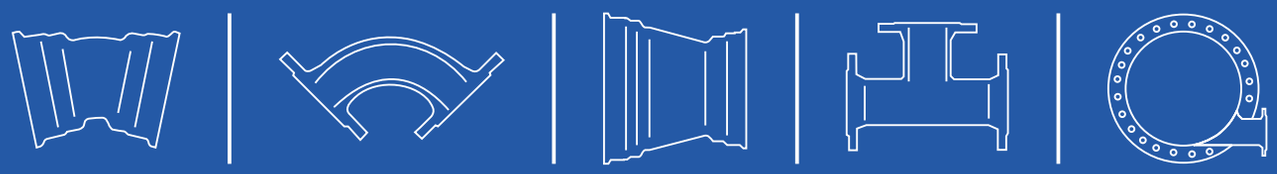
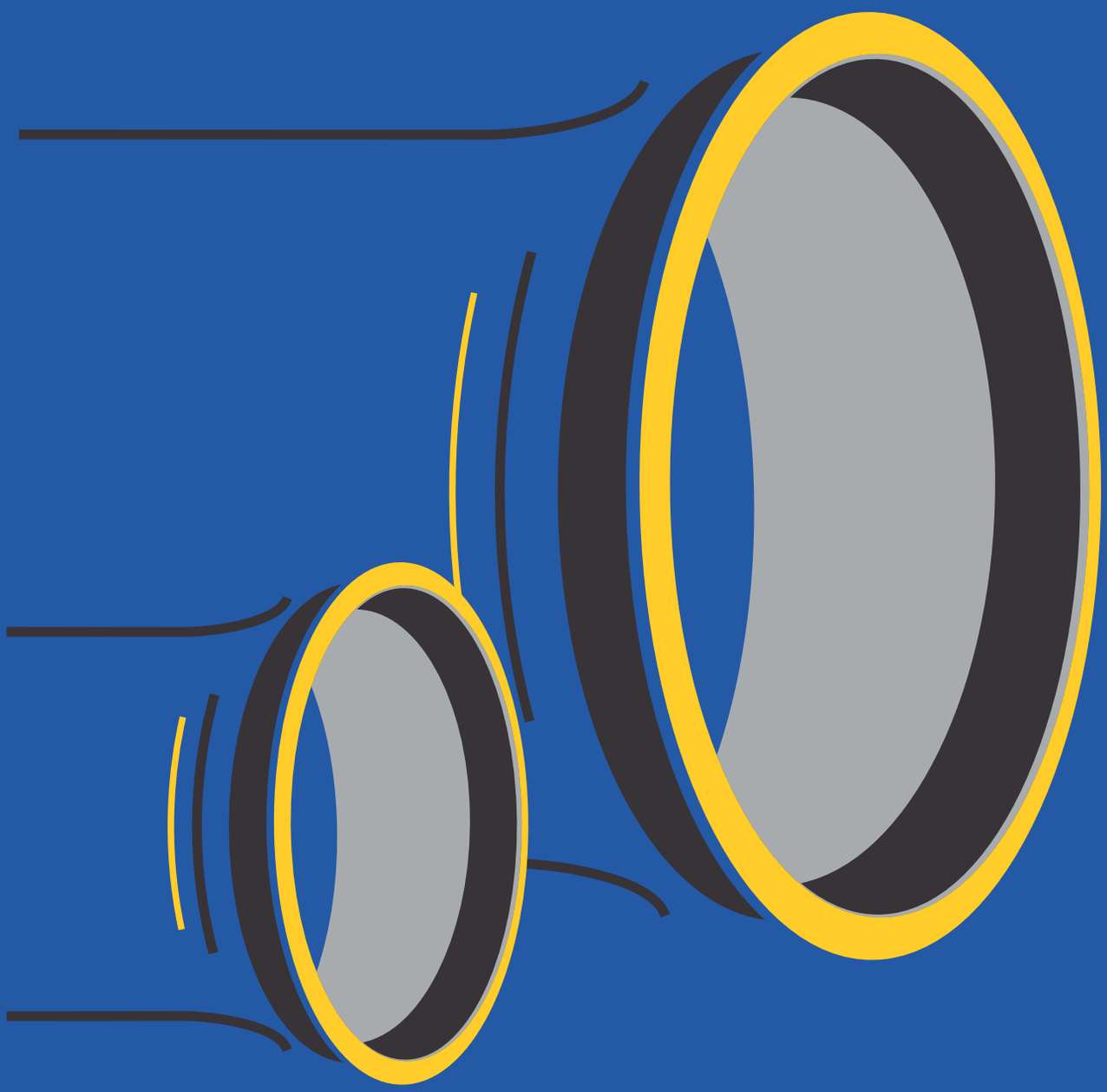
SAMSUN MAKİNA SANAYİ





DÜKTİL DEMİR BORU VE EK PARÇALARI

DUCTILE IRON PIPES

AND FITTINGS

düktil demir boru ve ek parçaları

ductile iron pipes and fittings

SAMSUN MAKİNA SANAYİ A.Ş.

