



PE-RT KATALOG

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HAKKIMIZDA ABOUT US

UPLAST'ın üretimi, PE toprak altı sulama boruları, PE-RT boruları, PPR-C boruları ve ek parçaları, PVC atık su boru ve ek parçaları, yumuşak PVC hortumlar, PVC spiral ve jakuzi hortumları, PVC spiral emici-verici hortumlar, PVC yağmur olukları ve ek parçalarını kapsamaktadır. Ürünlerimizi iç piyasa ve Orta Doğu, Türkî Cumhuriyetler, Balkanlar ve Rusya gibi ülkelere distribütörler ve güçlü bayi ağları aracılığıyla ulaştırmaktayız. Kurulduğu günden itibaren “Önce Kalite” ilkesi ile yola çıkan ve bu ilkesinden ödün vermeyen firmamız ürün bazında sahip olduğu TSE Ürün Kalite Belgelerinin yanına ISO 9001-2015 Kalite Sistem Belgesini de ekleyerek belirlediği hedeflerine emin adımlarla ilerlemekte ve Türk plastik sektörünün öncü kuruluşları arasındaki yerini sürekli yükseltmektedir.

UPLAST boru sistemleri TS EN 1329-1, TS EN 607, TS EN ISO 15874-2, TS EN ISO 15874-3, TS 13715, TS EN 22391-2 Türk ve Alman Standartlarına uygun olarak üretilir. Ürünlerimiz GOST-R (Russia), UKR Sepdo (Ukraine) gibi uluslararası kuruluşlar tarafından sertifikalandırılmıştır.

Production of UPLAST includes PE underground watering pipe, PE-RT pipe, PPR-C Installation Pipe and Fittings, PVC Waste Water Pipe & Joints, PVC Watering Hoses, PVC Sprall Basin Hoses, Sprall Suction & Discharge Hose, Roof&Rain Gutters And Fittings. We have been marketing our products in the domestic market and The Middle East, Turkish Republics, various countries such as Balkan States and Russia via distributors and powerful dealer nets. Our company, which set off with the “Quality First” principle and has never conceded this principle since it's foundation, advances towards its established targets through strong steps, and continuously elevates its position among leading companies in the Turkish plastic processing industry, by adding an ISO 9001 Quality System Certificate beside the TSE Product Quality certificate it has on product basis. UPLAST pipe systems are manufactured in compliance with Turkish and German Standards TS EN 1329-1, TS EN 607, TS EN ISO 15874-2, TS EN ISO 15874-3, TS 13715, TS EN 22391-2. Our products are certified by national corporation such as GOST-R(Russia), UKR Sepro (Ukraine)





GİRİŞ INTRODUCTION

PE-RT boru ısıya dayanıklı Polietilen borunun (Polyethylene of Raised Temperature) kısaltılmış halidir. TİP2 denilen PE-RT hammaddesinden üretilmektedir. PE-RT hammaddesi, lineer polietilen polimeri ile Octene-1 ko-monomerinin kopolimerizasyonu ile üretilen bir ko-polimerdir. Bu polimere etilen-okten kopolimeri adı verilmektedir. PE-RT, ısı direnci artırılmış polietilen malzemedir. Boru üretiminde kullanım için geliştirilmiş, PEX boru ürünlerine alternatif bir malzemedir. Çapraz bağlanma gerçekleştirilmeksizin geliştirilen bu malzeme yüksek ve düşük sıcaklık dayanımı, yüksek basınç dayanımı, mükemmel esneklik ve uzun ömürlü olmak gibi üst düzey özelliklere sahiptir. En yaygın kullanım alanı yer altı ısıtma sistemleri ve radyatör bağlantılarıdır. Endüstriyel mühendislik plastikleri ile rekabettir ve maliyeti makul seviyelerdedir. PE-RT boru, PEX'in sağladığı tüm özellikleri karşılaması yanında çapraz bağlanma prosesi gerçekleştirilmeden çok katmanlı boru üretiminde bilinen PE üretiminde olduğu gibi ekstrüde edilebilmektedir.

UPLAST PE-RT boru sistemleri üretimi TS EN 22391-2 standardına uygun olarak gerçekleştirilmektedir.

PE-RT pipe is the abbreviation of heat resistant Polyethylene pipe (Polyethylene of Raised Temperature). It is produced from PE-RT raw material called TYPE2. PE-RT raw material is a co-polymer produced by copolymerization of linear polyethylene polymer and Octene-1 co-monomer. This polymer is called ethylene-octene copolymer. PE-RT is a polyethylene material with increased thermal resistance. It is an alternative material to PEX pipe products, developed for use in pipe production. Developed without cross-linking, this material has high-level properties such as high and low temperature resistance, high compressive strength, excellent flexibility and longevity. The most common areas of use are underground heating systems and radiator connections. It is competitive with industrial engineering plastics and its cost is reasonable. In addition to meeting all the features provided by PEX, PE-RT pipe can be extruded without performing the cross-linking process, as in the known PE production in multi-layer pipe production.

UPLAST PE-RT pipe systems are produced in accordance with TS EN 22391-2 standard.





