INNOVATE
IMPROVE
PERFORM

IIP S.R.L.

Certification, Inspections, Tests and Training

Thanks to advanced and qualified test laboratories for the mechanical-performance and chemical characterization of materials and products in plastic, rubber, paper and cardboard, we support companies in testing activities.

TESTS LIST

PRODUCT CERTIFICATION

BRCGS, CE marking for building products, IIP UNI, PIIP, Recyclass, ...

MANAGEMENT SYSTEMS CERTIFICATION

Quality, Automotive Quality, Environment, Safety, Energy, ...

SUSTAINABILITY

ISCC PLUS Certification, Second Life Plastic (PSV),
Life Cycle Assessment (LCA),
Environmental Product Declaration (EPD), ...

TRAINING AND TECHNICAL SUPPORT

Provide useful notions to improve the knowledge of professionals
and to make them a key resource within the organization in which they operate

TESTING

IIP has laboratories accredited by Accredia (National System for the accreditation of certification and inspection bodies) in compliance with the UNI CEI EN ISO / IEC 17025: 2018 standard, for the measurement-determination of the physical-mechanical and chemical characteristics of various materials

Physical-Chemical Laboratory

IIP supports companies across different sectors (such as polymer and compound production, recycling, automotive, packaging industry, insulation for construction, medical...) by conducting all necessary tests for the **characterization of polymeric materials and their related products**. The laboratory also identifies causes of **breakages and/or malfunctions** in specific applications, utilizing a variety of analytical techniques.

Chemical-Sensory Laboratory

IIP assists companies needing to demonstrate compliance with mandatory and/or voluntary requirements related to products made of plastic, paper, cardboard, multi-layered materials, and other types of materials used in various fields. These include compliance with **MOCA legislation**, **Italian Ministerial Decree 174** (for drinking water), **REACH-SVHC** Regulation, **RoHS** Regulation, **FDA** (Food and Drug Administration), and **analytical studies**.

Mechanical Laboratory

IIP supports companies in verifying compliance with mandatory and/or voluntary requirements and product standards applicable to **plastic pipes and fittings** used for potable water, gas, wastewater transport, and their respective raw materials (**PE100RC**, **PE**, **PP**, **PVC**...). These tests can also be used to issue and subsequently maintain **product certifications** or **to verify specific production batches**.

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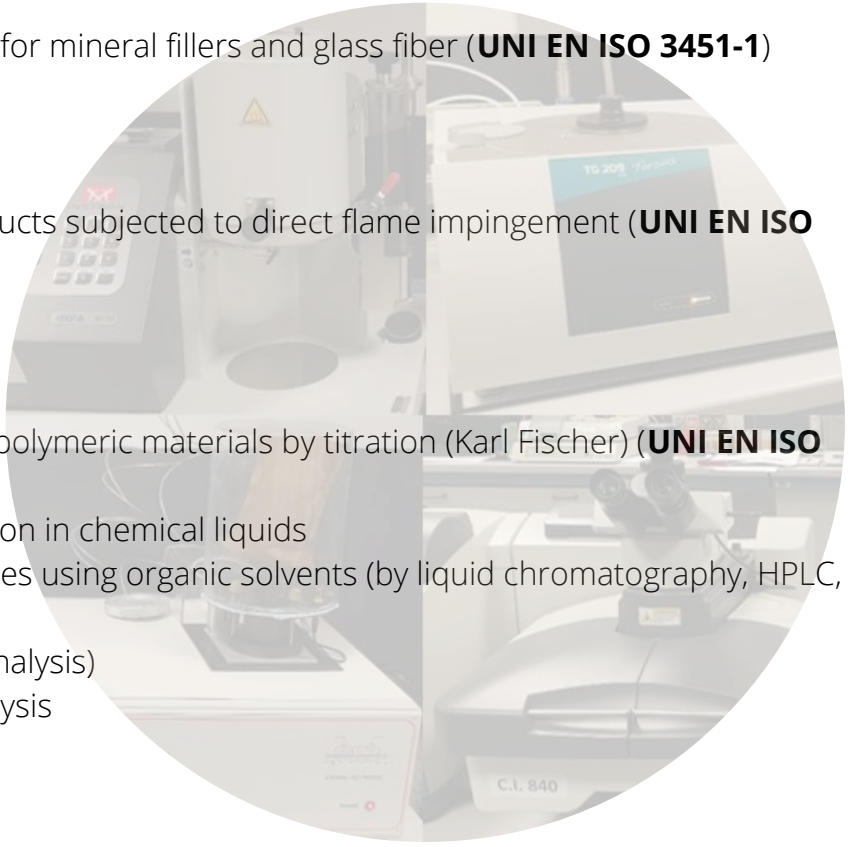
PHYSICAL-CHEMICAL LABORATORY TESTS LIST

