systems - Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation

	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

- ISO 9969
Thermoplastics pipes - Determination of ring stiffness
- ISO 11413
Plastics pipes and fittings - Preparation of test piece assemblies between a polyethylene (PE) pipe and an electrofusion fitting
- ISO 13953
Polyethylene (PE) pipes and fittings - Determination of the tensile strength and failure mode of test pieces from a butt-fused joint
- ISO 13954
Plastics pipes and fittings - Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm
- ISO 13955
Plastics pipes and fittings - Crushing decohesion test for polyethylene (PE) electrofusion assemblies
- ISO 13956
Plastics pipes and fittings - Decohesion test of polyethylene (PE) saddle fusion joints - Evaluation of ductility of fusion joint interface by tear test
- ISO 13968
Plastics piping and ducting systems - Thermoplastics pipes - Determination of ring flexibility
- ISO 15875-
Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X)
- Part 1: General
- Part 2: Pipes
- Part 3: Fittings
- Part 5: Fitness for purpose of the system - Part 7 (of ISO/TS 15875): Guidance for the assessment of conformity
- ISO 16871
Plastics piping and ducting systems - Plastics pipes and fittings - Method for exposure to direct (natural) weathering
- ISO 17454
Plastics piping systems - Multilayer pipes - Test method for the adhesion of the different layers using a pulling rig
- ISO 17456
Plastics piping systems - Multilayer pipes - Determination of long-term strength

	Certification Scheme ZP 8490 Polyethylene Multilayer pipes according to ISO 21004 for water supply	58490-00-N-GB	
		Dok.-Art	ZP
		Verfasser	DVGW CERT GmbH
		Stand	09.04.2024

- ISO 22391-
Plastics piping systems for hot and cold water installations - Polyethylene of raised temperature resistance (PE-RT)
 - Part 1: General
 - Part 2: Pipes
 - Part 3: Fittings
 - Part 5: Fitness for purpose of the system
 - Part 7 (of ISO/TS 22391): Guidance for the assessment of conformity

For undated references the, the latest edition of the referenced document applies. For dated references, only the edition cited applies. Tables 4 to 6 contain chapter numbers of dated references. If the dated references are revised, the numbers of the chapters in the tables have to be reviewed.

11 Period of validity

This certification scheme enters into force on 09.04.2024 until further notice.