SİSTEMİN GENEL ÖZELLİKLERİ MAIN CHARACTERISTICS OF THE SYSTEM

- PE-RT Tip 2 hammaddesinden üretilen borular çapraz bağlanma olmaksızın yüksek sıcaklıkta uzun süreli hidrostatik mukavemet sağlar.
Pipes produced from PE-RT Type 2 raw material provide long-term hydrostatic strength at high temperatures without cross-linking.
- Çevre ile dost, geri dönüştürülebilir hammadden üretilmektedir.
It is produced with environmentally friendly, recyclable raw materials.
- Çapraz bağlanmayı sağlayan kimyasal maddeler içermediğinden içme suyunda güvenle kullanılabilir.
It can be used safely in drinking water as it does not contain chemicals that provide cross-linking.
- Elastikiyeti yüksektir. Kıvrılabilir, bükülebilir.
It has high elasticity. It can be bent.
- Esnek yapısı sayesinde ısıtmaya gerek kalmadan daha az ek parça ile kolay kurulum sağlanabilir.
Due to its flexible structure, it can be easily installed with less additional parts without the need for heating.
- Hafif ve taşınması kolaydır.
Lightweight and easy to transport.





SİSTEMİN GENEL ÖZELLİKLERİ MAIN CHARACTERISTICS OF THE SYSTEM

Borular üzerine oksijen geçirimini engelleyen özel bir malzeme kaplanmasıyla üretilirler. Bu özel kaplama boru içindeki suya oksijenin geçmesini engelleyerek sistem parçaların iç kısmının korozyonu önlenir.

- They are produced by coating a special material that prevents oxygen permeation on the pipes. This special coating prevents the passage of oxygen into the water in the pipe, preventing corrosion of the interior of the system parts.
- Boru iç yüzeyinde kireçlenme oluşmaz.
No calcification occurs on the inner surface of the pipe.
- Boruda iç çap daralması görülmez.
No internal diameter shrinkage is observed in the pipe.
- Donmaya karşı dayanıklıdır.
It is resistant to freezing.
- Kimyasallara karşı yüksek direnç gösterir.
It shows high resistance to chemicals.

Kılıflı PE-RT boru alternatifi ile mobil döşeme sistemlerinde borularda oluşabilecek hasar ve tahribatlarda döşeme bozulmadan boruların değişimini mümkün kılar. Şap ile boru arasında hava boşluğu oluşturarak ısı yalıtımını sağlar, enerji kaybını azaltır. Tesisatta borunun boyutsal değişimine imkân sağlayarak malzemedeki iç gerilmeleri engeller.

- With the sheathed PE-RT pipe alternative, it makes it possible to change the pipes without spoiling the floor in case of damage and destruction that may occur in the pipes in mobile flooring systems. By creating an air gap between the screed and the pipe, it provides thermal insulation and reduces energy loss. It prevents the internal stresses in the material by allowing the dimensional change of the pipe in the installation.





HAMMADDE ÖZELLİKLERİ RAW MATERIAL PROPERTIES

PE-RT Borular, PE-RT Tip 2 sıcaklık ve basınç dayanımı arttırılmış özel hammaddeden üretilmektedir. Çapraz bağlanma gerçekleştirilmeksizin geliştirilen bu malzeme yüksek ve düşük sıcaklık dayanımı, yüksek basınç dayanımı, mükemmel esneklik ve uzun ömürlü olmak gibi üst düzey özelliklere sahiptir.

PE-RT Pipes are produced from special raw material with increased PE-RT Type 2 temperature and pressure resistance. Developed without cross-linking, this material has high-level properties such as high and low temperature resistance, high compressive strength, excellent flexibility and longevity.

ÖZELLİKLER / PROPERTIES	DEĞERLER / VALUES	BİRİMLER / UNIT	KONTROL METODLARI / TEST METHOD
Yoğunluk/Density	0.941	g /cm 3	ASTM D 1505
Eriyik Akış İndeksi (190 °C) / 2.16 kg / Melt Index	0.14	g /10 min	ASTM D 1238
Eriyik Akış İndeksi (190 °C) / 5 kg / Melt Index	0.45	g /10 min	ASTM D 1238
Vicat Yumuşama Noktası / Vicat Softening Temperature	122	° C	ASTM D 1525
Erime Noktası / Melting Temperature	126	° C	ASTM D 3418
Azami Çekme Dayanımı / Tensile Strength at Break	430	Kg / cm ^ 2	ASTM D 638
Azami Uzama / Elongation at Break	850	%	ASTM D 638
Eğilme Modülü / Flexural Modulus	1200	Kg / cm ^ 2	ASTM D 790



PE-RT MOBİL SİSTEM BORU VE EKLEME PARÇALARI

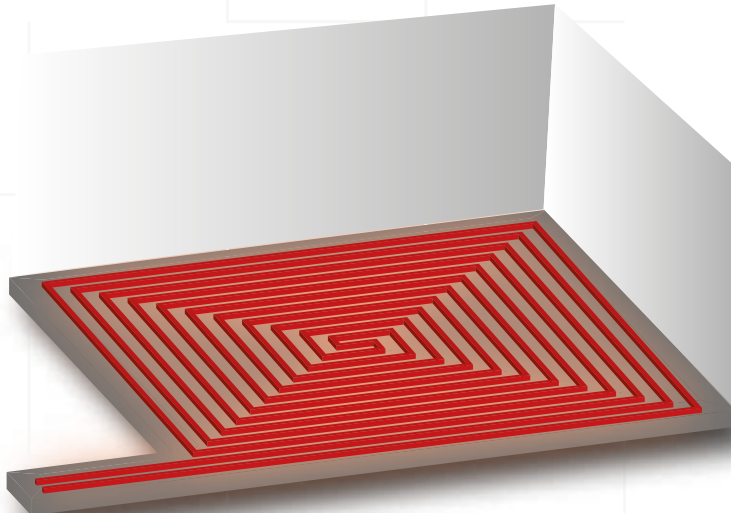
PE-RT PIPES AND FITTINGS

UPLAST PE-RT boru ve ekleme parçaları yürürlükte olan Avrupa standardı TS -EN- ISO 22391 -2 standardına uygun olarak ve aşağıdaki formlarda üretilir.

