

# **BULLETIN: TECHNICAL STANDARDS APPLICABLE TO THE PLASTIC INDUSTRY**



## **1 INTRODUCTION**

Basically, a standard is an established and agreed way of doing something, which may well be to manufacture a product, manage a process, provide a service or supply



materials. Standards can cover a wide spectrum of activities performed by organizations and used by their customers.

Technical standards, in particular, are documents that establish technical specifications based on the results of experience and technological development, which must be met in certain products, processes or services. Many of them are based on science and technology, and define repetitiveness or continuous application in industrial processes. In general, the standards focus on unifying criteria regarding specifications (of raw materials and finished or in-process products) and simplification of processes, both productive and service.

## **2 ¿ HOW ARE THE TECHNICAL STANDARDS DEVELOPED?**

Standards are essential for programming production processes. They are created with the consensus of all interested parties involved in an activity (manufacturers, administration, consumers, laboratories, research centers).

The elaboration of a Standard passes in the first instance by the determination of a need to regulate a certain area, namely: procedure of use, measurement method, preparation of test specimens, among others.

International regulations on the subject should always be taken into account. If there are no regulations in this regard – because they are very specific or too new – looking for regional or related industry company standards.

The next step is the constitution of the technical committee that will prepare the preliminary draft of the standard. It must be made up of representatives of the parties interested in the reason for the standard. Once the draft standard has been drafted, it is submitted to public consultation. The competent authorities, producers and representatives of the world of science and technology participate in this instance.

The observations of the public consultation are taken back to the technical committee, which resolves their relevance.

Al finalizar, se alcanza un texto oficial y aceptado por todos, que debe ser propuesto al organismo de normalización correspondiente, para su aprobación.

Standards are approved by recognized standards bodies. That is why they are identified by acronyms according to the body that approves them:

- ISO standards: Approved by the International Organization for Standardization (acronym in English, International Organization for Standardization). 
- ASTM Standards: Approved by the American Society for tests and materials (Acronym in English American Society for Testing and Materials) 
- DIN Standards: Approved by the German Institute for Standardization (Deutsches Institut für Normung)
- ICONTEC Standards: Approved by the Colombian Institute of Technical Standards and Certification.
- EN Standards: These are European standards approved by various standardization bodies: CEN European Committee for Standardization, CENELEC European Committee for Standardization of electrotechnique, ETSI, European Telecommunications Standard Institute.

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- UNE Standards: refer to Spanish standards (UNE comes from Una Norma Española) developed within the Spanish Association for Standardization (AENOR).

### **3 THE NORMS IN VENEZUELA**



The Venezuelan Commission for Industrial Standards (COVENIN) was the entity in charge of ensuring standardization and normalization under the quality guidelines in Venezuela, between the years 1958 and 2004. COVENIN established the minimum requirements for the elaboration of procedures, materials, products, activities and other aspects that these rules govern. Governmental and non-governmental entities specialized in an area participated in this commission.

As of 2004, the activities that COVENIN used to handle are now carried out by the Fund for Standardization and Quality Certification (FONDONORMA).

FONDONORMA is a non-profit civil association, with legal personality and its own assets, created in 1973, in order to develop standardization and certification activities in Venezuela in all industrial and service sectors, and to train human talent in said sectors specialties. FONDONORMA is accredited as a Certifying Body for Quality Systems and Products.

In June 2009, the recognition of Fondonorma as a National Standardization Body was revoked, and the National Autonomous Service for Standardization, Quality, Metrology and Technical Regulations

(SENCAMER) as the coordinating body for the process of developing national quality standards for products, processes and services, and this in turn recognizes the Civil Association Development Fund for Standardization, Quality, Certification and Metrology (FODENORCA), as the National Organization for Standardization, within the sector and specialty established with SENCAMER (Resolution DM/075 Official Gazette of the Bolivarian Republic of Venezuela No. 39,147 of 06/10/2009).

Additionally, in the aforementioned Decree, it is established that SENCAMER, as the coordinating body of the standards development process, will keep the record of the Venezuelan COVENIN Standards and Technical Regulations, in order to centralize the information, for its protection, control and provision to the population.

