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AENOR N Mark Specific Rules for Multilayer pipe systems for gas installations with a maximum operating pressure (MOP) up to and including 5 bar (500 Kpa)

Note: This document is a translation of the Spanish document RP 001.82 rev. 2 approved by the Plastics Technical Certification Committee (CTC-001). Spanish version always prevails over this translation.

RP 001.82

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1 Purpose and scope

Pursuant to paragraph 3.2 of the General Rules on the Certification of Products and Services with N Mark, hereafter the General Rules, the present Specific Rules describe the specific certification scheme for Multilayer pipe systems for gas installations with a maximum operating pressure (MOP) up to and including 5 bar (500 kPa). The present Specific Rules complete the AENOR N Mark Specific Rules for plastic materials – common requirements (RP 001.00). The General Rules always prevail over the present Specific Rules.

The N Mark for multilayer pipe systems for gas installations with a maximum operating pressure (MOP) up to and including 5 bar (500 kPa), hereafter the Mark, denotes product compliance with the UNE 53008-1:2014 or with the ISO 17484-1:2014.

The scope of product N Mark certification defined in this Specific Rules it refers to:

— Multilayer pipe systems for gas installations with a maximum operating pressure (MOP) up to and including 5 bar (500 kPa), made-up by multilayer pipes, fittings, their joints and also for joints with components made of other plastics and non-plastics materials for the supply of gaseous fuels in buildings both exposed installations and recessed installations, ensuring that all components are perfectly adapted among them, according to UNE 53008-1: 2014.

— Multilayer pipe systems for gas installations with a maximum operating pressure (MOP) up to and including 5 bar (500 kPa), made-up by multilayer pipes, fittings, their joints and also for joints with components made of other plastics and non-plastics materials intended of gas installations inside the buildings ensuring that all components are perfectly adapted among them, according to ISO 17484-1:2014.

2 Definition and special requirements

Reference: It is called a reference of pipes to the set of the same ones that have the same diameter and nominal thickness, and structure and in case of fittings to the set of the same ones that have the same nominal dimensions, figures and material.

Types of pipes:

- **Multilayer M pipe:** Pipe comprised of polymeric stress-designed layers and one or more metallic stress-designed layers.
- **Multilayer P pipe:** Pipe comprised of more than one polymeric stress-designed layer. (only for ISO 17484-1).

Similar structure: Similar structure by type is understood for more than one diameter of pipeline when the following conditions are fulfilled.

For type P:

- The same process technology is used.
- Materials having the same characteristics are used for each stress bearing layer. i.e. material type and specifications.
- The layers are assembled in the same sequence for different diameters.
- For all diameters of the same group, the standard dimension radio (SDR) of each stress-designed layer is equal to the design value ± 10.

For type M:

- The same process technology is used. For example: welding process, type of welding, etc.
- Materials having the same characteristics are used for each stress bearing layer. i.e. material type and specifications.
- The layers are assembled in the same sequence for different diameters.
- For all diameters of the same group, the metal layer standard dimension radio (SDRm) is ± 10 the same.

PIPES

For pipes, shall be submitted with the application, reference curves for both ISO 17484-1 (according to ISO 17456), and UNE 53008-1 (where applicable), attaching the control points.

Data sheet (Annex C-1). Geometric and general characteristics of the pipes should be described (raw material, diameters, wall thickness and of each of the layers, and its tolerances). Adhesives are not considered as independent layer.

For pipes type M, in addition it will be necessary to indicate type of welding, wall thickness of metal layer, diameter and tolerances and tensile strength and elongation of the metal layer up to the point of break.

FITTINGS

For plastic fittings (for both systems according to ISO 17484-1 and UNE 53008-1), shall be submitted with the application, the reference curves of the material according to point 7.3.3 of the UNE 53008-1.

SEALING JOINTS

For both systems according to ISO 17484-1 and UNE 53008-1, shall be submitted with the application, the ozone resistance test in accordance with section 7.3.4 of the UNE53008-1.