UPLAST PE-RT pipes and fittings are produced in accordance with the current European standard TS -EN- ISO 22391-2 and in the following forms.

- PE-RT Boru
PE-RT Pipe
- PE-RT Kılıflı Boru
PE-RT Sheated Pipe
- PE-RT Oksijen Bariyerli Boru
PE-RT Oxygen Barrier Pipe
- PE-RT Oksijen Bariyerli Kılıflı Boru
PE-RT Oxygen Barrier Sheated Pipe
- C sınıfı PE-RT boru boyutları aşağıdaki tabloya uygun olmalıdır.
C class PE-RT pipe dimensions should be in accordance with the table below.

Nominal Size DN / OD	Nominal Outside Diameter dn	Mean Outside Diameter dem,min	Mean Outside Diameter dem,max	Wall Thicknesses emin and en	Scale
12	12	12,0	12,3	2,0	2,5
14	14	14,0	14,3	2,0	3,0
15	15	15,0	15,3	2,0	3,2
16	16	16,0	16,3	2,0	3,5
17	17	17,0	17,3	2,0	3,8
18	18	18,0	18,3	2,0	4,0
20	20	20,0	20,3	2,0	4,5

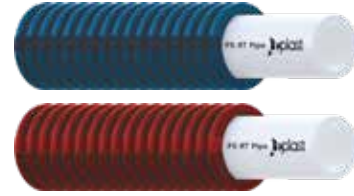




PE-RT MOBİL SİSTEM BORU VE EKLEME PARÇALARI PE-RT PIPES AND FITTINGS



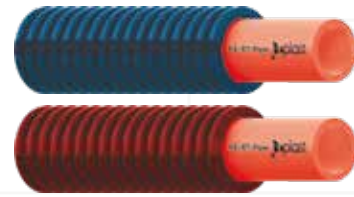
PE-RT BORU / PE-RT PIPE



PE-RT KILIFLI BORU / PE-RT SHEATED PIPE



PE-RT OKSİJEN BARIYERLİ BORU
/ PE-RT OXYGEN BARRIER PIPE



PE-RT OKSİJEN BARIYERLİ KILIFLI BORU
/ PE-RT OXYGEN BARRIER SHEATED PIPE



PE-RT MOBİL SİSTEM BORU VE EKLEME PARÇALARI PE-RT PIPES AND FITTINGS



KÖŞE DÜZELTİCİ / CORNER CORRECTOR



YERE TESPİT DUBELİ / GROUND FIXING ANCHOR



KLİPSLİ LAMA /CLIPED LAMA



U BORU TUTUCU / U PIPE HOLDER



ÇALIŞMA KOŞULLARI OPERATION CONDITIONS

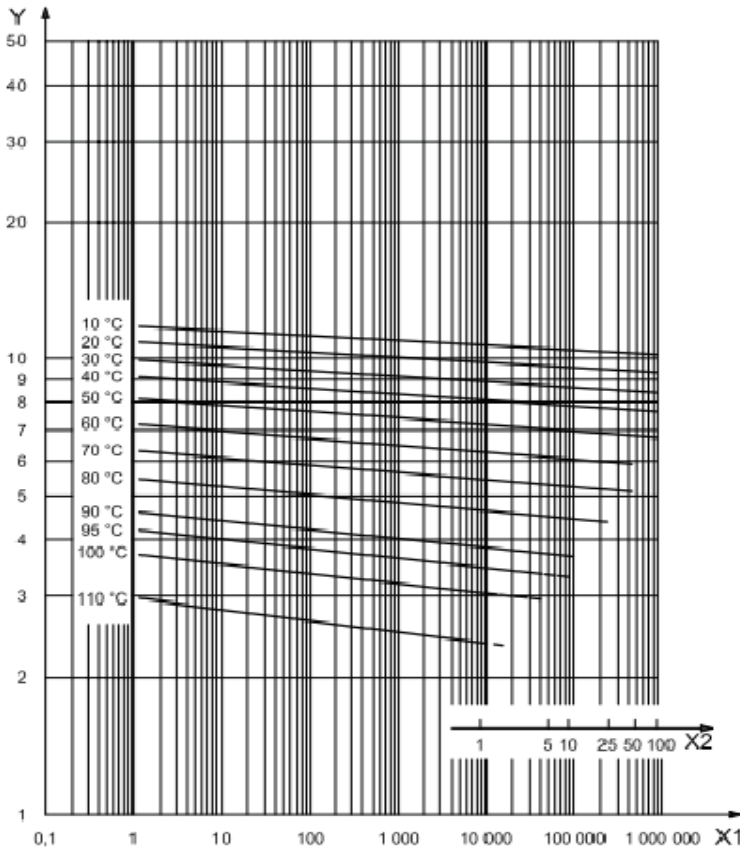
GERİLME EĞRİLERİ / SERVİS ÖMRÜ REGRESSION CURVES / SERVICE LIFE

Gerilme eğrisi basınç ve çalışma sıcaklığına bağlı olarak, boru hattının davranışını gösterir. Çevresel gerilme eğrisi, boru et kalınlığına etki eden çevresel gerilmenin bir fonksiyonu olarak, boru sisteminin ortalama ömrünü belirler. Bu eğriler çevresel gerilmeyi hesaplamak için kullanılabilir.

plamak için kullanılabilir.

Regression curves show the behavior of pipeline depending on pressure and operating temperature. It establishes the average life expectancy of a pipe line as function of hoop stress acting on the pipe walls. These curves can be used to calculate the hoop stress.