CHARACTERIZATION OF MATERIALS

· Identification of the chemical nature of materials (**Infrared Spectroscopy (FT-IR) with ATR or transmission**)
· Spot analysis with determination of the chemical nature and size of defects/inclusions (**Raman Spectroscopy**)
· Stratigraphic analysis with determination of thickness and chemical nature of various layers (**Raman Spectroscopy**)
· X-ray fluorescence analysis for qualitative elemental analysis (**XRF Spectrophotometry**)
· Transmittance analysis (**UV-VIS Spectroscopy**)
· Differential Scanning Calorimetry (DSC) from – 40°C to + 600°C for determining thermal transitions of materials (Glass transition temperature, Crystallization temperature, Melting temperature, crystallinity) and associated energies (**UNI EN ISO 11357-2**, **UNI EN ISO 11357-3**)
· Differential Scanning Calorimetry (DSC) for determining oxidation induction time – OIT (**UNI EN ISO 11357-6**)
· TGA (Thermogravimetric Analysis) for quantification of additives, plasticizers, fillers, and carbon black content (**UNI EN ISO 11358-1**)
· Ash determination in a muffle furnace for mineral fillers and glass fiber (**UNI EN ISO 3451-1**)



FLAMMABILITY TESTS

· Fire reaction tests – Ignitability of products subjected to direct flame impingement (**UNI EN ISO 11925-2)**
· Fire classification according to **UL94**

CHEMICAL TESTS

· Determination of moisture content in polymeric materials by titration (Karl Fischer) (**UNI EN ISO 15512 Method B1**)
· Determination of the effect of immersion in chemical liquids
· Determination of extractable substances using organic solvents (by liquid chromatography, HPLC, or gas chromatography GC-MS-MS)
· ICP-OES Spectroscopy (for inorganic analysis)
· VOC (Volatile Organic Compound) analysis
· SVHC, REACH, and ROHS analysis

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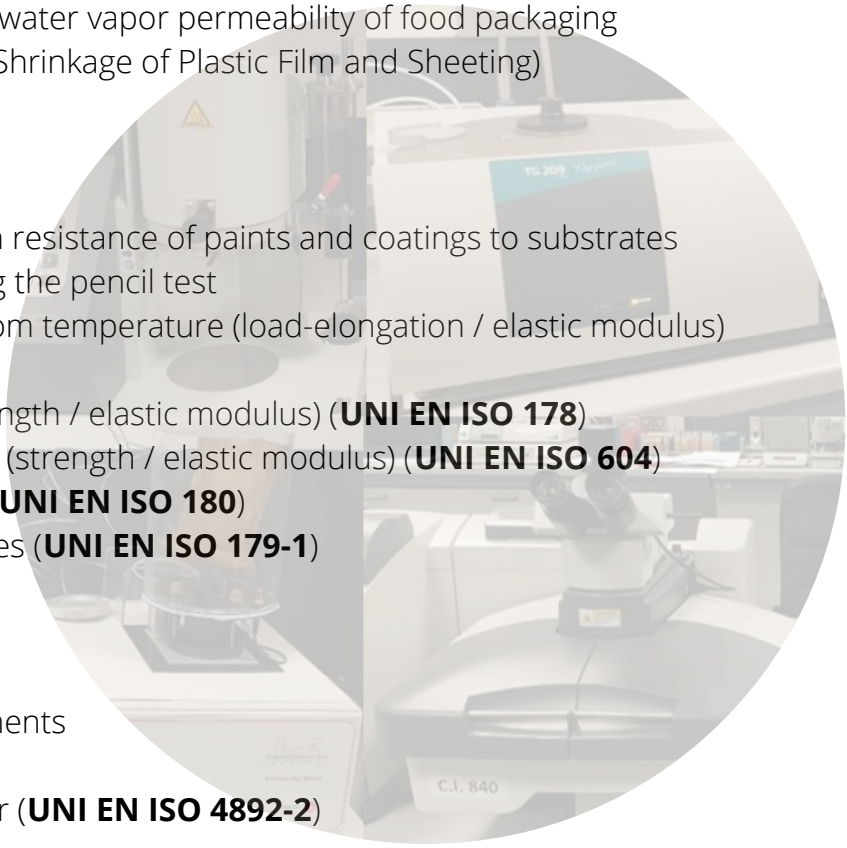
PHYSICAL-CHEMICAL LABORATORY TESTS LIST