3 Sampling and testing for granting and maintaining the product N Mark certificate

3.1 Test to be carried out in factory (See RP 001.00)

AENOR will carry out the tests indicated in table 1 during the initial or surveillance inspection.

3.2 Sampling and tests to be carried out by the laboratory (See RP 001.00)

AENOR will select and marked the necessary samples to carry out in the laboratory the tests indicated in table 1.

The manufacturer will send the selected samples to the laboratories indicated by the AENOR services, in a maximum term 7 days since the date of inspection. In case that the laboratory requested be necessary, the client of the certificate will send technical personnel for welds or assemblies needed to carry out the tests.

The criterion of valuation for all the tests is 1, in consequence no value will be allowed to be out of tolerances.

Dimensional tests, both pipe and fittings, will be carried out by AENOR in factory with habitual tools used by the manufacturer. In case of be necessary, samples will be sent to the laboratory to carry out dimensional control of wall thickness of the layers. Adhesive is not considered as an embedded layer.

	TESTS	GRANTING / MAINTAINING UNE 53008-1	GRANTING / MAINTAINING ISO 17484-1
TESTS TO BE CARRIED OUT BY THE INSPECTOR IN THE FACTORY	PIPES		
	Appearance	10 pipes / coils randomly	10 pipes / coils randomly According to data sheet of the manufacturer
	Mean outside diameter	1 pipe per reference minimum 10	1 pipe per reference minimum 10 According to data sheet of the manufacturer
	Total wall thickness	1 pipe per reference minimum 10	1 pipe per reference minimum 10 According to data sheet of the manufacturer
	Minimum thickness of aluminium	1 pipe per reference	1 pipe per reference minimum 10 According to data sheet of the manufacturer
	Ovality	1 pipe per reference (according to point 6.3.3 of the Standard)	1 pipe per reference minimum 10 According to data sheet of the manufacturer
TESTS TO BE CARRIED OUT BY THE LABORATORY	CHARACTERISTICS OF THE RAW MATERIAL (AS A PIPE)		
	Resistance to gas condensates (only inner layer)	Certificate of the supplier of the raw material	-
	Carbon black content (only black compound. Only outer layer)	1 reference randomly	-
	Carbon black dispersion (only black compound. Only outer layer)	1 refererence randomly - Once a year if the manufacturer pigments) - If the manufacturer does not pigment, at granting and every 5 years	-
	Pigment dispersion (only non- black compounds and in case of outdoor installations without additional protection, marking OUTDOOR)	1 refererence randomly - Once a year if the manufacturer pigments) - If the manufacturer does not pigment, at granting and every 5 years	-
	Resistance to weathering (only non-black compounds and in the case of outdoor installations without additional protection, marking OUTDOOR)	1 reference randomly (if the manufacturer pigments or crosslinked)	-
	PIPES		
	Resistance to the internal pressure 20°C 1h	20% references/minimum 2	-
	Resistance to the internal pressure 165 h (note 1)	20% references/minimum 2 (point 6.4 UNE 53008)	20% references/minimum 2 (point 5.4.1 ISO 17484)
	Resistance to the internal pressure 1000 h (note 1)	1 reference randomly (point 6.4 UNE 53008)	1 reference randomly (point 5.4.1 ISO 17484)