İÇİNDEKİLER

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DÜKTİL DEMİR BORULAR

İçme suyu şebekelerinde görülebilecek problemlerin başında doğal ve yapay yer hareketleri gelmektedir. Bu hareketlerin şebekelerde yol açabileceği etkinin en aza indirilebilmesi için, boruların ve bağlantı parçalarının üretiminde kullanılan malzemelerin deforme olmadan esneyebilmesi, eğilebilmesi ve darbelere karşı dirençli olması gerekmektedir.

İsale ve dağıtım hatları büyük maliyetler gerektiren yatırımlardır. Bu nedenle projelendirme ve fizibilite aşamasında, malzeme birim fiyatının yanında ömür boyu maliyet, uzun ömürlü kullanım, düşük işletme masrafları, montaj kolaylığı, bakım ve onarım maliyetleri gibi özellikler de dikkate alınmalıdır.

Düktil döküm, dökme demirlerin korozyona dayanım, aşınma direnci, işlenebilirlik ve yorulma mukavemeti gibi üstün özelliklerine, çekme dayanımı, darbe direnci ve uzama kabiliyetini de eklemektedir. Bu nedenle düktil döküm, boru başta olmak üzere bütün altyapı ekipmanları için en uygun seçenektir.

Düktil Demir Borular Neden En Uygun Çözümdür?

• **Yüksek Çekme Mukavemeti**
Düktil demir borular, içten pozitif/negatif basınç ve su darbesi, dıştan yer hareketleri nedeniyle oluşan aşırı yüklere karşı koyabilme özelliğine sahip olan tek üründür.

• **Yüklere Dayanım**
Ağır trafik yükü, yer hareketleri nedeniyle oluşan kaymalar ve gömülü boru üzerindeki toprak yükü gibi etkenler yeraltına döşenmiş olan borular üzerinde aşırı ağırlık oluşturmaktadır. Farklı malzemelerden üretilen borularla yapılan testler, düktil döküm boruların yaygın ve noktasal yüklere karşı çok daha dirençli olduğunu göstermiştir.

• **Deforme Olmaksızın Esneme Kabiliyeti**
Düktil demir boruların, deforme olmadan esneyebilme özellikleri, ağır yük etkisi altındaki çelik profillere benzemektedir. Bu özelliği, düktil demir boruların olağandışı yükler ve etkiler karşısında isale ve dağıtım hatlarının sağlıklı olarak hizmet vermesini sağlamaktadır.

• **Korozyon Direnci**
Düktil demir boruların korozyon dayanım özelliği, laboratuvarda ve sahada yapılan testlerle de ortaya çıkmıştır. Bu testlerin sonuçları düktil demir boruların, herhangi bir koruma önlemi alınmadan 300 yıldan uzun süre toprak altında kullanılan gri dökme demir borulardan daha üstün korozyon dayanımına sahip olduklarını göstermektedir. Birçok toprak cinsinde, düktil demir boruların korozyona karşı korunmasına gerek yoktur; ancak nadir olarak karşılaşılan korozif özellikli topraklarda, boruların dış yüzeyinde polietilen kılıfların kullanılması gibi ekonomik çözümler geliştirilebilir.

• **Üstün Darbe Dayanımı**
Düktil dökümün üstün fiziksel özellikleri ve yüksek dayanımı, taşıma ve montaj aşamalarında olabilecek darbelere karşı boruları korur. Düktil demir boruların deprem bölgelerinde ve hareketli zeminlerde, diğer malzemelerden üretilen boruların büyük zaaflarının ortaya çıkması nedeniyle, başka bir alternatifleri yoktur.

• **Kolay, Hızlı ve Ekonomik Montaj**
Çok çeşitli ek ve bağlantı parçalarının olması, düktil demir boruların saha montajlarının, diğer borulara göre daha pratik yapılmasını sağlamaktadır. Düktil demir boruların döşenmesi için karmaşık projeler hazırlanmasına gerek yoktur; çünkü bu boruların sahada kolaylıkla kesilebilme ve delinebilme özellikleri bulunmaktadır. Muflu-geçmeli bağlantıları olan düktil demir borular, az sayıda personel ve makine ile hızlı ve ekonomik montaj olanağı sağlamaktadır.

• **Düşük Bakım Gereksinimi**
Farklı malzemelerden üretilen borularla karşılaştırıldığında; düktil demir boruların kullanıldığı hatların bakım ihtiyacının ihmal edilebilecek düzeyde olduğu görülmektedir.

• **Enerji Tasarrufu ve Ömür Boyu Maliyet**
Düktil demir boruların sürtünme kayıpları, yüksek akış katsayısı ve diğer malzemelerden üretilen borulara göre daha geniş olan iç çapları sayesinde en aza inmektedir. Bu özellikleri de pompaj maliyetlerini düşürür ve ömür boyu maliyet kriterleri doğrultusunda en ekonomik çözümleri sağlar.