SPECIMEN PREPARATION

· Injection molding of test specimens
· Preparation of specimens from finished products

PHYSICAL-MECHANICAL TESTS

• Determination of tensile properties from 100°C to 350°C (load-elongation / elastic modulus) (**UNI EN ISO 527-2**)
· Determination of density **(UNI EN ISO 1183-1 Method A**)
· Hardness measurement using a durometer (Shore hardness A-D) (**UNI ISO 48-4**)
· Determination of static and dynamic coefficients of friction for films or sheets (**UNI EN ISO 8295 / ASTM D1894**)
· Dart Drop Impact Test for determining the impact resistance of packaging materials such as plastic films, laminates, and paper by a free-falling dart (**ISO 7765-1**)
· Determination of oxygen permeability (**ASTM F2622 / ASTM D3985**), carbon dioxide permeability (**ASTM F2476**), and water vapor permeability (**ASTM F1249**) of films
· Determination of oxygen/carbon dioxide/water vapor permeability of food packaging
· Determination of longitudinal shrinkage (Shrinkage of Plastic Film and Sheeting)
· Seal strength testing (**ASTM F88/F88M**)
· Peeling resistance (**ASTM F904**)
· BCT (Box Compression Test)
· Cross-cut test for evaluating the adhesion resistance of paints and coatings to substrates
· Hardness determination of coatings using the pencil test
· Determination of tensile properties at room temperature (load-elongation / elastic modulus) (**UNI EN ISO 527-2**)
· Determination of flexural properties (strength / elastic modulus) (**UNI EN ISO 178**)
· Determination of compressive properties (strength / elastic modulus) (**UNI EN ISO 604**)
· Determination of Izod impact resistance (**UNI EN ISO 180**)
· Determination of Charpy impact properties (**UNI EN ISO 179-1**)



AGING

· Accelerated aging in hot or cold environments
· Accelerated aging in a climatic chamber
· Accelerated aging in a Xenon arc chamber (**UNI EN ISO 4892-2**)
· Accelerated aging in a UV chamber

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PHYSICAL-CHEMICAL LABORATORY TESTS LIST

RHEOLOGICAL TESTS

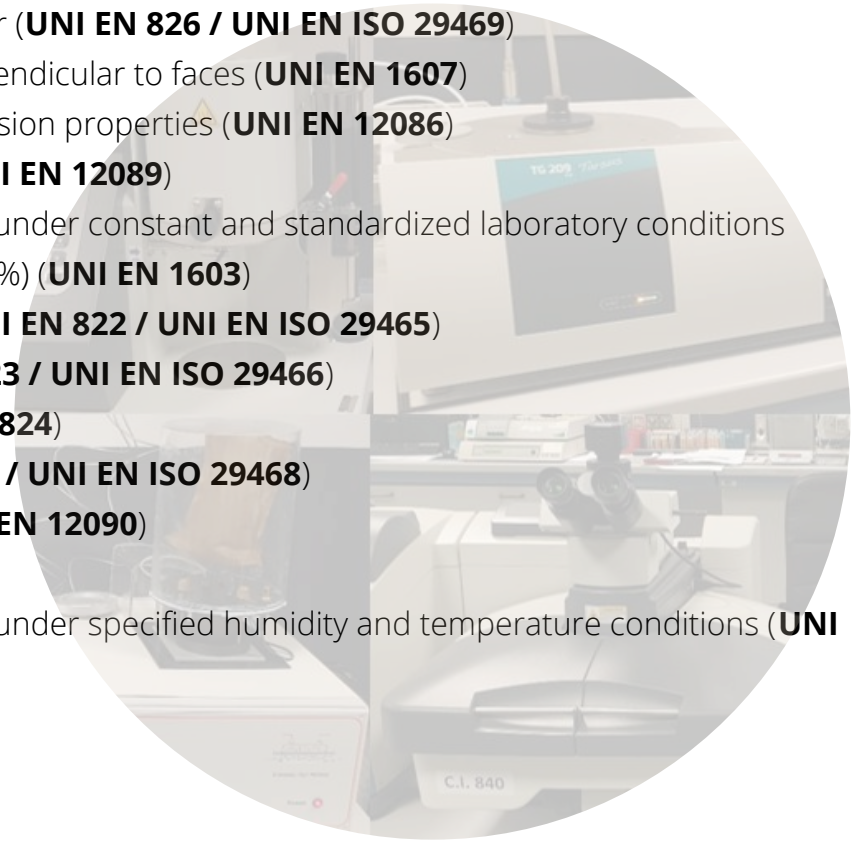
· MFI (Melt Flow Index) for the viscosity properties of polymers (**UNI EN ISO 1133-1**)
· Polyamides – Determination of viscosity number (**UNI EN ISO 307**)
· Polyesters (e.g., PET) – Determination of intrinsic viscosity (**ASTM D4603**)