	TESTS	GRANTING / MAINTAINING UNE 53008-1	GRANTING / MAINTAINING ISO 17484-1
TESTS TO BE CARRIED OUT BY THE LABORATORY	Resistance to the internal pressure 22h (note 1)	-	20% references/minimum 2 (point 5.4.1 ISO 17484)
	Determination of adherence and cracking by expanding	20% references/minimum 2	-
	Adherence by tensile	20% references/minimum 2	-
	Adherence by tensile after cycling	1 reference randomly	-
	Oxidation Induction Time (on PE y PE-RT pipes)	1 reference randomly	1 reference randomly
	Crosslinking degree (for pipes with PE-X) (note 2 and note 4)	1 reference randomly	1 reference randomly
	Melt flow rate (for pipes with PE and PE-RT) (note 4)	1 reference randomly	1 reference randomly
	Thermal durability of the outer layer of the multilayer pipes (note 5)	At granting and in case of any formulation change 1 reference randomly	At granting and in case of any formulation change 1 reference randomly
	Strength of the joint line (Pipes M)	-	20 % references/minimum 2
	Resistance to slow crack growth of the outlayer (Pipes M)	-	20 % references/minimum 2
	Delamination	-	20 % references/minimum 2
	Resistance to gas constituents	-	1 reference randomly
	Odour permeability	-	1 reference randomly and of on the smaller thickness
	FITTING / SYSTEM (*)		
	Chemical composition (metalic fittings)	5 % references/minimum 2	5 % references/minimum 2
	Corrosion resistance (metalic fittings) (note 3)	5 % references/minimum 2	5 % references/minimum 2
	Resistance to gas condensates (plastic fittings)	At granting and every 5 years 1 reference randomly	-
	Resistance to gas constituents	-	At granting and in case of formulation change 1 reference randomly
	Resistance to the repeated bending	1 diameter (only DIM 16 mm y 20 mm)	1 diameter
	Internal pressure test long term (60° 1000 h)	1 reference randomly	-
	Thermal cycling resistance	1 diameter	1 diameter
	Tensile stress resistance 800 h		
	Tensile stress resistance 1 h		
	Joint resistance to crushing		
	Impact resistance test on joints		

TABLA 1

(*) System test will be carried out by type of clamp, being able to perform the thermal cycling test and the internal pressure test 95° 1000 h, combining different clamps.

Nota1 Test parameters (temperature and pressure) are set out in table 5 of the UNE 53008 or according to the reference curves (minimum temperature of the test 60° C.

Nota 2 For pipes PEX-b, if the test result of the crosslinking degree is "non-compliant" and the company requests the repetition of the mentioned test, the repetition will be performed on samples that are available in the laboratory and not countersamples.

Nota 3 When tested in accordance with UNE EN ISO 1456, for the condition 2 in neutral salt fog (NSN), 48 hours, metal fittings must not show any defects of corrosion such as pitting corrosion, chipping or red-orange colored spots or green, that affects to more than 5% of the external surface of the fitting. Areas where salt deposits are appreciated should not be considered for the test result.

Nota 4 Applicable to the inner layer and the outer layer, if it supports effort.

Nota 5 Does not apply if the outer layer is made of material according to the reference standards listed in Annex A, and if the thermal durability is covered by this product standard of reference (See note b table 6 UNE 53008-1).

4 Manufacturer internal control

4.1 Characteristics under factory production control

Characteristics under factory production control are:

- Raw materials

  The manufacturer must ensure that the mixtures and compounds involved in the manufacture of pipes having appropriate characteristics. In the same way, the specifications provided in the Certificate of Analysis of material received, comply with established purchase requirements.

  This requirement applies to all raw materials used in all parts of the fitting: body of the fitting, ring, joint, sleeve, exterior treatment, etc.

- Sealing joints

  The non metallic sealing elements for gas applications, must comply with the requirements specified in the UNE-EN 549, including ozone resistance test indicated in table 3 of the mentioned Standard.

- Controls on the final product

  Tests and their frequency are stated in table 2, as proceed.

