



مجلس أبوظبي للجودة والمطابقة
ABU DHABI QUALITY & CONFORMITY COUNCIL



Abu Dhabi Certification Scheme for Plastic Pipe Systems Used for Hot and Cold Water Installations (PP-R, PP-RCT, PE-RT and PEX)

Assessment and Surveillance Plan



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Amendment Page

To ensure that each controlled copy of this ASP contains a complete record of amendments, the Amendment Page is updated and issued with each set of revised/new pages of the document.

<u>Amendment</u>			<u>Discard</u>		<u>Insert</u>	
<u>No</u>	<u>Date</u>	<u>Sections Changed</u>	<u>Page(s)</u>	<u>Issue no</u>	<u>Page(s)</u>	<u>Issue no</u>
1	12/10/2014	Scheme launched	-	-	20	1.0



ABOUT THE ABU DHABI QUALITY AND CONFORMITY COUNCIL

The Abu Dhabi Quality and Conformity Council (QCC) was established by law No. 3 of 2009, issued by His Highness Sheikh Khalifa Bin Zayed Al Nahyan, President of the UAE and Ruler of Abu Dhabi.

QCC is responsible for the development of Abu Dhabi Emirate's Quality Infrastructure, which enables industry and regulators to ensure that products, systems and personnel can be tested and certified to UAE and International Standards.

QCC aims to coordinate with the concerned stakeholders including regulators and manufacturers to ensure that products whose production or distribution requires conformity assessment against defined specifications or specific levels of quality comply with current legislations of the Emirate to achieve safety, health and environmental protection within the Emirate. Furthermore, QCC aims to raise the overall level of product safety and quality, and enhance product competitiveness on local, regional and international levels through encouraging government entities, the private and public sectors to preferentially deal with products that bear the Abu Dhabi Trustmark.

Products certified by QCC receive the Abu Dhabi Trustmark. The Trustmark of the QCC is designed to communicate that a product or system conforms to various health, safety, performance and environmental standards that are set by Abu Dhabi regulators.

1 FOREWORD

This Assessment and Surveillance Plan (ASP) is a controlled document issued by QCC as part of a product certification scheme.

Advisory note: A number of factors additional to the characteristics addressed in this ASP may influence the safety and quality of products (manufactured products). Such factors are beyond the scope of the third-party product certification described in this ASP. QCC recommends that suitable precautions, such as third party inspection and the use of qualified installers are taken by the end users, to improve the likelihood of compliance of manufactured products.

The requirements herein may from time to time be varied by the issue of one or more 'QCC Notices' issued as controlled documents and sent to certificate holders.

2 SCOPE

This schedule defines and specifies the procedures for the certification of Polypropylene Random Copolymer (PP-R, PP-RCT), Polyethylene Rise Temperature (PE-RT) and Cross-linked Polyethylene (PEX) plastic pipe systems used for Hot and Cold water installations used for domestic and industrial applications according to the standards referenced in section 3.



3 REFERENCES

Standard Reference ¹	Description Title
DIN 8077:2008	Polypropylene (PP) pipes - PP-H, PP-B, PP-R, PP-RCT - Dimensions
DIN 8078:2008	Polypropylene (PP) pipes - PP-H, PP-B, PP-R, PP-RCT - General quality requirements and testing
DIN 16962 Part 1 Part 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8 Part 9 Part 10 Part 11 Part 12	Pipe joints and elements for polypropylene (PP) pressure pipelines type 1 and 2 Part 1: Bends of segmental construction for butt-welding; dimensions Part 2: Tees and branches produced by segment inserts and necking for butt welding; dimensions Part 3: Bends formed from pipe for butt-welding; dimensions Part 4: Adaptors for fusion jointing, flanges and sealing elements; dimensions Part 5: General quality requirements and testing Part 6: Injection moulded elbows for socket-welding; dimensions Part 7: Injection moulded tee pieces for socket-welding; dimensions Part 8: Injection moulded sockets and caps for socket-welding; dimensions Part 9: Injection moulded reducers and nipples for socket welding; dimensions Part 10: Injection-moulded fittings for butt welding; dimensions Part 11: Turned and pressed reducing sockets for butt-welding; dimensions Part 12: Dimensions of bushings, flanges and sealing elements, for socket welding
DIN 16892: 2000	Crosslinked polyethylene (PE-X) pipes - General requirements and testing
DIN 16893: 2009	Crosslinked polyethylene (PE-X) pipes - Dimensions