THERMAL TESTS

· Determination of Vicat softening temperature (VST) (**UNI EN ISO 306**)
· Determination of heat deflection temperature (HDT) (**UNI EN ISO 75-1**)

SPECIFIC TESTS FOR THERMAL INSULATION FOR BUILDING

· Determination of thermal conductivity (**UNI EN 12667 / UNI EN 12664**)
· Determination of long-term water absorption by immersion (**UNI EN 12087 / UNI EN ISO 16535**)
· Fire classification of construction products and building elements – Part 1: Classification based on fire reaction test results (**UNI EN 13501-1, UNI EN ISO 11925-2**)
· Determination of compressive behavior (**UNI EN 826 / UNI EN ISO 29469**)
· Determination of tensile strength perpendicular to faces (**UNI EN 1607**)
· Determination of water vapor transmission properties (**UNI EN 12086**)
· Determination of flexural behavior (**UNI EN 12089**)
· Determination of dimensional stability under constant and standardized laboratory conditions (temperature 23 °C/relative humidity 50%) (**UNI EN 1603**)
· Determination of length and width (**UNI EN 822 / UNI EN ISO 29465**)
· Determination of thickness (**UNI EN 823 / UNI EN ISO 29466**)
· Determination of squareness (**UNI EN 824**)
· Determination of flatness (**UNI EN 825 / UNI EN ISO 29468**)
· Determination of shear behavior (**UNI EN 12090**)
· Apparent density (**UNI EN 1602**)
· Determination of dimensional stability under specified humidity and temperature conditions (**UNI EN 1604**)



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CHEMICAL-SENSORY LABORATORY TESTS LIST

TESTS IN THE CONTEXT OF MOCA LEGISLATION

· Overall migration in simulants A, B, C, D1, D2, E, and substitute oil simulants (isooctane and ethanol) (**UNI EN 1186**)
· Specific migration of substances subject to legal limits in simulants A, B, C, D1, D2, E, and substitute oil simulants (isooctane and ethanol) (**UNI EN 13130**)
· Content of substances subject to legal limits according to legislation
· Specific migration of primary aromatic amines (spectrophotometric and chromatographic methods)
· Specific migration of metals (**UNI EN ISO 11885**)
· Specific migration of colorants (spectrophotometric method)
· Screening tests for NIAS determination
· SET-OFF analysis
· Performance tests
· Olfactory and gustatory sensory tests (**UNI 10192 / UNI EN 1230**)

SOME OF THE MAIN ANALYTICAL TECHNIQUES

· Gas chromatography (HS-GC-FID/ECD, HS-GC-MS, HS-GC-MS-MS...)
· Liquid chromatography (HPLC)
· ICP-OES spectroscopy
· UV-VIS spectroscopy
· XRF spectrophotometry
· Microwave digestion
· Accelerated solvent extraction (ASE)