UPLAST PE-RT Boruların Servis Ömrü Grafiği Service Life Graphic of UPLAST PE-RT Pipes



X1 : Zaman (saat) / Hasarlanma Süresi //time,t,to fracture,expressed in hours

X2 : Zaman (yıl) / Hasarlanma Süresi // time,t,to fracture,expressed in years

Y : Çevresel Gerilme (Mpa) / Hidrostatik Gerilme // hoop stress, expressed in megapascal



ÇALIŞMA KOŞULLARI OPERATION CONDITIONS

BASINÇ DAYANIMI TABLOSU
PRESSURE RESISTANCE TABLE

Yıl Year	Sıcaklık (°C) Temperature	16*2 mm PE-RT Boru Basınç (bar) Pressure	Yıl Year	Sıcaklık (°C) Temperature	16*2 mm PE-RT Boru Basınç (bar) Pressure
1	20	18,6	1	60	12,0
5	20	18,2	5	60	11,7
10	20	18,1	10	60	11,5
25	20	17,9	25	60	11,4
50	20	17,8	50	60	11,2
1	30	16,9	1	70	10,3
5	30	16,6	5	70	10,1
10	30	16,5	10	70	9,9
25	30	16,3	25	70	9,8
50	30	16,1	50	70	9,6
1	40	15,3	1	80	8,8
5	40	15,0	5	80	8,5
10	40	14,8	10	80	8,4
25	40	14,6	25	80	8,2
50	40	14,5	50	80	-
1	50	13,6	1	95	6,5
5	50	13,3	5	95	6,3
10	50	13,2	10	95	6,2
25	50	13,0	25	95	-
50	50	12,9	50	95	-

Güvenlik Faktörü / Safety Factor: 1.5

Isı iletkenlik Katsayısı / Coefficient of Thermal Conductivity: 60 °C 'de 0.4 W /m

Isıl Genleşme Katsayısı / Coefficient of Thermal Expansion : 0.15 mm /mK



MONTAJ YÖNTEMİ INSTALLATION METHODS

Pe -Rt boru montajı öncesi hesaplamalar yapılmalıdır. Kollektörün yeri ve mesafeler tespit edilmelidir.

Calculations should be made before installing the Pe -Rt pipe. The location of the collector and the distances should be determined.

Sıcak ve soğuk su boruları birbiri üzerinden geçmeyecek şekilde ayarlanmalıdır.

Hot and cold water pipes should be arranged so that they do not cross each other.

Basınç dengesinin sağlanabilmesi için sistemde kullanılan gidiş ve dönüş borularının uzunluklarının aynı olması gerekmektedir.

In order to ensure pressure balance, the lengths of the flow and return pipes used in the system must be the same.

Kollektör yüksekliği minimum 50 cm yüksekte olmalıdır.

Collector height must be at least 50 cm high.

Sistemin kurulacağı ortamın yüzey alanına göre uygulama yapılması gerekmektedir.

It is necessary to apply according to the surface area of the environment where the system will be installed

Uygulama yapılacak düz zemin üzerine izolasyon malzemesi olarak strafor döşenir. Strafor üzerine yerden ısıtma boruları yerleştirilir ve klipsli lamalar ile sabitlenir.

Styrofoam is laid as insulation material on the flat surface where the application will be made. Underfloor heating pipes are placed on the styrofoam and fixed with clips

Tesisatın bitişindeki kollektöre sıcak ve soğuk borular monte edilir.

Hot and cold pipes are mounted to the collector at the end of the installation.

Montaj işlemi bittikten sonra basınç testi yapılır. Kaçak olup olmadığı kontrol edilir. Sonrasında zemin şap ile kaplanır.

After the assembly process is completed, a pressure test is performed. Check for leaks. Then the floor is covered with screed.

Şap atıldıktan sonra basınç testi tekrarlanır. Bir problem olmaması durumunda zemin kaplaması yapılabilir.

After the screed is coated, the pressure test is repeated. If there is no problem, floor covering can be done.



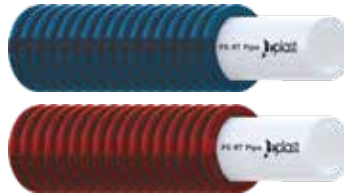


ÜRÜNLER PRODUCTS



PE-RT BORU / PE-RT PIPE

PE-RT BORU / PE-RT PIPE		
ÜRÜN KODU//PRODUCT COD	ÇAP // DIAMETER / mm	PAKET ADEDİ // PACKAGE QTY
1500-000016	16x2mm	160



PE-RT KILIFLI BORU / PE-RT SHEATED PIPE

PE-RT KILIFLI BORU / PE-RT SHEATED PIPE		
ÜRÜN KODU//PRODUCT COD	ÇAP // DIAMETER / mm	PAKET ADEDİ // PACKAGE QTY
1500-160016-5	16x2mm (mavi)	100
1500-160016-9	16x2mm (kırmızı)	100

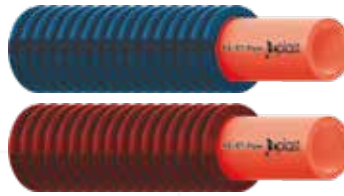


ÜRÜNLER PRODUCTS



PE-RT BORU / PE-RT PIPE

PE-RT BORU / PE-RT PIPE		
ÜRÜN KODU//PRODUCT COD	ÇAP // DIAMETER / mm	PAKET ADEDİ // PACKAGE QTY
1500-000162	16x2mm	160



PE-RT KILIFLI BORU / PE-RT SHEATED PIPE

PE-RT KILIFLI BORU / PE-RT SHEATED PIPE		
ÜRÜN KODU//PRODUCT COD	ÇAP // DIAMETER / mm	PAKET ADEDİ // PACKAGE QTY
1500-162162-5	16x2mm (mavi)	100
1500-162162-9	16x2mm (kırmızı)	100