¹For more detailed testing requirements from the referenced standards, refer to APPENDIX A



DIN EN ISO 15874:2013 Part 1 Part 2 Part 3 Part 5	Plastics Piping for Hot and Cold Water Installations – Polypropylene (PP-R and PP-RCT) Part 1: General Part 2: Pipes Part 3: Fittings Part 5: Fitness for Purpose of the System
DIN EN ISO 15875:2003 Part 1 Part 2 Part 3 Part 5	Plastics Piping for Hot and Cold Water Installations –Cross-linked Polyethylene (PE-X) Part 1: General Part 2: Pipes Part 3: Fittings Part 5: Fitness for Purpose of the System
DIN EN ISO 22391 Part 1 :2009 Part 2 :2009 Part 3 :2009 Part 5 :2009 Part 7 :2011	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: Guidance for the assessment of conformity

Other References	Description Title
BS 6920: 2000	Suitability for use in contact with water intended for human consumption (issued by WRAS / KTW / DVGW / SKZ / KIWA)

Note: The latest version of the Standards shall be considered the preferred version when evaluating test reports submitted for evaluation - although test reports against the previous version of the standard may be allowed for a suitable transition period after the publication of the latest version determined by the QCC certification committee. If the standard itself refers to a transition period, the rules of this transition period will be applied if still currently in effect.

Applicability of Standards: All companies submitting for this product certification scheme can determine which country standards to comply with and must state in the submitted data which standard has been used by their quality department; however if the companies' current product lines are tested to other country standards, the committee will not accept a mixture of standards from different countries and shall evaluate the submitted data to determine if those other country standards are an acceptable equivalency and for compliance with general safety criteria established by the listed reference standards.



4 CERTIFICATION REQUIREMENTS

4.1 General requirements

The general requirements are contained in the Application, Terms and Condition, and License for Certification form QCC-QP-PCSCSS-F01.03.

The applicant may pursue one of two processes (A or B) preference as outlined below:

Process A:

Requirement of issuance of the Trustmark:

The product has been certified by an *accepted**product certification body (PCB) according to a certification scheme which satisfied the criteria of system N with $N > 1$ of ISO/IEC 17067 and the certificate is valid for at least for 3 months on the day of application.

Documents to be submitted:

Copy of product certificate and test report(s), additionally production and/or market samples of the product upon request.

***Accepted Product Certification Bodies:**

Product certification bodies who are accredited to ISO/IEC 17065 for the product certification scheme in question by an accreditation body signatory of the IAF MLA or PCBs recognized individually by QCC.

Process B:

Requirement of issuance of the Trustmark:

The product has been tested by an *accepted** testing laboratory, the test report not being older than one year. If the test report(s) is older than one year a QCC expert will evaluate that no parts of the product relevant to safety have been changed since the testing was performed. The product manufacturing facility/ies shall be certified to ISO 9001:2008 by an accepted quality management system (QMS) certification body. In the absence of a sufficient quality management certificate, (regular) verification testing and/or audit of the manufacturing facility by QCC personnel may be accepted.

Documents to be submitted:

Copy of test report(s) and quality management system certificate(s), additionally production and/or market samples of the product upon request.

***Accepted Testing Laboratories/QMS Certification Bodies:**

Testing laboratories who have been accredited to ISO/IEC 17025 for the scope of the product testing in question by an accreditation body signatory of the ILAC MRA or testing laboratories recognized individually by QCC.

Quality management system certification bodies who have been accredited to ISO/IEC 17021 by an accreditation body signatory of the IAF MLA.



4.2 Technical File Requirements

In order to gain certification, the applicant shall submit the following documents:

- A complete application form(QCC-QP-PCSCSS-F01.03);
- A full technical file including the following documents:
 - Company profile including a profile of the manufacturing facility
 - Manufacturer declaration of conformity to the referred scheme requirements
 - Product description including but not limited to the following data:
 - Product photos
 - Product manufacturing process and assembly details
 - List of applicable standards, list of parts/components and their certifications, instruction, maintenance and quality manuals, quality control procedures.

Depending on the process chosen, the following also need to be submitted:

Process A:

- All test reports on which the product certification has been based;
- A valid product certificate from an accepted certification body. The certificate must certify conformity with the standards mentioned in Section 3 in an ISO/IEC 17067:2013 type 5 scheme;
- Samples of the product (when and if deemed necessary by QCC);

Process B:

- Test report by an accepted laboratory not older than 1 year;
- Samples of the product (when and if deemed necessary by QCC);

4.3 Quality Management System (QMS) Requirements

Process A: No additional requirements.