Public or private laboratories constitute the testing subsystem, whose objective is to confirm that the products or services comply with standards or technical regulations, in order to guarantee the reliability of their results within the scope of accredited tests.

### **4 ¿ WHY THE USE OF STANDARDS IN THE PLASTIC INDUSTRY?**

The use of standards in the various industries and, in particular, in the plastics industry, allows reproducible results to be obtained, as well as keeping records for traceability and subsequent use for the sake of product quality control and/or production process.

The standards are part of the quality control dynamics of the companies that produce plastic products, responding directly to the requirements of their customers.

An adequate quality control routine is carried out according to specific standards that are applied to both the raw material (resin) and the manufactured items.

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## **5 STANDARDS FOR QUALITY CONTROL**

The use of standards according to the various products to be manufactured is described below:

### **5.1 IN RESINS**

The companies that produce plastic resins guarantee the quality of the resin they produce and market, by measuring its properties, such as the Melt Flow Index and the density of the resin of the grades they offer.

The measurement of the fluidity index is a test that is carried out within the resin reception according to the Fondonorma 1152, ASTM D1238 and ISO 1133 standards. For a transformer, the fluidity index is a fundamental property, since according to its values, modifications of variables in the process and the performance of the final articles are defined.

Density determination is another of the resin quality control parameters, a measurement that is carried out according to the Covenin 461, ASTM D 1505 and ISO 1183 standards.

Likewise, the Covenin 1210 and ASTM E313 standards allow the estimation of the yellowness and whiteness index in resins, these values being vital components of almost all plastic manufacturing processes.

### **5.2 IN FINISHED PRODUCTS.**

There are standards specifically adapted to the reality and characteristics of each finished plastic product, which are globalized with national and international standards and methods.

#### **✓ FOR PLASTIC AND FLEXIBLE PACKAGING.**



The plastic bag is possibly the most everyday plastic product used in supermarkets and other stores. They must comply with various standards between

which include the **Covenin 1392 and 1010, Fondonorma 2305 and ISO 2248** standards that describe the measurement of the thickness and width of the bags, the characteristics of the impact tests and instrumental perforation for this type of products, intended for applications such as garbage bags, for the transport of valuables and documents.

Flexible packaging has different behaviors depending on the nature of the environment where it is stored, so its development must be linked to the conditions to which it is exposed, form of storage, shelf life and the material to be packed. Its performance is established through the determination of various properties, in accordance with the corresponding standards for each case.

Thus, the mechanical properties in tension are measured according to the **Covenin 2557 or ASTM D882** standards, the resistance to friction according to the **Covenin 463 or ASTM D1894** standards, and the resistance to sealing according to the **Covenin standards 837 or ASTM F1921**.

#### **✓ PACKAGING THAT CONTAINS FOOD.**

Within the variety of standards for packaging there are those that describe the determination of the barrier properties, such as the ASTM D1434 and ISO 2528 standards, especially use in packages



Containing foods. These standards specify the methods for estimating the rate of transmission of gases and vapors to through polymeric materials.

Similarly, there are standards for determining water absorption and shrinkage in flexible packaging, which allows determining the quality and shelf life of the packaged product.

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The appearance or optical properties are factors that can affect the quality of the contained products or favor the image of the packaging. These include turbidity and light transmission, measured according to **ASTM D1003**.

## ✓ **PACKAGING CONTAINERS AND CONTAINERS.**



For the category of plastic containers, the standards are intended to ensure their correct performance and the extension of the useful life of both the container and the product that contain

Among the standards used in evaluating the quality of these products is the determination of dimensions and tolerances for plastic bottles, according to the **ASTM D2911** standard.

In general, the containers are subjected to tests of resistance to impact by free fall, measurement of resistance to crushing, measurement of contraction, resistance to stacking, etc.

In Venezuela, there are mandatory guidelines for plastic containers intended to contain food, which conform to official regulations. These are the collections for sanitary permits, which are carried out in accordance with the following regulations: **Fondonorma 3239, Covenin 3328 and 3313**, for the determination of global migration, the maximum extractable fraction in n-hexane and soluble in xylene from food packages or containers, tests that analyze the packages to detect the transfer of monomers, additives and other residual substances in.