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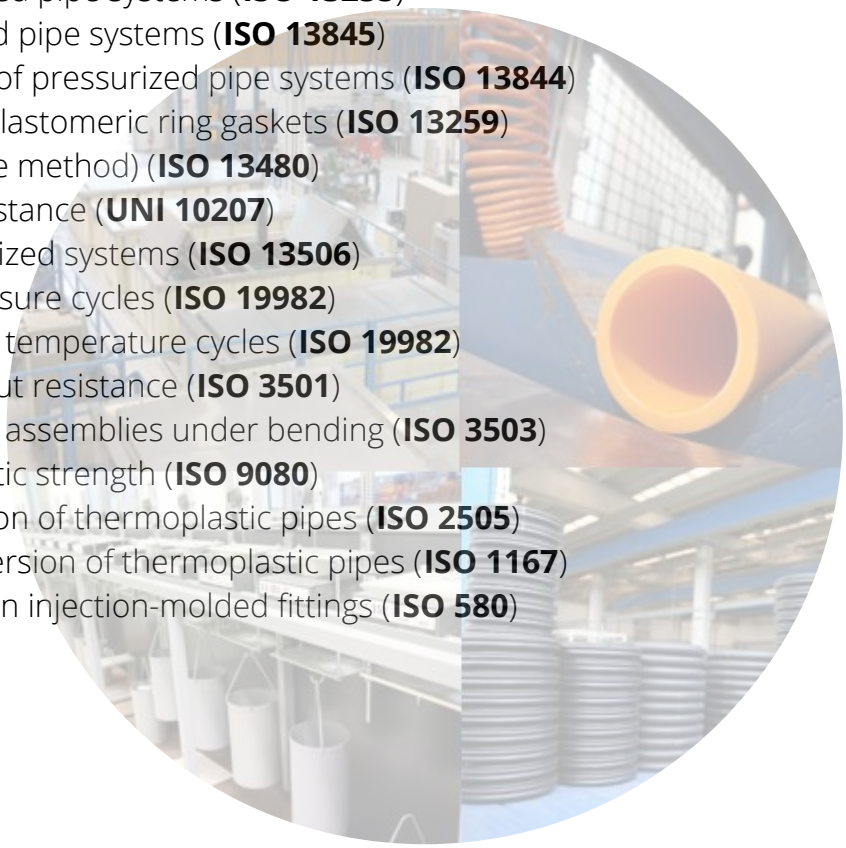
MECHANICAL LABORATORY TESTS LIST

SPECIFIC TESTS FOR PIPES, FITTINGS, VALVES AND SYSTEMS

· Verification of geometric characteristics (**ISO 3126**)
· Internal pressure resistance (20°C, 60°C, 80°C, 95°C, 110°C) (**ISO 1167**)
· Resistance to slow crack growth (SCG) (**ISO 13479**)
· Crack propagation resistance under cyclic loading (CRB) (**ISO 18489**)
· Determination of the strain hardening modulus (SHT) (**ISO 18488**)
· Environmental stress cracking resistance (ESC) of polyethylene (FNCT) (**ISO 16770**)
· Resistance to rapid crack propagation (RCP) (**ISO 13477**)
· External impact resistance (Round Clock method) (**ISO 3127**)
· Impact resistance of a saddle branch connection (**EN 1716**)
· Verification of valve integrity after external impact (**EN 1705**)
· Determination of valve opening, closing, and operational torque (**ISO 8233**)
· Determination of pipe ring stiffness (**ISO 9967**)
· Water tightness testing of non-pressurized pipe systems (**ISO 13254**)
· Air tightness testing of non-pressurized pipe systems (**ISO 13255**)
· Water tightness testing of pressurized pipe systems (**ISO 13845**)
· Negative pressure resistance testing of pressurized pipe systems (**ISO 13844**)
· Verification of the seal of joints with elastomeric ring gaskets (**ISO 13259**)
· Resistance to slow crack growth (cone method) (**ISO 13480**)
· Determination of stress-cracking resistance (**UNI 10207**)
· Vacuum resistance testing of pressurized systems (**ISO 13506**)
· Verification of joint resistance to pressure cycles (**ISO 19982**)
· Verification of assembly resistance to temperature cycles (**ISO 19982**)
· Verification of mechanical joint pull-out resistance (**ISO 3501**)
· Verification of the seal of pressurized assemblies under bending (**ISO 3503**)
· Determination of long-term hydrostatic strength (**ISO 9080**)
· Determination of longitudinal reversion of thermoplastic pipes (**ISO 2505**)
· Determination of circumferential reversion of thermoplastic pipes (**ISO 1167**)
· Verification of the effects of heating on injection-molded fittings (**ISO 580**)



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