Process B: The manufacturer (not the importer, or distributor, or retailer) must be certified according to ISO 9001:2008, the certificate being issued by a certification body accredited according to ISO / IEC 17021:2011 by an accreditation body signatory of the IAF MRA.

5 ASSESSMENT OF APPLICATION

Process A: A QCC representative will review the application and all the submitted documents formally, i.e. for completeness and correctness and check the identity of the product. If it is found compliant, the representative will submit his/her recommendation to the QCC certification committee.

Process B: A QCC representative will review the application and all the submitted documents formally, i.e. for completeness and correctness. The submitted samples will be inspected and (if



deemed necessary) subjected to verification testing to assure that they are identical to the one described in the test report. If this can be confirmed, the representative will submit his/her recommendation to the QCC certification committee.

6 PRODUCT INFORMATION

Approved product information, clearly detailing the materials utilised in the manufacturing of the product covered under the certification, shall be retained by the applicant and QCC. This product information shall include a list of constituents / suppliers and details of the product, technical brochures, supporting documentation and typical quality control plans, as applicable, photographs of the product and shall be reviewed and stamped by QCC.

7 IDENTIFICATION AND LABELLING

Each certified product may be provided with an evident label (depending on product and subject to agreement between the applicant and QCC). Where this is not possible the immediate packaging of the unit for sale shall be marked in accordance with brand guidelines specified in QCC-QP-PCSCSS-F01.03.

The certified product shall be despatched with a copy of the conformity certificate.

8 SURVEILLANCE AND AUDIT

Proof of continued compliance must be demonstrated if (i) a referenced standard has changed; or (ii) the product has been modified; or (iii) annually following issuance of the Abu Dhabi Trustmark conformity certificate, whichever comes first.

Moreover the following activities shall be carried out by the applicant:

Process A: The continued validity of the product certificate and accreditation status of the certification body is to be demonstrated by re-submitting the necessary documents as described above. Additionally, an affidavit by the applicant and the manufacturer should be submitted showing that the production system has not been modified and the specification of the product remains unchanged.

Process B: In cases (i) or (ii) a new test report is to be submitted and the accreditation status of the notified certification body/ certification body testing laboratory (NCB/CBTL) is to be demonstrated. In case (iii) an affidavit by the supplier and the manufacturer should be submitted showing that the production system has not been modified and the specification of the product remains unchanged. In all cases the continued validity of the ISO 9001:2008 certification shall be demonstrated.

In all cases, the QCC will also verify through market surveillance the continued compliance with the scheme if deemed necessary.



9 INSPECTION PLAN

Applicants must provide proof i.e. test reports and/or audit reports to demonstrate continued auditing activities conducted within factories. As for the QCC audits, these will be conducted when and if QCC deems necessary. Table A describes the inspection plan as required by the standards referred to in section 3:

TABLE A

Test	Initial Test	Audit Test	Internal Production Control
Tests on Raw Material			
Material	x		Proof of Inspection Certificate 3.1 according to DIN EN 10204 from supplier
Melt Flow Rate (MFR)	x	x2/year	On each raw material batch delivery by the raw material supplier
Tests on Pipe			
Marking	x	x2/year	Continuously/daily records
Appearance	x	x2/year	x2/hour
Dimensions	x	x2/year	x2/hour
Ovalty	x	x2/year	x2/hour
Longitudinal reversion	x	x2/year	x1/week for each Dimension and Machine
Hydrostatic pressure	x	x2/year	1 hour- Once per batch for each diameter & Machine and 165 h- once per month for each diameter & machine.
Homogeneity	x	x2/year	x1/month (microtome method) / Change in material batch
Melt Flow Rate (MFR)	x	x2/year	After 24 hours of start up
Impact behaviour	x	x2/year	x1/delivery batch of each size
Degree of cross linking (PE-X pipes only)	x	x2/year	Once every batch
Tests on Fittings			
Chemical Composition(for Metallic fittings)	x	x2/year	On each metallic inserts delivery by the raw material supplier (e.g.:- brass insert) - proof of inspection certificate and report of monthly inspection done in external or internal lab.
Marking	x	x2/year	Continuously/daily records
Appearance	x	x2/year	Continuously, records once every four hours