DUCTILE IRON PIPES

The natural and artificial ground motions are one of the main problems that could be faced at potable water networks. In order to minimize the effect of those movements, the material of the pipes and the fittings should be able to resist the bending forces and impacts without deforming.

The distribution networks and water mains are very important and costly investment. Therefore, during design and feasibility phases, long life and life cycle cost, low operation and maintenance expenses, ease of erection and repair costs should be taken into consideration.

Ductile casting or nodularity of iron adds tensile strength, impact resistance and elongation abilities to the superior properties of cast iron, which are known as resistances to corrosion, abrasion and fatigue, as well as machining. Therefore ductile iron is the best choice for all infrastructure elements, mainly for the pipes.

Why Ductile Iron Pipe is the Most Appropriate Solution?

• **High Tensile Strength**
Ductile iron pipes are the unique products, which have very high resistance property against the excessive loads caused by inner positive and/or negative (vacuum) pressures due to water hammer effects and exterior ground movements.

• **Load Resistance**
Heavy traffic load, slides because of ground motions and earth load over embedded pipe, form excessive forces on the pipes laid under the ground. Tests performed on the pipes made of various materials showed that, the ductile iron pipes are the most resistant pipes against the distributed and concentrated loads.

• **Elasticity and Resistance to Deformation**
Ductile iron pipes behave like steel profiles under heavy load effects because of their ductility. They are elastic like steel. This property provides ductile iron pipes to serve efficiently and effectively at the distribution networks and pipe lines under extraordinary loads and effects.

• **Corrosion Resistance**
Site and laboratory tests prove the corrosion resistance of the ductile iron pipes. The results of those tests show that the ductile iron pipes manufactured according to ISO 2531, without any additional protection measure, have more superior corrosion resistance than the gray cast iron pipes which are being used under the ground for more than 300 years. In many ground types, the ductile iron pipes do not have to be protected against the corrosion by special means. Moreover, for the rare grounds having extreme corrosive properties, economical solutions like polyethylene lining on the exterior surfaces of the pipes were developed.

• **Superior Impact Resistance**
The superior physical properties and high load resistance of the ductile cast iron prevents the pipes from the impacts during transport and installation phases. Especially for earthquake zones and unstable grounds, ductile iron pipes have no other alternatives.

• **Easy, Fast and Economical Installation**
Having various types of joint and connection pieces makes the site installation of ductile iron pipes very practical compared to the other kind of pipes. There is no need to prepare complicated procedures for laying the ductile iron pipes as they have easy cutting and driling properties at the site. Socket to spigot connections, besides flanged connection possibilities, give fast and economical installation ability with less number of staff and machinery.

• **Minimum Maintenance Requirement**
When compared with the pipes made of other materials, it is observed that the maintenance need of ductile iron pipe lines is in negligible level.

• **Energy Saving and Life Cycle Cost**
The friction losses of the ductile iron pipes are minimized as to their larger inner diameters and high flow coefficients compared to the pipes manufactured from other materials. High flow coefficients also ensure lower pumping costs and gives out the most economical solutions regarding the life cycle cost criteria.

ÜRÜN ÖZELLİKLERİ

Standartlar

SMS santrifüj döküm düktil demir borular ve ek parçaları aşağıdaki standartlara göre üretilmektedir:

Düktil Demir Borular ve Ek Parçaları

ISO 2531	Düktil demir borular, ek parçaları, diğer elemanlar ve bağlantıları
ISO 7186	Pis su uygulamaları için düktil demir borular, bağlantı parçaları ve aksesuarları
EN 545	Su hatlarında kullanılan düktil demir borular, ek parçaları, diğer elemanlar ve bağlantıları
EN 598	Pis su uygulamaları için düktil demir borular, ek parçaları, diğer elemanlar ve bağlantıları

İç ve Dış Kaplama

ISO 8179-1	Düktil demir borular - Çinko bazlı dış kaplama - Bölüm 1: Son kat uygulamalı metalik çinko
ISO 4179	Basınçlı ve basınçsız boru hatları için düktil demir borular - Çimento harçlı iç kaplama
ISO 8180	Düktil demir borular - Polietilen kılıflama
EN 14628	Düktil Demir Borular, bağlantı parçaları ve aksesuarları - Yüksek aşındırıcı topraklardaki borular için dış polietilen kaplama
EN 15189	Düktil demir borular, bağlantı parçaları ve aksesuarlar - Borular için dış poliüretan kaplama
EN 15542	Düktil demir borular, bağlantı elemanları ve aksesuarlar - Borular için dış çimento harç kaplaması
EN 16132	Düktil demir boru ve bağlantı elemanları - Çimento harç kaplamaları için sızdırmaz yüzey kaplama

Malzeme Özellikleri

Minimum çekme dayanımı	420 MPa
Kopmadaki minimum uzama	DN80 - 1000 borular için %10, DN1100 - 2200 için %7, DN 80-2200 ek parçaları için %5
Brinell sertlik maksimum değeri	Borular için 230 HBW, ek parçaları için 250 HBW

Et Kalınlığı

Nominal et kalınlığı 'e': **e=K(0,5 + 0,001DN)** **DN** anma çapı, **K** kalınlık sınıfı katsayısı

SMS düktil demir boruları standart olarak K=9 kalınlık sınıfında üretilirler. Başka kalınlık sınıfları için lütfen SMS'ye danışınız.