TESTS	FREQUENCY UNE 53008-1	FREQUENCY ISO 17484-1
CHARACTERISTICS OF THE RAW MATERIAL (AS A PIPE)		
Resistance to gas condensates (only inner layer)	Certificate of the supplier of the raw material	-
Carbon black content (black compound). Only outer layer	1 time per batch if the manufacturer pigments and once a year if the manufacturer does not pigment	-
Carbon black dispersion (only black compounds). Only outer layer		
Pigment dispersion (non black compounds). Only outer layer		
Resistance to weathering (only not black compounds and in the case of outdoor installations without additional protection)	At granting and in case of any formulation change	-
Tensile strength and elongation of the metal layer	Certificate of raw material per delivery batch	Certificate of raw material per each delivery batch
PIPES		
Appearance	Every 4 hours / production line	Every 4 hours / production line
Mean outside diameter		
Total wall thickness		
Minimum thickness of aluminium		
Ovality	Per period of production	Per period of production
Resistance to the internal pressure 20°C 1h	Once every two weeks per line	-
Resistance to the internal pressure 165 h (note 1)	Once every two weeks per line (point 6.4 UNE 53008)	Once every two weeks per line (point 5.4.1 ISO 17484)
Resistance to the internal pressure 1000 h (note 1)	One pipe per production line once a year (point 6.4 UNE 53008)	One pipe per production line once a year (Point 5.4.1 ISO 17484)
Resistance to the internal pressure 22h (note 1)	-	Once a year per reference (point 5.4.1 ISO 17484)
Adhesion and cracking by expansion	Every 8 hours / production line	Every 8 hours / production line
Adherence by tensile	Every 8 hours / production line	Every 8 hours / production line
Adherence by tensile after cycling	1 reference per year	1 reference per year
Oxidation Induction Time (for PE and PE-RT pipes)	Minimum twice a year on pipe and pellets	Minimum twice a year on pipe and pellets
Crosslinking degree (for PE-X pipes) (note 2 ; note 4)	Once per production period/ minimum twice a week	Once per production period/ minimum twice a week
Melt flow rate (for pipes with PE and PE-RT) (note 4)	Every three batches of raw material	Every three batches of raw material
Thermal durability of the outer layer of the multilayer pipes (note 5)	At granting and in case of any formulation change	At granting and in case of any formulation change

TESTS	FREQUENCY UNE 53008-1	FREQUENCY ISO 17484-1
PIPES		
Strength of the joint line (Pipes M)	-	Every 8 hours / production line
Resistance to slow crack growth of the outlayer (Pipes M)	-	Once a year
Durability – P pipes	-	Every 8 hours / production line
Durability – M pipes	-	Once a year
Resistance to gas constituents	-	At granting and in case of any formulation change
Odour permeability	-	At granting and in case of any formulation change
FITTING/SYSTEM (*)		
Appearance	According to manufacturer´s internal procedures	According to manufacturer´s internal procedures
Chemical composition (metalic fittings)	One fitting per each raw material batch if the manufacturer of the fitting manufacturer the raw material or Raw material certificate for each delivery batch if the manufacturer of the fitting does not manufacture the raw material	One fitting per each raw material batch if the manufacturer of the fitting manufacturer the raw material or Raw material certificate for each delivery batch if the manufacturer of the fitting does not manufacture the raw material
Corrosion resistance (metallic fittings) (note 3)	At granting and whenever there is a change in the alloy or/and in the coating	At granting and whenever there is a change in the alloy or/and in the coating
Resistance to gas condensates (plastic fittings)	At granting and in case of any formulation change	At granting and in case of any formulation change
Resistance to gas constituents	-	At granting and every 5 years 1 reference randomly
Internal pressure test long term 60° 1000 h	Every four months alternating the diameters to cover the whole range	-
Tensile stress resistance 1 h	Once a year/ 1 diameter alternating to cover the whole range	Once a year/ 1 diameter alternating to cover the whole range
Tensile stress resistance 800 h		
Joint resistance to crushing		
Impact resistance test on joints		
Thermal cycling resistance		
Repeated bending resistance	Once a year/ 1 diameter alternating to cover the whole range (only DIM 16 mm y 20 mm)	Once a year/ 1 diameter alternating to cover the whole range

TABLE 2

(*) System test will be carried out by type of clamp, being able to perform the thermal cycling test and the internal pressure test 95° 1000 h, combining different clamps.

Nota 1 Test parameters (temperature and pressure) are set out in table 5 of the UNE 53008 or according to the reference curves (minimum temperature of the test 60° C.

Nota 2 For pipes PEX-b, if the test result of the crosslinking degree is "non-compliant" and the company requests the repetition of the mentioned test, the repetition will be performed on samples that are available in the laboratory and not countersamples.