Dimensions	x	x2/year	Once per shift /Change in M/C parameter which affect the dimension of the product.
Hydrostatic pressure	x	x2/year	x1/ week (1 hour) and x1/month (165 hour)
Melt Flow Rate (MFR)	x	x2/year	After 24 hours of start up
Hygienic and toxicological tests			
Hygiene and toxicology	x	x1/year	

The following tests demonstrated in Table B shall be performed if one of the following changes occurs:

- Change of raw material supplier
- Change of polymerisation process
- Change of chemical properties of co-monomer)
- Change of additives (pigments, antioxidants)

TABLE B

Test	Polymer was amended	Additive was amended	Test execution
Tests on Raw Material			
Melt Flow Rate (MFR)	x	x	x1/recipe
Tests on Pipe			
Appearance	x	x	x1/recipe
Dimensions	x	x	x1/recipe
Longitudinal reversion	x	x	x1/recipe
Hydrostatic pressure	x	x	x1/recipe for approx. 2000h
Homogeneity	x	x	x1/recipe (microtome method)
Melt Flow Rate (MFR)	x	x	x1/recipe
Impact behaviour	x	x	x1/recipe
Tests on Fittings			
Appearance	x	x	x1/recipe
Dimensions	x	x	x1/recipe
Hydrostatic pressure	x	x	x1/week for 1 and 165 h
Melt Flow Rate (MFR)	x	x	x1/recipe



10 EFFECTIVE DATE

This document shall take effect immediately.



11 APPENDIX A: DETAILED REQUIREMENTS

The specifications below apply to:

- Polypropylene Random Copolymers (PP-R)
- Polypropylene Random Copolymers with improved temperature resistance (PP-RCT)
- Polyethylene of raised temperature resistance (PE-RT)
- Crosslinked Polyethylene (PE-X)

Intended to be used for hot and cold water installation for domestic and industrial application i.e. drinking water and heating installations within buildings. The systems should be designed according to the applications classes of DIN EN ISO 15874 – 1:2013, DIN EN ISO 22391-2:2010 and DIN EN ISO 15875-1:2003, and have a lifetime of 50 years at an operating pressure of 10 bars at 20°C.

Influence on water intended for human consumption – potable water

All raw materials for components of the PP and PE piping system, when in permanent or temporary contact with water which is intended for human consumption, shall not adversely affect the quality of the drinking water. The raw material formulation shall meet the requirements of a recognized body i.e. WRAS, KTW, DVGW (recommended DVGW here than SKZ), KIWA. Furthermore the raw material shall be listed in the material list of the certificate issuing body for this particular matter (drinking water installation). Finally the material shall meet the requirements according to an accredited testing laboratory.

Reprocessable material

The use of the manufacturer's own reprocessable material obtained during the production and works testing of products conforming to this standard is permitted (max. 10%) in addition to the use of virgin material. Reprocessable material obtained from external sources and recyclable material shall not be used

Melt Flow Rate

Requirement: Max 20% deviation from the raw material (suggesting 30 % as per DVGW)

Test: According to EN ISO 1133

System performance requirement

Pipes and fittings shall have the same application class for use as a system.

For combinations of pipes and fittings having different design pressures (4 bar, 6 bar, 8 bar or 10 bar) the design pressure of the system shall be defined by the lowest design pressure rating.

11.1 RAW MATERIAL

11.1.1 Hydrostatic strength properties

The material from which the pipes and fittings are made shall be evaluated in accordance with EN ISO 9080 where internal pressure tests are made in accordance with EN ISO 1167. The



hydrostatic strength –values determined shall at least be as high as corresponding value of the reference curves according to:

- DIN 8077/78
- EN ISO 15854 for PP-R and PP-RCT
- EN ISO 15875 for PEX
- ISO 22391 for PE-RT Type I and Type II

Metallic Fittings Materials – (PP-R fittings with metal)

Metallic materials for fittings intended to be used with components conforming to EN ISO 15874 shall confirm to the requirement given in EN 1253 -3 or EN 10088-1 as applicable.

Metallic Fittings threads

Threads used for joining shall confirm to EN 10226-1

Fittings for Fusion (Ref: - ISO 15874-3)

a. Socket Fusion Fittings

Fittings in which the joint with the pipe is made by melting together the outer part of the pipe with the inner part of the fittings by means of heat induced by heated tool.

b. Electro Fusion Fittings

Fittings in which the joint with the pipe is made by melting together the outer part of the pipe and the inner part of the fittings by means of heat conducted by current flowing in an appropriate resistor instead in the fittings body .

c. Fittings with Incorporated Inserts

Fittings in which the joint is made by means of connecting threads or other outlets, inserted in the plastics body combined with fusion ends for socket fusion or electrofusion.