ÜRÜNLER PRODUCTS



KÖŞE DÜZELTİCİ / CORNER CORRECTOR

KÖŞE DÜZELTİCİ / CORNER CORRECTOR		
ÜRÜN KODU//PRODUCT COD	ÇAP // DIAMETER / mm	PAKET ADEDİ // PACKAGE QTY
2512-00020	16	150



YERE TESPİT DUBELİ / GROUND FIXING ANCHOR

YERE TESPİT DUBELİ / GROUND FIXING ANCHOR		
ÜRÜN KODU//PRODUCT COD	ÇAP // DIAMETER / mm	PAKET ADEDİ // PACKAGE QTY
2510-000020	20mm	7500
2510-000025	25mm	5000



ÜRÜNLER PRODUCTS



KLİPSLİ LAMA / CLIPED LAMA

KLİPSLİ LAMA / CLIPED LAMA		
ÜRÜN KODU//PRODUCT COD	ÇAP // DIAMETER / mm	PAKET ADEDİ // PACKAGE QTY
2511-000025	16mm	300



U BORU TUTUCU / U PIPE HOLDER

U BORU TUTUCU / U PIPE HOLDER		
ÜRÜN KODU//PRODUCT COD	ÇAP // DIAMETER / mm	PAKET ADEDİ // PACKAGE QTY
2512-000020-1	25mm	6000



KALİTE GÜVENCE QUALITY ASSURANCE

Bütün UPLAST PE-RT ürünleri, fabrikamızın kendi kalite kontrol departmanı tarafından yapılan çok sıkı inceleme ve kontrollerinden geçerken tüm sonuçlar ve yapılan işlemler raporlanır. Kalite denetimi fabrikaya gelen hammadde ve yarı mamullerin testinden başlar. Üretimde sadece TS EN ISO 22391-2 standardına uygun yüksek kaliteli malzemeler kullanılır. Üretim kontrol ve denetim işlemleri özel, yüksek eğitimli, profesyonel çalışanlar tarafından yürütülür. UPLAST test laboratuvarı testler için gerekli olan ekipmanları kapsayacak şekilde donatılmıştır. Sadece kusursuz olarak incelenmiş ve onay verilmiş ürünlerin paketlenmesine ve bir daha ki sevkiyat için depolanmasına izin verilir. Proses parametreleri düzenli aralıklarla kontrol edilir, fabrikamızdaki kalite güvence prosedürlerine göre tanımlanır ve çıkan ürünlerin iç-dış yüzeyleri gözle kontrol edilip boyutsal kontrolleri de gerçekleştirilir.

All UPLAST PE-RT products undergo strict control and inspection made by our factory's quality control department. Also all results and processes are documented. Quality inspection starts from testing of incoming raw materials and semi-finished products. Only top quality materials that comply with international standards and requirements as TS EN ISO 22391-2 are used in further production. Production control and inspections processes are carried out by specially trained high professional employees. UPLAST testing laboratory is equipped to cover equipment that is required for the all necessary tests. Only carefully inspected products are allowed to be packed and stored for further transportation. Process parameters inspect with regular intervals and its describes due to quality assurance procedure. We control that final product's internal and external diameters and surface roughness.

Gelen Malzeme Kabulü ve Testler / Acceptance of Incoming Goods and Tests

Tedarikçilerden aldığımız tüm hammadde ve yardımcı ürünlerin teste tabi tutulmasıyla, gelen ürünlerin belirtilen şartlara uygun olması sağlanır. Gelen hammadde ve yardımcı malzemelerin her bir partiden alınan numuneleri, Giriş Kalite Kontrolleri ile; yoğunluk ve MFI gibi testlerden geçtikten sonra hammadde "Üretime Uygun" onayı alması gerekir.

All incoming raw materials and auxiliary products are subject to testing, which ensures that incoming products conform to specified requirements. Samples randomly chosen from each lot of raw materials and auxiliary materials supplied by our suppliers have to pass tests through; density and MFI materials must obtain "Suitable for Production" approval.



KALİTE GÜVENCE QUALITY ASSURANCE

Proses Sırasında Muayene ve Testler / *Inspection and Testing In-Process*

Kalite kontrol standartları, üretim öncesi ve üretim esnasındaki yapılan muayenelerle yürütülmesi gerekir. Ürünler laboratuvarımızda ulusal (TSE) standart kurumlarınca belirlenen Proses Kalite Kontrol testlerinden geçirilirler ve düzenli olarak kayıt altına alınırlar. Başlıca Proses Kalite Kontrol testleri şunlardır:

The quality-control standards require that inspections are carried out before and during production. Products in our laboratory determined by national (TSE) institutions and recorded regularly. Main Process Quality Control tests are as follows

Görünüş, boyut ve işaretleme / *Appearance, Dimension and Marking*
Boyutsal Kararlılık / *Longitudinal Reversion*
İç Basınca Dayanıklılık / *Resistance to Internal Pressure*
Termal Stabilité / *Thermal Stability by Hydrostatic Pressure Testing*
Eriyik Akış İndeksi / *Melt Mass Flow Rate (MFR)*

Son Muayene ve Deneyler / *Final Inspection and Testing*

Kalite kontrol standartları bitmiş ürünler üzerinde yapılacak muayeneler gerektirir ve tüm sonuçlar test raporlarımızda belgelenmektedir. Tüm test ve muayeneler ulusal (T.S.E.) standartlarının öngördüğü usullere uygun yapılır. Kalite onayı alan ürünlerimizin, otomatik olarak yapılan ambalaj ve paketlemeden sonra; Ambalaj Uygunluğu ve Etiket Uygunluğu gibi kontrollerden geçerek "Sevkiyata Uygun" onayı alması zorunludur. Son muayene ve testler aşağıdaki test prosedürlerini kapsar.

