Royal Scientific Society (RSS)

Conformity Assessment Centre (CAC)

General description of Certification Scheme of Polyethylene (PE) Pipes for Water Supply Systems

Scheme No. CACSM02S01.

Scope:

This Certification scheme applies to batch certification of polyethylene (PE) pipes for water supply systems (scheme type 1b).

Certification Standard:

The certification scheme is performed as per CEN/TS 12201-7:2014 “Plastics piping systems for water supply and for drainage and sewerage under pressure - Polyethylene (PE)-Part 7: Guidance for the assessment of conformity”, provides general information on the concept of testing and the organization of tests used for the purpose of the assessment of conformity of PE plastics piping systems.

Product Standards:

(PE) Pipes shall be manufactured according to the following international specifications:

- ISO 4427-1:2019: Plastics piping systems for water supply and for drainage and sewerage under pressure — Polyethylene (PE) - Part 1: General
- ISO 4427-2:2019 Amd.1:2023: Plastics piping systems for water supply and for drainage and sewerage under pressure — Polyethylene (PE) - Part 2: Pipes.
- BS EN 12201-1:2011 2024: Plastics piping systems for water supply, and for drainage and sewerage drains and sewers under pressure. Polyethylene (PE) – Part 1: General
- BS EN 12201-2:2011+A1:2013 2024: Plastics piping systems for water supply, and for drainage and sewerage drains and sewers under pressure. Polyethylene (PE) – Part 2: Pipes

Raw Material:

The PE Compound covered by the scheme shall be virgin Raw Material classified as PE 100 and listed by international approval bodies such as PE 100+ association.

Pipes testing:

The (PE) Pipes are subjected to 3 types of tests, which are as follows:

1. **Type Testing (TT)**

Dealing with the company requiring pipe batch certification by CAC for the first time, CAC Conformity Specialist visits the company to take representative sample from the production for type testing (TT) as per bellow table.

Characteristic	**Reference to Part, Clause or Sub-Clause of ISO 4427**	**Requirement (acceptance criteria)**	**Sampling Procedure**
Appearance	ISO 4427-2:2019 *Amd.1:2023*, Clause 6.1	Internal and external surfaces shall be free from defects	1 test piece of each diameter
Colour	ISO 4427-2:2019 *Amd.1:2023*, Clause 6.2	Blue, or black with blue stripes	1 test piece of each diameter
Effect on water quality	ISO 4427-2:2019 *Amd.1:2023*, Clause 6.3	materials in contact with, drinking water shall not constitute a toxic hazard, shall not support microbial growth and shall not give rise to an unpleasant taste or odour, to cloudiness or to discoloration of the water.	BS 6920
Geometrical characteristics	ISO 4427-2:2019 *Amd.1:2023*, Clause 7	Dimensions shall be in accordance with table 1 and 2 of ISO 4427-2:2019 *Amd.1:2023*	1 test piece of each diameter
Hydrostatic strength (20 °C, 100 h)	ISO 4427-2:2019 *Amd.1:2023*, Clause 8.2	No failure of any test piece during test period	3 test pieces of one diameter/ size group 1, 2 and 3
			1 test piece of one diameter/ size group 4 and 5 or by agreement with the end-user or purchaser
Hydrostatic strength (80 °C, 1000 h)	ISO 4427-2:2019 *Amd.1:2023*, Clause 8.2	No failure of any test piece during test period	3 test pieces of one diameter/ size group 1, 2 and 3
			1 test piece of one diameter/ size group 4 and 5 or by agreement with the end-user or purchaser
Elongation at break	ISO 4427-2:2019 *Amd.1:2023*, Clause 9.2	≥ 350 %	Number of test pieces shall conform to ISO 6259-1, One sample/ size group
Oxidation induction time (Thermal stability)	ISO 4427-2:2019 *Amd.1:2023*, Clause 9.2	≥ 20 min	1 sample/ size group
Melt mass flow rate	ISO 4427-2:2019 *Amd.1:2023*, Clause 9.2	Change of MFR by processing ±20 %	1 sample/ size group
Longitudinal reversion	ISO 4427-2:2019 *Amd.1:2023*, Clause 9.2	≤ 3% No effect on surface	1 sample/ size group
Marking	ISO 4427-2:2019 *Amd.1:2023*, Clause 12	The minimum required marking shall be in accordance with table 6 of ISO 4427-2:2019 *Amd.1:2023*	1 sample of each diameter
Tensile strength for butt fusion	ISO 4427-2:2019 *Amd.1:2023*, Clause 4.2.2.1	Test of failure: ductile: pass brittle: fail	1 sample/ size group 2
	ISO 4427-2:2019 *Amd.1:2023*, Clause 4.2.2.2	Test of failure: ductile: pass brittle: fail	1 sample/ size group 2