## ✓ **TANKS.**

For their part, water tanks fall into the category of containers and vessels. They must provide the necessary features to make them the best storage option of water, and from the point of view of

transformer, it is important that its elaboration is under standards. That is why there are standards such as **ASTM D1998**, which specifies the characteristics of vertical polyethylene storage tanks, among others.

## ✓ **PIPELINES.**

In terms of construction, the plastic pipe has become the most used and in the case of polyethylene pipes, its manufacture and specifications are regulated by different standards, which describe the permitted values of elongation at break and resistance, among other. The national rules among other. The corresponding national standards are **Fondonorma 3839 and 3833** for polyethylene pipes for gas and water conduction. In addition, there are rules like the **Covenin 1710**



and **ASTM D3895** for the determination of carbon black dispersion and the determination of the oxidative induction time of polyolefins, which serve to identify if the material is correct for certain applications.

It also has **ISO 13479 standards and 13477** regulate the determination of the resistance to the growth of cracks in plastic pipes; the **ISO 1167-1 standard**, which describes the procedure for determining the resistance to rupture by hydrostatic pressure, and the **ASTM D1599 standard**, for the determination of the maximum resistance of pipes and joining elements. These standards and others are used to minimize the occurrence and consequences of failure.

## **6 CONCLUSIONS**

As a general rule, sourcing products and validating their performance characteristics against standards allows the producer to be confident that the product is fit for purpose, as well as its quality and safety. The existence and fulfillment of the

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standards ensures that a plumber can buy a PE pipe for drinking water and attach it to a valve, because its diameters conform to a specific standard.

The standardization of products, that is, their classification and description according to their characteristics, it is an instrument of singular importance for the best functioning of the markets

It is for all these reasons that, ultimately, the rules a sustainable model of growth and management of quality to favor the multiplication of smart industries

The transformation of an industry into a smart industry is an innovation

institutional and technical standards are a useful tool to get started

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## **STANDARDS CITED**

- FONDONORMA 1152-08 Thermoplastics. Determination of mass and volume flow rate.

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- ISO 1133-05 Plastics-Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics.
- COVENIN 461-90 PLASTICS. Density determination.
- ASTM D 1505-10 Standard Test Method for Density of Plastics by the Density-Gradient Technique.
- ISO 1183-2-04 Method for Determining the Density of Non-cellular Plastics. Density Gradient Column Method.
- COVENIN 1210-77 Test method to determine the yellowness index of plastics.
- *ASTM E 313-10 Standard Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates.*
- COVENIN 1392-88 Plastic Containers. LDPE Plastic Bags for Supermarkets and Related (T-shirt Type).
- COVENIN 1010-87 Plastic Containers. LDPE Plastic Bags for Garbage Type A, type B and Pathogenic bags
- FONDONORMA 2305-0 Bags of Polyethylene for the Transport of Values and/or Documents. Requirements
- ISO 2528-85 Packaging - Complete, filled transported packages - Vertical impact test by dropping.
- FONDONORMA 2557-2014 Resistance to the Traction
- ASTM D 882-12 Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
- COVENIN 463 -94 Plastic Films. Determination of the Coefficient of Friction
- ASTM D 1894-11E1 Standard Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting. COVENIN 837-95 Flexible polyolefin packings. Combined. Determination of the Seal Strength and Coefficient of the Sealing
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- COVENIN 3328-97 Determination of the Maximum Extractable Fraction in N-hexane of Olefinic polymers intended to be in food contact
- COVENIN 3313-97 Determination of the Maximum Xylene Soluble Fraction of Olefinic Polymers Intended to be in
- ASTM D1998-06 Standard Specification for Polyethylene Upright Storage Tanks.
- FONDONORMA 3839-04 Polyethylene (PE). Pipes for Gas Conduction. Requirements. Metric Series
- FONDONORMA 3833-06 Polyethylene (PE). Pipes for the conduction of water
- FONDONORMA 1710-07 Plastics. Determination of the black content of smoke and its degree of dispersion in

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- ASTM D 3895-14 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry.
- ISO 13479-09 Polyolefin pipes for the conveyance of fluid - Determination of resistance to crack propagation - Test method for slow crack growth on notched pipes.
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