The quality-control standards require that inspections be carried out on all finished products and tests performed on samples from every production run. The results are documented in test reports. All tests and inspections national (TSE) standards is made in accordance with the procedures provided. Our products which obtained 'Suitable for sale' approval also have to get 'Suitable for Output' approval passing through Packaging Compliance and Label Compliance checks soon after automatic packaging and wrapping processes. The final inspection and test covers the following test procedures.



KALİTE GÜVENCE QUALITY ASSURANCE

TESTLER Tests	REFERANS STANDART Reference Standards
Görünüş, boyut ve işaretleme Appearance, Dimension and Marking	TS EN ISO 22391-2
Boyutsal Kararlılık Longitudinal Reversion	ISO 2505
İç Basınca Dayanıklılık Resistance to Internal Pressure	
1 h, 20 °C, 10,8 MPa	ISO 1167-1
22 h, 95 °C, 3.9 MPa	
165 h, 95 °C, 3.7 MPa	ISO 1167-2
1000 h, 95 °C, 3.6 MPa	
Termal Stabilité Thermal Stability by Hydrostatic Pressure Testing	
8760 h, 110 °C, 2.3 MPa	ISO 1167-1 ISO 1167-2
Eriyik Akış İndeksi Melt Mass Flow Rate (MFR)	ISO 1133-1



İLGİLİ STANDARTLAR REFERENCES STANDARDS



ISO 1133-1	Plastics — Determination of the melt volume-flow rate (MVR) and the melt mass-flow rate (MFR) of thermoplastics — Part 1: Standard method
ISO 1167-1	Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method
ISO 1167-2	Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 2: Preparation of pipe test pieces
ISO 2505	Thermoplastics pipes — Longitudinal reversion — Test method and parameters
ISO 3126	Plastics piping systems — Plastics components — Determination of dimensions
ISO 7686	Plastics pipes and fittings — Determination of opacity
ISO 9080	Plastics piping and ducting systems — Determination of long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation
ISO 13760	Plastics pipes for the conveyance of fluids under pressure — Miner's rule — Calculation method for cumulative damage
ISO 22391-1:2009	Plastics piping systems for hot and cold water installations — Polyethylene of raised temperature resistance (PE-RT) — Part 1: General
ISO 22391-3	Plastics piping systems for hot and cold water installations — Polyethylene of raised temperature resistance (PE-RT) — Part 3: Fittings
ISO 22391-5	Plastics piping systems for hot and cold water installations — Polyethylene of raised temperature resistance (PE-RT) — Part 5: Fitness for purpose of the system



KİMYASAL DİRENÇ CHEMICAL RESISTANCE

Chemical	Concentration	MATERIAL ° C		
		PE-RT		
		20	40	60
Acetaldehyde	40% aqueous solution	+	+	0
Acetaldehyde	Technically pure	+	0	
Acetic acid	50% Aqueous	+	+	+
Acetic acid	Technically pure, glacial	+	+	0
Acetic acid anhydride	Technically pure	+	0	
Acetic acid ethylester		+		
Acetic acid isobutyl ester	Technically pure	+		
Acetone	up to 10% aqueous	+	+	+
Acetone	Technically pure	+	+	+
Acetonitrile	100%	0		
Acetophenone	100%	0		
Acrylic acid methyl ester	Technically pure	0		
Acrylicethyl	Technically pure	0		
Acrylonitrile	Technically pure	+	+	+
Adipic acid	Saturated, aqueous	+	+	+
Allyl alcohol	96%	+	+	+
Ammonia	Gaseous, technically pure	+	+	+
Ammonium acetate	Aqueous, all	+	+	+
Ammonium persulphate		0		
Amonium salts, aqueous inorganic	Saturated	+	+	+
Amyl acetate	Technically pure	+	+	+
Amyl alcohol	Technically pure	+	+	+
Aniline	Technically pure	+	0	
Antimony trichloride	90% aqueous	+	+	+
Aqua regia	Mixing ratio	-		
Arsenic acid	80% aqueous	+	+	+
Barium salts, aqueous inorganic	Saturated	+	+	+
Beer	Usual commercial	+		
Benzaldehyde	Saturated, aqueous	+	+	0
Benzene	Technically pure	0	0	
Benzene sulfonic acid	Technically pure	+	+	0
Benzine (Gasoline)	Free of lead and aromatic com	+	+	
Benzoic acid	Aqueous, all	+	+	+
Benzyl alcohol	Technically pure	+	+	0
Beryllium salts, aqueous, inorganic		+	+	+
Borax	Aqueous, all	+	+	+
Boric acid	All, aqueous	+	+	+
Bromine water	Saturated, aqueous	-		
Butadiene	Technically pure	0		
Butane	Technically pure	+		
Butanediol	Aqueous 10%	+	+	+