2. Batch Release Testing (BRT)

At the end of batch production CAC Conformity Specialist visits the company for taking samples from the produced pipes for batch release tests (BRT)the taken samples as per bellow table.

Characteristic	Reference to Part, Clause or Subclause of ISO 4427	Requirement (acceptance criteria)	Sampling Procedure
Appearance	ISO 4427-2:2019 *Amd.1:2023*, Clause 6.1	Internal and external surfaces shall be free from defects	At start up and at least every 8 h.
Colour	ISO 4427-2:2019 *Amd.1:2023*, Clause 6.2	Blue or black with blue stripes	At start up and at least every 8 h.
Geometrical characteristics	ISO 4427-2:2019 *Amd.1:2023*, Clause 7	Dimensions shall be in accordance with table 1 and 2 of ISO 4427-2:2019 *Amd.1:2023*	At start up and continuously or at least every 8 h.
Hydrostatic strength (80 °C, 165 h)	ISO 4427-2:2019 *Amd.1:2023*, Clause 8.2	No failure of any test piece during test period	test piece/ batch, but at least every 7d (size groups 1 and 2), 1 test piece/ batch (size group 3) By agreement with the end-user or purchaser (size group 4 and 5)
Elongation at break d	ISO 4427-2:2019 *Amd.1:2023*, Clause 9.2	≥ 350 %	1 sample/ batch
Oxidation induction time (thermal stability)	ISO 4427-2:2019 *Amd.1:2023*, Clause 9.2	≥ 20 min	1 sample/ batch
Melt mass-flow rate (MFR)	ISO 4427-2:2019 *Amd.1:2023*, Clause 9.2	Change of MFR by processing ±20 %	1 sample/ batch
Marking	ISO 4427-2:2019 *Amd.1:2023*, Clause 12	The minimum required marking shall be in accordance with table 6 of ISO 4427-2:2019 *Amd.1:2023*	At start up and every 8 h

3. Process verification tests results (PVT)

The PVT tests that CAC requires for the pipes and these specific intervals are detailed in bellow table.

Characteristic	Reference to Part, Clause or Sub-Clause of ISO 4427	Requirement (acceptance criteria)	Minimum Sampling Frequency
Hydrostatic strength (80 °C,1000 h)	ISO 4427-2:2019 *Amd.1:2023*, Clause 8.2	No failure of any test piece during test period	One diameter / year/ MRS class / size group 1, 2 and 3 One diameter / year/ MRS class / size group 4 and 5
Elongation at break	ISO 4427-2:2019 *Amd.1:2023*, Clause 9.2	≥ 350 %	1 sample of one diameter/ size group/ year/ compound designation

Longitudinal reversion	ISO 4427-2:2019 *Amd.1:2023*, Clause 9.2	≤ 3% No effect on surface	1 sample of one diameter/ size group/ year/ compound designation

Testing Laboratory:

Testing laboratory accredited for the relevant test standard according to EN ISO/IEC 17025.

Evaluation of Results:

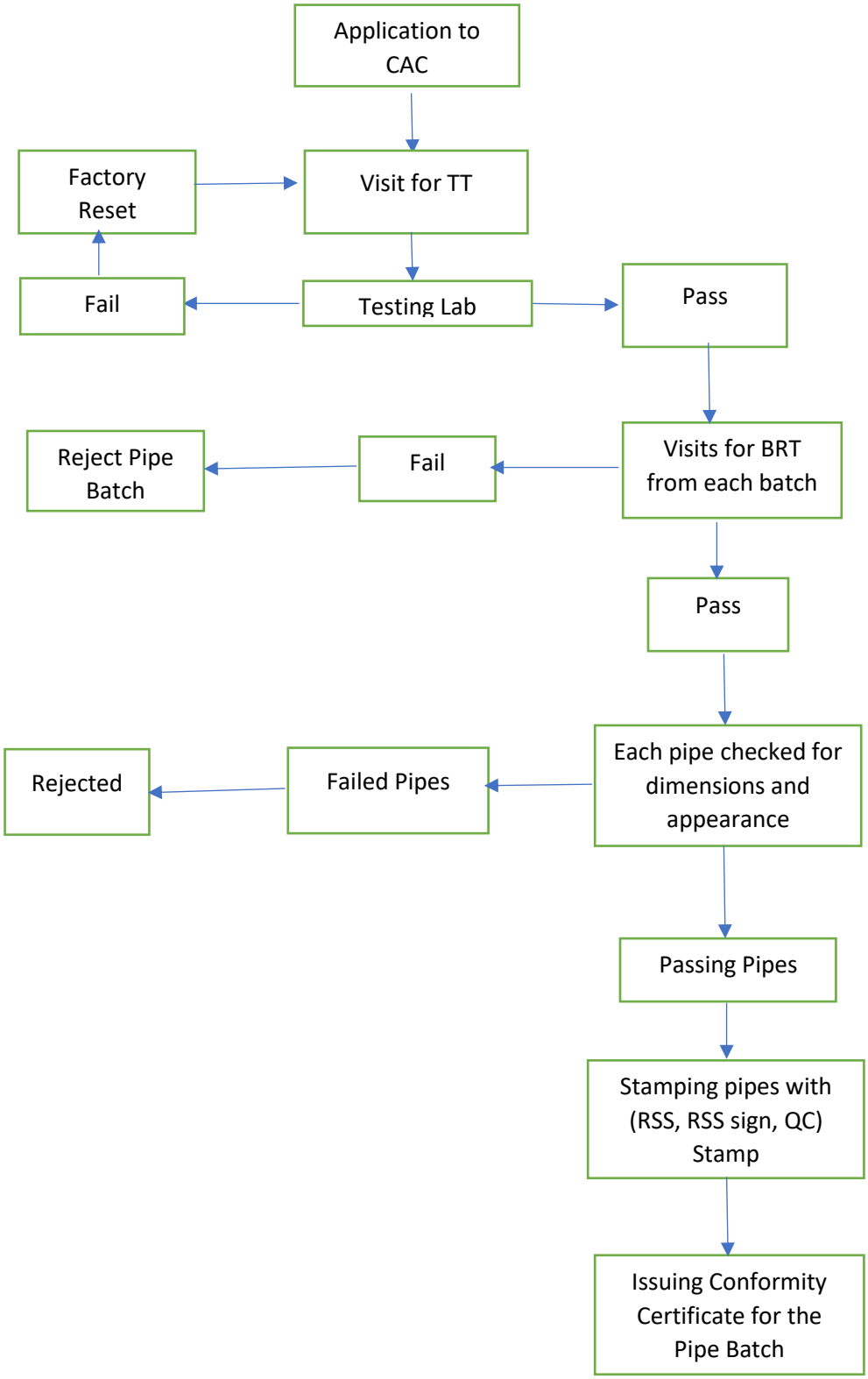
The pipes tests results are evaluated according to the requirements of the international specification for pipes, and the pipes must pass all tests.

The pipe batch passing all batch release tests, then the Conformity specialist make a visit to the company in order to verify the pipes dimensions and appearance, all pipes that their dimensions and appearance is comply with the requirements stamping with special mark for HDPE pipes contain the following stamp (RSS, RSS sign, QC) at the end of the pipe.

Certificate of conformity:

CAC issued a certificate of conformity for batches passing all required tests, the certificate must contain the following minimum information:

- Company name.
- Nominal outside diameter and nominal thickness.
- Lot symbol or Number.
- Number of produced pipes.
- Manufactured date.
- Compound manufacturer, trade name and grade of material.
- Total approved length of pipes.


Application to CAC
Visit for TT
Factory Reset
Fail
Testing Lab
Pass
Visits for BRT from each batch
Fail
Reject Pipe Batch
Pass
Each pipe checked for dimensions and appearance
Failed Pipes
Rejected
Passing Pipes
Stamping pipes with (RSS, RSS sign, QC) Stamp
Issuing Conformity Certificate for the Pipe Batch