11.1.2 Thermal stability by means of long term hydrostatic pressure testing

The thermal stability of material from which the pipes and fittings are made shall be tested by means of hydrostatic pressure testing in accordance with ISO 1167-1 and ISO 1167-2 at 110 °C for 8760 hours, using a test piece in pipe form or a fitting connected to pipe. The test piece shall withstand the test without bursting. The test shall be conducted in water-in-air. If the fitting connected to a pipe is used as a test piece and the pipe connection fails, then the thermal stability test shall be repeated using a test piece in the pipe form.

Requirement: No leakages, cracks or failures shall occur during hydrostatic pressure testing

Test: According to ISO 1167



Table 1

Temperature [°C]	Time to Failure [h]	Hoop stress [N/mm ²]				
		PP-R	PP-RCT	PE-RT Type I	PE-RT Type II	PEX
110	≥8760	1.9	2.6	1.9	2.3	2.5

11.1.3 Melt flow index

The melt flow index of material from which the pipes and fittings are made shall be tested in accordance with ISO 1131-1 using the following test parameters

- 230 °C, 2.16 Kg for PP-R and PP-RCT. Requirement MFR≤0.5 g/10 min
- 190 °C, 5 Kg for PE-RT and PEX. Requirement MFR≤0.3 g/10 min

11.2 PIPES

11.2.1 Appearance

Requirement: Internal and external surfaces of pipes shall be smooth, clean and free from scoring, cavities, and other surface defects
The materials shall not contain visible impurities.

Visual test: DIN 8077 and DIN 8078
EN ISO 15874-2 for PP-R and PP-RCT
EN ISO 15875 -2 /DIN 16892/16893 for PEX
ISO 22391 / DIN 16833-10 for PE-RT

Note: Ovalty (Out –of-roundness):-

Requirement: - Ovalty (Out –of-roundness) (is the difference between the measured maximum outside diameter and the measured minimum outside diameter in the same cross-section of the pipe) shall be measured to the nearest 0.1 mm immediately after production.

11.2.2 Opacity (for potable water usage)

Requirement: Pipes that are declared to be opaque shall not transmit more than 0.2 % of visible light according to ISO 15874

Test: According to ISO 7686

Pipes that are declared to be opaque shall not transmit more than 0.2 % of visible light, when tested in accordance with ISO 7686.



11.2.3 Dimensions and tolerances

Requirement: According to: EN ISO 15874-2: 2013 / DIN 8077 and DIN 8078 (PP-R, PP-RCT)
EN ISO 15875-2 /DIN 16892/16893(PEX)
DIN 16834-10 (PE-RT)
ISO 22391 (PE-RT)

Test: According to ISO 3126 and ISO 16833

11.2.4 Longitudinal reversion

Requirement: ≤2% according to EN ISO 15874/ DIN 8077 and DIN 8078(PP-R, PP-RCT)
≤3% according to EN ISO 15875/DIN 16892/16893 (PEX)
≤2% according to DIN 16833-10 (PE-RT) and ISO 22391 (PE-RT)

Test: According to ISO 2505

11.2.5 Melt Flow Rate

Requirement: Max 20% deviation from the raw material (Recommended deviation -30 %)

Test: According to EN ISO 1133

11.2.6 Internal Pressure Testing

Requirement: No leakages, cracks or failures shall occur during hydrostatic pressure testing

Test: According to ISO 1167

Table 2²

Temperature [°C]	Time to Failure [h]	Hoop stress [N/mm ²]				
		PP-R	PP-RCT	PE-RT Type I	PE-RT Type II	PEX
20	≥ 1	16	15	9.9	10.8	12
95	≥165	3.8	4	3.6	3.7	4.6
95	≥1000	3.5	3.8	3.4	3.6	4.4

²does not apply for fittings



11.2.7 Homogeneity (for colored pipes)

Requirement: Pigment aggregations, bubbles, voids and impurities shall not exceed 0.02 mm²

Microtome section of approximately 10 µm shall be removed. The microtome section shall be examined for the possible inhomogeneities by magnifying the area 75 to 100 times. The examined area shall be minimum 100 mm²