Toleranslar

Santrifüj döküm borular ve ek parçalarının nominal et kalınlığı toleransları aşağıdaki gibidir:

	Tolerans
Santrifüj döküm Borular	e≤6 için -1,3 mm
	e>6 için -(1,3+0,001DN) mm
Ek parçaları	e≤7 için -2,3 mm
	e>7 için -(2,3 + 0,001DN) mm

İç basınç direnci açısından güvende kalmak için üst sınır (+ tolerans) belirtilmemiştir.

Uzunluk toleransları

Geçmeli tip borular	- 30 /+70 mm
Flanşlı borular	±10 mm

Boru düzlüğü, boru uzunluğunun en fazla % 0,125'i kadar sapma gösterebilir.

PRODUCT PROPERTIES

Standards

SMS centrifugally cast ductile iron pipes and fittings are manufactured in compliance with the following standards:

Ductile Iron Pipes

ISO 2531	Ductile iron pipes, fittings, accessories and their joints
ISO 7186	Ductile iron pipes, fittings and accessories for sewerage applications
EN 545	Ductile iron pipes, fittings, accessories and their joints for water pipelines
EN 598	Ductile iron pipes, fittings, accessories and their joints for sewerage application

Internal Linings and External Coatings

ISO 8179-1	Ductile iron pipes - External zinc based coating - Part 1: Metallic zinc with finishing layer
ISO 4179	Ductile iron pipes for pressure and non-pressure pipelines - Cement mortar lining
ISO 8180	Ductile iron pipes - Polyethylene sleeving
EN 14628	Ductile iron pipes, fittings and accessories - External polyethylene coating for pipes in highly aggressive soils
EN 15189	Ductile iron pipes, fittings and accessories - External polyurethane coating for pipes
EN 15542	Ductile iron pipes, fittings and accessories - External cement portar lining for pipes
EN 16132	Ductile iron pipes and fittings - Seal coats for cement mortar linings

Material Properties

Minimum tensile strength	420 MPa
Minimum elongation	10% for pipes between DN 80-1000, 7% for DN 1100-2200, 5% for fittings between DN80-2200
Maximum value of Brinell hardness	230 HBW for centrifugally cast ironpipe, 250 HBW for fittings

Wall Thickness

Nominal Wall Thickness 'e': **$e = K(0{,}5 + 0{,}001DN)$**

where **DN** is the nominal diameter, and **K** is a coefficient representing the thickness class of the pipe.

SMS ductile iron pipes are manufactured at K=9 thickness as standard. For other thickness classes please get in contact with SMS.

Tolerances

The nominal wall thickness tolerances of the centrifugally cast pipes and fittings are as follows:

	Tolerance	
Centrifugally cast pipe	for $e \leq 6$	-1,3 mm
	for $e > 6$	-(1,3+0,001DN) mm
Fittings	for $e \leq 7$	-2,3 mm
	for $e > 7$	-(2,3 + 0,001DN) mm

There is no limit (+ tolerance) in order to be on safe side against internal pressure resistance.

Tolerances on lengths are as follows

Push-on type pipes	- 30 /+70 mm
Flanged pipes	±10 mm

Pipes are straight, with a maximum deviation of 0,125% of their length.