KİMYASAL DİRENÇ CHEMICAL RESISTANCE

Butanol	Technically pure	+		
Butyl acetate	Technically pure	+		
Butyl phenol p-tertiary	Technically pure	0		
Butyleneglyco	Technically pure	+	+	+
Butylene liquid	Technically pure	-		
Butyric acid	Technically pure	+		
Cadmium salts aqueous inorganic	<Saturated acid	+	+	+
Caesium salts, aqueous, inorganic	<Saturated acid	+	+	+
Calcium acetate	Saturated	+	+	+
Calcium hydroxide	Saturated aqueous	+	+	+
Calcium lactate	Saturated	+	+	+
Calcium salts, aqueous, inorganic	Saturated acid	+	+	+
Carbon dioxide	Technically pure, anhydrous	+	+	+
Carbon tetrachloride	Technically pure	-		
Carbonic acid		+	+	+
Caro's acid				
Caustic potash solution (potassium hydroxide)	50% aqueous	+	+	+
Caustic soda solution	50% aqueous	+	+	+
Chloric acid	10% aqueous	+	+	
Chloric acid	20% aqueous	0		
Chlorine	moist, 97%, gaseous	-		
Chlorine	Liquid, technically pure, as delivered	-		
Chlorine	Anhydrous, technically pure, as delivered	0	0	
Chlorine water	saturated	0	0	
Chloroacetic acid, mono	50% Aqueous	+	+	0
Chloroacetic acid, mono	Technically pure	+	+	0
Chlorobenzene	Technically pure	0		
Chloroethanol	Technically pure	+	+	+
Chlorosulphonic acid	Technically pure	-		
Chromic acid	All, aqueous	0		
Chromic acid + water + sulphuric acid	50g 15g 35g	-		
Chromium (II)- salts, aqueous, inorganic	<Saturated acid			
Compressed air, containing oil		+	+	
Copper salts, aqueous inorganic	<Saturated acid	+	+	+
Cresol	Cold saturated, aqueous	+	+	0
Crotonic aldehyde	Technically pure	+		
Cyclohexane	Technically pure	+	+	+
Cyclohexanol	Technically pure	+	+	+
Cyclohexanone	Technically pure	+	0	0
Dextrine	Usual commercial	+	+	+
Di isobutyl ketone	Technically pure	+	0	
Dibromobenzene	<Saturated acid	0		
Dibutyl ether	Technically pure	0		
Dibutyl phthalate	Technically pure	+	0	0
Dichloroacetic acid	50% Aqueous	+	+	0



KİMYASAL DİRENÇ CHEMICAL RESISTANCE

Dichloroacetic acid	Technically pure	+	+	0
Dichloroacetic acid methyl ester	Technically pure	+	+	+
Dichlorobenzene	Technically pure	0		
Dichloroethylene	Technically pure	-		
Diesel oil		+		
Diethyl ether		-		
Diethylamine	Technically pure	+		
Dimethyl formamide	Technically pure	+	+	0
Dimethylamine	Technically pure	+		
Dioxane	Technically pure	+	+	+
Ethanolamine	Technically pure	+		
Ethyl alcohol (Ethnause)	Technically pure 96%	+	+	+
Ethyl benzene	Technically pure	0		
Ethyl chloride (G)	Technically pure	0		
Ethyl ether	Technically pure	+		
Ethylene diamine	Technically pure	+	+	+
Ethylene glycol	<50%	+	+	+
Ethylene glycol	Technically pure	+	+	+
Ethylenediamine-tetraacetic acid (EDTA)		+		
Fluorine	Technically pure	-		
Fluorosilicic acid	32% aqueous	+	+	+
Formaldehyde	40% aqueous	+	+	+
Formamide	Technically pure	+	+	+
Formic acid	<25%	+	+	+
Formic acid	up to 50% aqueous	+	+	+
Formic acid	Technically pure	+	+	+
Frigen 12 (freon 12)	Technically pure	-		
Fuel oil		+		
Furfuryl alcohol	Technically pure	+	+	+
Gelatin	All, aqueous	+	+	+
Glucose	All, aqueous	+	+	+
Glycerol	Technically pure	+	+	+
Glycin	10% aqueous	+	+	
Glycolic acid	37% aqueous	+	+	+
Heptane	Technically pure	+	+	
Hexane	Technically pure	+	+	
Hydrazine hydrate	aqueous	+	+	+
Hydrochloric acid	up to 30% aqueous	+	+	+
Hydrochloric acid	38% aqueous	+	+	
Hydrochloric acid	Technically pure	+	+	+
Hydrofluoric acid	40%	+	+	0
Hydrogen	Technically pure	+	+	+
Hydrogen chloride	Technically pure, gaseous	+	+	+
Hydrogen peroxide	30% aqueous	+		
Hydrogen peroxide	90% aqueous	0		

KİMYASAL DİRENÇ CHEMICAL RESISTANCE

Hydrogen sulphide	Saturated aqueous	+	+	+
Hydrogen sulphide	Technically pure	+	+	0
Hydroquinone	30%	+	+	+
Lodine-potassium iodide solution (Lugol's solution)		+		
Iron salts, aqueous inorganic	<Saturated acid	+	+	+
Isooctane	Technically pure	+		
Isopropyl alcohol (ESC)	Technically pure	+	+	0
Isopropyl ether	Technically pure	0		
Lactic acid	10% aqueous	+	+	+
Lead acetate	aqueous saturated	+	+	+
Lead salts, aqueous, inorganic	<Saturated acid	+	+	+
Linseed oil	Technically pure	+	+	+
Lithium salts, aqueous, inorganic	<Saturated acid	+	+	+
Magnesium salts, aqueous, inorganic	<Saturated acid	+	+	+
Maleic acid	Cold saturated, aqueous	+	+	+
Mercury	pure	+	+	+
Mercury salts	<Saturated	+	+	+
Methane (natural gas)	Technically pure	+		
Methanol	All	+	+	+
Methyl acetate	Technically pure	+		
Methyl amine	32%, aqueous	+		
Methyl bromide	Technically pure	0		
Methyl ethyl ketone	Technically pure	+		
Methyl isobutyl ketone		+		
Methyl methacrylate		+		
Methyl phenyl ketone (acetophenon)		+		
Milk		+	+	+
Mineral water		+	+	+
mixed acids -nitric 15% -hydrofluoric 15% -	3 parts 1 part 2 parts	0		
mixed acids -sulphuric -nitric -water	10 % 20 % 70 %	+		
mixed acids -sulphuric -nitric -water	50 % 33 % 17 %	-		
mixed acids -sulphuric -nitric -water	50 % 31 % 19 %	-		
mixed acids -sulphuric -phosphoric -water	30 % 60 % 10 %	+	+	+
N,N-Dimethylaniline	Technically pure	+		
N, methylpyrrolidon		+		
Naphthalene	Technically pure	+		
Nickel salts, aqueous in organic	<saturated acid	+	+	+
Nitrating acid -sulphuric acid -nitric acid -w	65 % 20 % 15 %	-		
Nitric acid	6.3% aqueous	+	+	+
Nitric acid	<25%	+	+	0
Nitric acid	65% aqueous	0	-	
Nitric acid	85%	-		
Nitric acid	100%	-		
Nitrobenzene	Technically pure	+		
Nitrotoluene (o-, m-, p-)	Technically pure	+	0	