According to ISO 18553

11.2.8 Impact Resistance (for PP-R and PP-RCT pipes only)

Requirement: Failure rates ≤10% at 0 +/- 2 °C from 10 measurements

Test: According to ISO 9854-1 and ISO 9854-2, DIN 8078, ISO15874-2

Degree of Cross linking

When tested as per DIN 16892 sub clause 6.5, the degree of cross linking shall be as follows:

Type A (peroxide cross linked) pipes: 70 %

Type B (hydro silicon cross linked) pipes: 65 %

Type C (electron beam cross linked) pipes: 60 %

11.3 FITNESS FOR PURPOSE OF THE SYSTEM

11.3.1 Hydrostatic pressure test on pipe connections

Requirement: During hydrostatic pressure testing under the conditions in table 2, leakages, cracks or failures shall not occur,

Test: According to ISO 1167-7

11.3.2 Hygienic and Toxicological test

Requirement: Compliant with DVGW/WRAS recommendations for pipe and fittings

Test: DVGW/ WRAS/ TZW work sheet W270 and KTW recommendations at 20 and 60°C.

Sealing Elements

The sealing element shall have no detrimental effect on the properties of the pipe or fittings and shall not cause the test assembly to fail to conform standard requirements

The material of the elastomeric sealing elements used in joint assemblies shall conform to EN 681-1 or EN 681-2



Performance Requirements

When pipes conforming to EN ISO 15874-2 (PP-R) & EN ISO 15875-2(PE-X) standards are joined to each other or to components conforming to EN ISO 15874-3 (PP-R Fittings) & EN ISO 15875-3(PE-X fittings), the pipes and joins shall conform to EN ISO 15874 -5 (PP-R System) & EN ISO 15875 -5 (PE-X System)

Test Certificate

By agreement, the pipe manufacture shall issue an EN 10204 inspection certificate

12 APPENDIX B: REFERENCED STANDARDS

Standard Reference	Description Title
EN 681: 1996	Elastomeric seals
EN ISO 1133: 2005	Plastics -- Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics
BS EN 1253-1:2003	Gullies for buildings. Requirements
BS EN 10088: 2005	Stainless steels. Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
BS EN 10226-2:2005	Pipe threads where pressure tight joints are made on the threads. Taper external threads and taper internal threads. Dimensions, tolerances and designation
ISO 1167 Part 1: 2006 Part 2 :2006 Part 3 :2007 Part 4 :2007	Thermoplastics pipes, fittings and assemblies for the conveyance of fluids -- Determination of the resistance to internal pressure Part 1: General method Part 2: Preparations of pipe test pieces Part 3: Preparation of components Part 4: Preparation of assemblies
ISO 2505: 2005	Thermoplastics pipes -- Longitudinal reversion -- Test method and parameters
ISO 3126: 2005	Plastics piping systems -- Plastics components -- Determination of dimensions
ISO 7686: 2005	Plastics pipes and fittings -- Determination of opacity



ISO 9080:2012	Plastics piping and ducting systems -- Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation
ISO 9854: 1994 Part 1 Part 2	Thermoplastics pipes for the transport of fluids -- Determination of pendulum impact strength by the Charpy method Part 1: General test method Part 2: Test conditions for pipes of various materials
ISO/IEC TS 17021: 2013	Conformity assessment -- Requirements for bodies providing audit and certification of management systems
ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories
ISO/IEC 17065:2012	Conformity assessment -- Requirements for bodies certifying products, processes and services
ISO/IEC 17067:2013	Conformity assessment -- Fundamentals of product certification and guidelines for product certification schemes
ISO 18553: 2002	Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds
DIN 1988: 2010	Codes of practice for drinking water installations
DIN 16833: 2009	Polyethylene pipes of raised temperature resistance (PE-RT) - PE-RT Type I and PE-RT Type II - General quality requirements, testing
DIN 16834:2009	Polyethylene pipes of raised temperature resistance (PE-RT) - PE-RT Type I and PE-RT Type II - Dimensions
DIN EN ISO 22391-2:2010	Plastics piping systems for hot and cold water installations - Polyethylene of raised temperature resistance (PE-RT)
DVGW W 544: 2007	Plastic pipes in drinking water Installations
DVGW W 534: 2004	Connecting pipe elements & pipe connections in drinking water installations
DVS - 2207	Welding of thermoplastic pipes & fittings
DVS - 2208	Welding M/C & devise of thermoplastic pipes & fittings