SMS İmalatı Düktil Demir Boru ve Ek Parçaları için Kaplama Tipleri

Düktil Demir Boru Dış Kaplama Seçenekleri	
Zinoc Serisi	Metalik çinko (200 g/m²)+son kat kaplamalı (bitümlü boya (minimum 70 mikron) veya epoksi boya (minimum 70 mikron+ minimum ortalama 80 mikron) / ISO 8179-1 - EN 545 (ISO 2531)
AlZinoc Serisi	Alaşım Zn85Al15 (400 g/m²)+mavi epoksi boya (minimum 70 mikron+minimum ortalama 80 mikron) / ISO 8179-1 - EN 545 (ISO 2531)
CAlZinoc Serisi	Alaşım Zn85Al15 (400 g/m²)+Cu+mavi su bazlı akrilik (minimum 70 mikron+minimum ortalama 80 mikron) / ISO 8179-1 - EN 545 (ISO 2531)
TERRAPENoc Serisi	Poliüretan kaplama (minimum ortalama 900 mikron) / EN 15189
ARMADoc Serisi	Metalik çinko (200 g/m²)+HDPE kaplama (standart kalınlıkta / veya artırılmış kalınlıkta) / EN 14628
	HDPE kaplama (standart kalınlıkta / veya artırılmış kalınlıkta) / EN 14628
CemZinoc Serisi	Metalik çinko (200 g/m²)+dış çimento harcı kaplı (minimum 3mm+minimum ortalama 5 mm) / EN 15542
RedZinoc Serisi	Metalik çinko (200 g/m²)+RAL3009 kiremit rengi son kat bitümlü veya epoksi boya (minimum 70 mikron), ATIK SU için / EN 598 (ISO 7186)
THERMoc Serisi	Ön izolasyonlu borular: Ön izolasyonlu borular üç kısımdan oluşur: 1) Düktil demir boru, 2) İzolasyon katmanı "poliüretan köpük", 3) Muhafaza borusu. Düktil demir boru üzerine, poliüretan köpükten ısı yalıtım tabakası uygulanır, muhafaza borusu olarak, polietilen boru veya alüminyum / galvaniz sac kaplanır. Isı yalıtımı için düktil demir boru ile muhafaza borusu arasında poliüretan köpük kullanılır. Son kat kılıflama malzemesi seçimi ve köpük kalınlığı müşteriler tarafından projelerine uygun olarak belirtilir.
Düktil Demir Boru İç Kaplama Seçenekleri	
Portland çimento harcı / ISO 4179	
Sülfata dayanıklı çimento harcı / ISO 4179	
Sızdırmaz yüzey kaplı / ISO 16132	
Epoksi boya (minimum 70 mikron+minimum ortalama 80 mikron)	
Yüksek alüminalı çimento harcı (minimum %40 Al), ATIK SU için EN 598 / ISO 4179	
Bağlantı Parçaları İçin Dış Kaplama Seçenekleri	
Mavi epoksi (minimum 250 mikron) / EN 14901	
Metalik çinko bakımından zengin boya+bitümlü boya (minimum 250 mikron)	
Astar epoksi reçine+akrilik poliüretan (minimum 250 mikron)	
Bağlantı Parçaları İçin İç Kaplama Seçenekleri	
Mavi epoksi, minimum 250 mikron / EN 14901	
Portland çimento harcı	

Coating Types for Ductile Iron SMS Pipe and Fittings

External Coating Options for Ductile Iron Pipe	
Zinoc Series	Metallic zinc (200 g/m²)+with finishing layer (bituminous paint (minimum 70 micron) or epoxy paint (minimum 70 micron+ minimum average 80 micron) / ISO 8179-1 - EN 545 (ISO 2531)
AlZinoc Series	Alloy Zn85Al15 (400 g/m²)+blue epoxy paint (minimum 70 micron+minimum average 80 micron) / ISO 8179-1- EN 545 (ISO 2531)
CAlZinoc Series	Alloy Zn85Al15 (400 g/m²)+Cu+blue aqua acrylic (minimum 70 micron+minimum average 80 micron) / ISO 8179-1 - EN 545 (ISO 2531)
TERRAPENoc Series	Polyurethane coating (minimum average 900 micron) / EN 15189
ARMADoc Series	Metallic zinc (200 g/m²)+HDPE coating (with standard thickness / or increased thickness) / EN 14628
	HDPE coating (with standard thickness / or increased thickness) / EN 14628
CemZinoc Series	Metallic zinc (200 g/m²)+external cement mortar coated (minimum 3mm+minimum average 5 mm) / EN 15542
RedZinoc Series	Metallic zinc (200 g/m²)+with finishing layer of a RAL 3009 red-brown color epoxy or bitumenous paint (minimum 70 micron), for WASTE WATER / EN 598 (ISO 7186)
THERMoc Series	Pre-insulated pipes: A pre-insulated pipe normally consists of three parts: 1) Ductile iron pipe, 2) Insulating layer polyurethane foam 3) Casing pipe. Ductile iron pipe, then, thermal insulating layer of polyurethane foam and as protective casing of polyethylene pipe or aluminum / galvanized sheet; for thermal insulation polyurethane foam is used between ductile iron pipe and casing pipe The choice of foam thickness and material for the casing is made by the customers for their project.
Internal Coating Options for Ductile Iron Pipe	
Portland cement mortar / ISO 4179	
Sulfate resisting cement mortar / ISO 4179	
Seal coated pipes ISO 16132	
Epoxy paint (minimum 70 micron + minimum average 80 micron)	
High alumina-cement mortar (minimum 40% Al) for WASTE WATER EN 598 / ISO 4179	
External Coating Options for Fittings	
Blue epoxy (minimum 250 micron) / EN 14901	
Metallic zinc rich paint+bituminous paint (minimum 250 micron)	
Primer epoxy resin+ crylic polyurethane (minimum 250 micron)	
Internal Coating Options for Fittings	
Blue epoxy, minimum 250 micron / EN 14901	
Portland cement mortar	