Nota 3 When tested in accordance with UNE EN ISO 1456, for the condition 2 in neutral salt fog (NSN), 48 hours, metal fittings must not show any defects of corrosion such as pitting corrosion, chipping or red-orange colored spots or green, that affects to more than 5% of the external surface of the fitting. Areas where salt deposits are appreciated should not be considered for the test result.

In the internal control the manufacturer will perform the corrosion resistance test, using any of the methods indicated in the standard UNE-EN ISO 1456.

Nota 4 Applicable to the inner layer and the outer layer, if it supports effort.

Nota 5 Does not apply if the outer layer is made of material according to the reference standards listed in Annex A, and if the thermal durability is covered by this product standard of reference (See note b table 6 UNE 53008-1).

5 Marking of certified products

The marking on the pipes will carry out every meter and will include as minimum the following:

Information	Mark or symbol	Pipe	Fitting
Reference to the word AENOR	AENOR	X	X[3)]
AENOR Mark logotype, with a size not less than 3 mm	N	X	X[3)]
Number of the contract signed with AENOR	001/XXX	X	X[3)]
Manufacturer or trademark	Name or symbol	X	X
Internal fluid	Fuel	X	X[1)]
Design pressure P_D	5 bar	X	-
Dimensions	d_n x e_n	X	
	d_n		X[2)]
Material designation (only for plastic fittings)	For example: PE-X		X
Construction of layers and type of material required; Description from outside to inside	Example: PE-X/Al/PE-X o PE-RT/Al/PE-RT ó PE/Al/PE	X	-
Production period (date/code)	Manufacturer's own reference	X	X
Reference to this Standard	UNE 53008-1 / ISO 17484-1	X	-
Identification use outdoor	Outdoor	X	-

1) In case of fittings can be replaced by a yellow mark.

2) In the case of several thicknesses of the pipe for the same diameter of fitting, it should be marked the fitting with the thickness of the pipe which is compatible.

3) In the packaging of the fitting.

SYSTEM

The client shall include as minimum the following data at commercial and technical documentation for systems:

- Trademark of the system
- Reference to the word AENOR
- N Mark logotype, with a size not less than 3 mm
- Type of joint
- Design pressure(s) (MOP)
- Diameter range certified of pipes and fittings
- Tool to use and instructions for proper installation of the system including the type of clamp

In case of this documentation includes certified and not certified products, the N Mark use shall be in that way that never leads into mistake about which products are certified and which are not.

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Annex C

Descriptive questionnaire for multilayer pipe systems for gas installations with a maximum operating pressure (MOP) up to and including 5 bar (500 Kpa)

CLIENT:

PIPES MANUFACTURER COMPANY:

FITTINGS MANUFACTURER COMPANY:

DESCRIPTION OF THE TYPE OF JOINT:

TYPE OF CLAMP:

SITE WHERE MANUFACTURER INTERNAL CONTROL TESTS FOR THE SYSTEM ARE GOING TO BE CARRIED OUT:

FACTORY OF THE PIPES SITE ☐ OF THE FITTING ☐ EXTERNAL LAB ☐

OTHER ☐ (TO INDICATE _____)

TRADEMARK(S):

STANDARD:

PIPES

DIMENSIONS (DN x THICKNESS)	APPLICATION CLASS/DESIGN PRESSURE

FITTINGS

FIGURE	MATERIAL	MANUFACTURER INTERNAL REFERENCE

For any modification of the indicated date, the client shall send to the Committee Secretary this updated descriptive questionnaire.

…….…… on …… of …… 20……

SIGNATURE AND STAMP OF THE MANUFACTURER

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Annex C1

Data sheet

Construction of layers and type of material required (description from outside to inside. Example: PE-X/AL/PE-X o PE-RT/AL/PE-RT o PE/AL/PE)

TYPE OF WELDING:

RAW MATERIAL OF EACH LAYER	SUPPLIER	REFERENCE

DIMENSIONS OF EACH LAYER: (include tolerances)

DIMENSIONS (DN x THICKNESS)	E1 internal	e2 embedded	e3 external	D interior	D embedded	D total	SDR or SDRm

…….…… on …… of …… 20……

SIGNATURE AND STAMP OF THE MANUFACTURER