KİMYASAL DİRENÇ CHEMICAL RESISTANCE

Nitrous acid		+		
Nitrous gases (nitric oxide)	diluted, moist, anhydrous	0		
Oleic acid	Technically pure	+	+	0
Oleum	10% SO ₃	-		
Olive oil		+	+	0
Oxygen	Technically pure	+	+	0
Ozone	up to 2%, in air	0		
Ozone	Cold saturated, aqueous	0		
Palm oil, palm nut oil		+		
Paraffin emulsions	usual commercial, aqueous	+		
Paraffin oil		+		
Perchlorid acid	10% aqueous	+		
Perchlorid acid	70% aqueous			
Perchloroethylene (tetrachlorethylene)	Technically pure	0		
Phenol	up to 10%, aqueous	+	+	0
Phenol	Up to 90%, aqueous	+	+	1
Phosgene	gaseous, technically pure	0		
Phosgene	Liquid, technically pure	-		
Phosphoric acid	85%, aqueous	+	+	+
Phosphoric acid	Upto 95%	+	+	
Phosphorous chlorides -trichloride -pentachloride	Technically pure	-		
Photographic developer	usual commercial	+	+	0
Photographic emulsions		+	+	
Photographic fixer	usual commercial	+	+	
Phthalic acid	saturated, aqueous	+	+	+
Potassium hydroxide	50%	+	+	+
Potassium aluminium salts, (alum), aqueous	<saturated acid	+	+	+
Potassium persulphate (potassium peroxide)	All, aqueous	+	+	+
Potassium hypochlorite		0		
Propane	Technically pure, gaseous	0		
Propane	Technically pure, liquid	+		
Propanol, n- and iso-	Technically pure	+	+	0
Propionic acid	50% aqueous	+	+	+
Propionic acid	Technically pure	+	0	0
Propylene glycol	<50%	+	+	+
Propylene glycol	Technically pure	+	+	+
Pyridine	Technically pure	+	0	0
Salicylic acid	saturated	+	+	+
Sea water		+	+	+
Silicic acid		+	+	+
Silicone oil		+	+	+
Silver salts, aqueous, inorganic	<saturated acid	+	+	+
Sodium chlorite	diluted, aqueous	0		
Sodium hypochlorite	12.5% active chlorine, aqueous	0	0	

KİMYASAL DİRENÇ CHEMICAL RESISTANCE

Sodium persulphate	cold saturated, aqueous	+	+	+
Sodium salts, aqueous, inorganic	<saturated acid	+	+	+
Stannous chloride	cold saturated, aqueous	+	+	+
Starch solution	All, aqueous	+	+	+
Styrene				
Succinic acid	Aqueous, all	+	+	+
Sulfuryl chloride	Technically pure	-		
Sulphur dioxide	Technically pure, liquid	-		
Sulphur dioxide	All, moist	+	+	+
Sulphuric acid	saturated aqueous	+	+	+
Sulphuric acid	Up to 80% aqueous	+	+	0
Sulphuric acid	Up to 96% aqueous	-		
Sulphuric acid	98%	-		
Tannic acid	All, aqueous	+	+	+
Tetrachlorethylene (perchloroethylene)		-		
Tetrachloroethane	Technically pure	0		
Tetraethylene lead	Technically pure	+		
Tetrahydrofurane	Technically pure	0		
Tin salts, aqueous, inorganic	<saturated acid	+	+	+
Toluene	Technically pure	0		
Trichloromethane	100%			
Trichloroacetic acid	50% aqueous	+	+	+
Trichloroacetic acid	Technically pure	+	0	-
Trichloroethane	Technically pure	0		
Trichloroethylene	Technically pure	-		
Triethylamine	Technically pure	+		
Trifluoroacetic acid	up to 50%	+		
Turpentine oil	Technically pure	0	0	
Urea	Up to 30% aqueous	+	+	+
Urine		+	+	+
Vinyl acetate	Technically pure	+	+	
Vinyl chloride	Technically pure	-		
Waste gases, containing Alkaline		+	+	+
Waste gases, containing hydrochloric acid	all	+	+	+
Waste gases, containing hydrogen fluoride	Traces	+	+	+
Waste gases, containing nitrous gases	Traces	+	0	0
Waste gases, containing sulphur dioxide	Traces	+	+	
Water, drinking, chlorinated	<0.1ppm Chlorine	+	+	+
Water -distilled -deionised		+	+	+
Xylene	Technically pure	-		
Zinc salts, aqueous, inorganic	<saturated acid	+	+	+

Key	
	No Data
-	Not recommended
0	Conditionally Resistant
+	Resistant