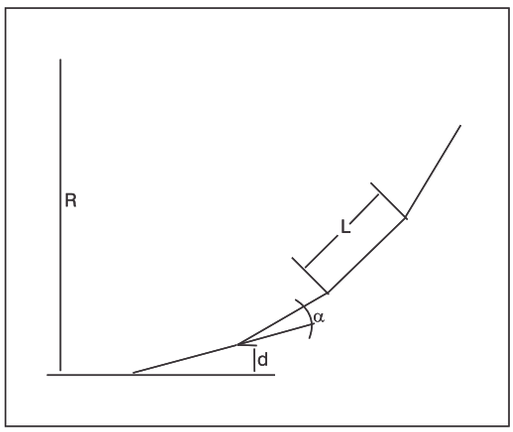



Muflu ve kilitli tip bağlantılar için izin verilen açısal sapmalar ve karşılık gelen sapma mesafeleri (L=6m): / **Permissible angular deflection and subsequent offset values for push-on type and anchored type joints (L=6m):**

Bağlantı Şekli Type of Joint	**DN**	**En Yüksek Sapma Açısı** Maximum Allowable Deflection α (derece / degrees)	**Sapma Mesafesi** Deflection Offset d(mm)	**Kavis Yarıçapı** Radius of Curvature R(m)
Muflu Push-on Type	**80-300**	5,0	520	69
	350-800	4,0	420	86
	900-1000	4,0	310	115
	1100-1200	3,0	310	115
	1400-1600	2,0	419	155
	1800-2200	2,0	279	228
Kilitli Anchored Type	**80-300**	2,5	261	86
	350-600	2,0	314	114
	700-1400	1,5	209	172
	1500-2000	0,75	139	455

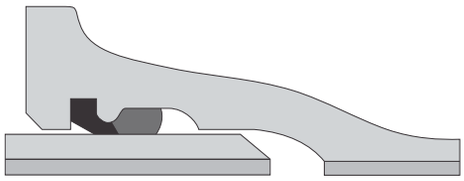
Not: DN 1200> için L=8 / For DN 1200>, L=8

L: Döşeme uzunluğu/Nominal laying length
α: Sapma açısı/Deflection angle
d: Her boru için sapma mesafesi/Offset value
R: Kavis yarıçapı/Radius of curvature

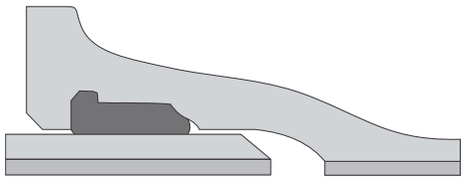


BAĞLANTI ŞEKİLLERİ

Samsun Makina Sanayi, DN80 çaptan DN2200 çapa kadar muflu, tespitli ve flanşlı bağlantılar uygulanabilen borular üretmektedir.



T-TİP



STANDART TİP

Muflu Bağlantı

Muflu bağlantılar montajı çok kolay ve çabuk olan T veya STANDART tiplerde üretilmektedir. Bu tip bağlantılar, özel ekipman gerektirmeden, az iş gücü ile, en zor şartlarda uygulanabilme özelliğine sahiptir. İçerisinde su bulunan kanallarda da rahatlıkla montaj yapılır.

Bu bağlantı şekli tam bir sızdırmazlık sağlar. Hattaki akışkanın basıncı arttıkça, iki boru arasındaki açıklıktan contaya uygulanan basınç ve buna bağlı olarak contanın boru duvarlarına uyguladığı basınç artar. Böylece mükemmel bir sızdırmazlık sağlanır. Boru dayanımını zorlayan sızdırmazlık testi basınçlarında dahi sızdırma olmaz.

Bu tip bağlantının çok önemli bir özelliği de açısal sapmalara ve küçük eksenel oynamalara imkan vermesidir. Her bağlantıda, boru çapına bağlı olarak 5 dereceye kadar açısal sapmalar ek parçaları olmaksızın hattın kolayca yön değiştirmesine imkan sağlar. Eksenel hareket kabiliyeti ise ısıl uzama ve kısalmanın olacağı ortamlarda, örneğin yerüstü uygulamalarında büyük önem kazanır.

Ayrıca hem açısal, hem de eksenel hareket kabiliyeti, hattın, deprem gibi toprak hareketlerinden etkilenmemesini sağlar.

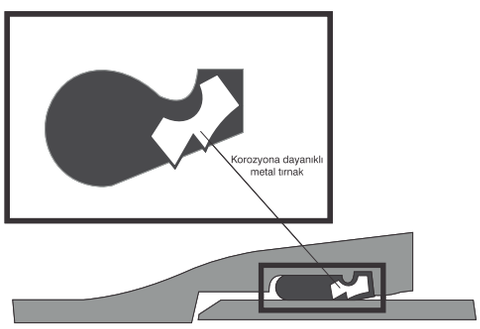
T-Lok Sistemi

T-Lok sistemi düktil demir boru hatlarında kilitleme sağlayan bir metottur. Conta içinde bulunan paslanmaz çelik tırnaklı segmanlar vasıtası ile T-Lok plus tip conta normal boru ile muf bağlantının kilitlenmiş bağlantıya dönüşmesini sağlar. T-Lok bağlantı sistemi sayısız uygulamalar ile kendisini kanıtlamıştır.

T-Lok plus tip conta, boru hatlarında, kesit alanı düşümü, yön değişikliği veya hat sonlarında hattın körlenmesi nedeniyle ortaya çıkan kuvvetleri taşır.

Avantajları
T-Lok sistemi boru hattı tasarımcılarına bir çok avantajlar sunmaktadır:

- Geleneksel beton mesnet bloklarına ihtiyaç kalmaması
  - Boşluğun az olduğu ve başka alt yapılarla engellenme olan sıkışık servis koridorlarında
  - Bir boru hattının işletmeye alınmasının acil olduğu ve beton mesnet bloklarının kürlenmesinin gecikmelere neden olacağı durumlarda
  - Beton sağlama lojistiğinin zor olduğu alanlarda
- Zayıf toprak koşullarında mesnet sıkıştırmasını sağlama yeteneği
- Gömülü koşullarda alternatif flanşlı bağlantı sağlaması
- Stratejik şebekelerde ilave güvenlik sağlaması

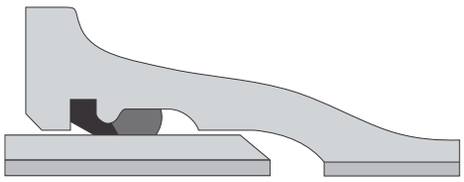


İşletme Basıncı
T-Lok plus tip contalar DN80 ila DN600 çap aralığında mevcuttur ve bunlar 16 bar işletme basıncına kadar uygundur. Daha yüksek basınçlarda kullanılması gerektiğinde SMS'ye danışılmalıdır.

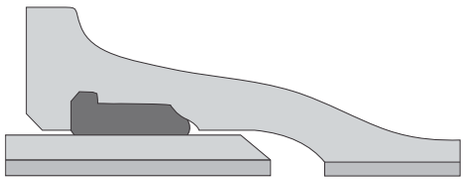



CONNECTION TYPES

Samsun Makina Sanayi manufactures pipes in diameter range DN80 - 2200 having standard push-on socket-spigot, anchored and flanged type connections.



T-TYPE



STANDARD TYPE

Socket Type Connection

Socket type connections are manufactured in T or STANDARD types, which are installed very easy and fast. Those type connections have the properties of application in difficult conditions with less workmanship and without special equipment. They are even installed in channels having water inside without any problem.

This type of connection provides full impermeability. As the fluid pressure within the line is increased the appiled pressure to the gasket from the gap in between two pipes and in connection with it the pressure applied to the pipe walls by the gasket is increased. By this way an excellent impermeability is achieved. The tests which are applied in order to determine the pressures, which would lead permeability, are generally ends with damage of the pipe; that is, gasket is not permeable even under the pressures forcing pipe resistance.

Another very important property of those kinds of connections is that they provide lateral deflection and small axial movements. At each connection, depending on the pipe diameter up to 5 degrees lateral deflections provide easy direction change of the line without using fittings. The axial movement ability gains great importance at the areas where thermal expansion and contraction happens, for example at surface applications.

Either lateral or axial movement ability also provides the line not to be affected from the ground movements like earthquakes.

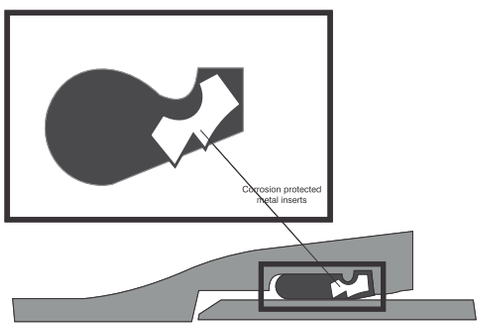
T-Lock System

T-Lock system is a method, which provides locking in the ductile iron pipelines. By the way of stainless steel, clawed segments within the gasket, the T-Lock plus type gasket transforms the normal spigot and socket joint into locked joint. The T-Lock system has proved itself by numerous applications.

The T-Lock plus type gasket carries forces inducing at pipeline due to section area slope, direction changes or blinding of the line at the dead ends.

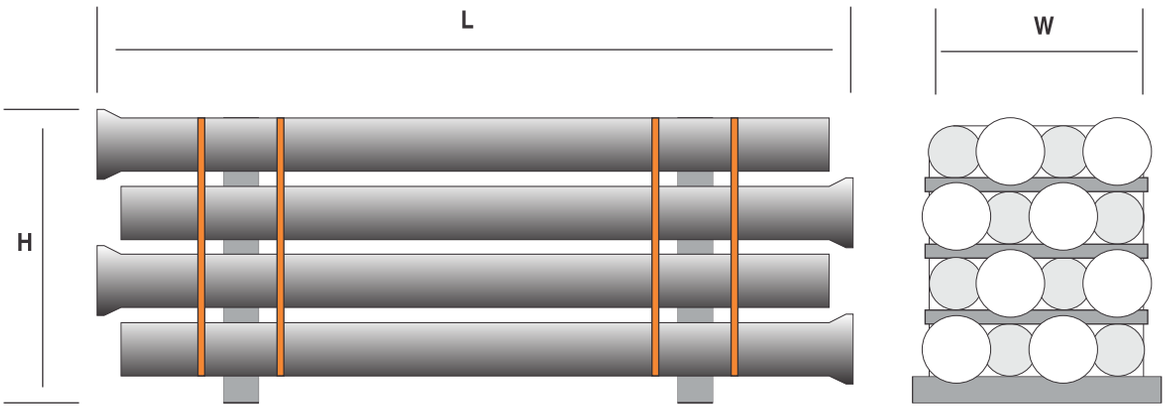
Advantages of the T-Lock System
The T-Lock system offers many advantages for pipeline designer:

- Requires no traditional concrete thrust blocks
  - in narrow service passages where space is minimum and interference in future by other utilities
  - if the pipeline commissioning does not allow delays by the concrete thrust block “cures”
  - when ready mix concrete supply is not easy
- In poor soil conditions providing thrust restraints
- In buried areas it is an alternative to flanged joints
- Provides additional safety to all pipelines



Working Pressure
T-Lock plus type gaskets are available in sizes DN80 to DN600 and are rated to a operating pressure of 16 bar. Above that pressure levels, assistance should be asked.

TAŞIMA VE DEPOLAMA — HANDLING AND STORAGE

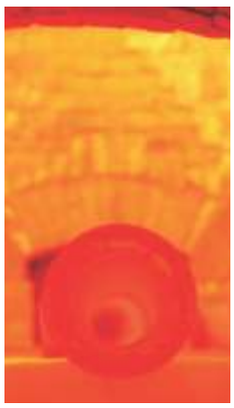


DN	Demet (WXH) Bundle Configuration	Demetteki Boru Sayısı No of Pipes in the Bundle	L	W	H	Demet Ağırlığı Weight in Bundle (K9)
80	5x7	35	6200	510	910	3045
100	6x5	30	6200	730	750	3210
125	6x5	30	6200	730	1060	4050
150	4x6	24	6200	690	1200	3912
200	4x5	20	6300	1120	1025	4380
250	3x4	12	6300	1100	950	3432
300	3x3	9	6300	1020	1100	3240
350	2x3	6	6300	1150	1260	2856
400	2x2	4	6300	860	950	2264
	2x3	6	6300	1290	950	3396

Not: Takoz ağırlıkları dahil değildir. / Chock block weights are not included.

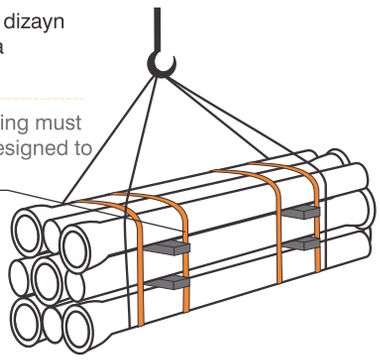
Taşıma esnasında hem personel güvenliği hem de boru iç ve dış kaplamalarının zarar görmemesi için tekstil kayışlar, halatlar veya kauçuk kaplı metal halatlar kullanılmalıdır.

Appropriate textile belts, slings or ropes and rubber coated steel ropes should be preferred for the safety of the staff and to prevent any damage on the internal lining and external coating of the pipes



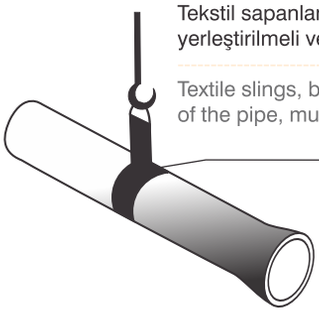

Demetleme şeritleri yük taşımaya göre dizayn edilmemiştir. Taşıma-kaldırma amacıyla kullanılmamalıdır.

Usage of the metal baling straps for lifting must strictly be prohibited as they are not designed to bear the weight of the bundles.



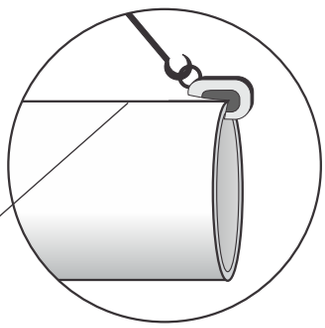
Tekstil sapanlar borunun ağırlık merkezine gelecek şekilde yerleştirilmeli ve kaymayı önleyecek kadar geniş olmalıdır.

Textile slings, being wide enough to prevent from slipping of the pipe, must be positioned to the center of gravity.



Koruyucu ağızlı kanca

Protective hooks, with a rubber based lining inside



400 mm'den büyük boruların kaldırılmasında metalik olmayan sapan veya uygun şekle sahip kauçuk benzeri bir malzeme ile kaplanmış kancalar kullanılmalıdır. Borunun, her iki ucundan birer kanca yardımıyla kaldırılması, geçerli yöntemlerden biridir.

Borular, demetler halinde veya münferit istiflenebilir. Aşağıdaki istif yüksekliklerinin aşılmaması önerilir ('kat sayısı' üst üste koyulabilecek boru adedini ifade eder).

To lift pipes bigger than DN400 mm in diameter, non metallic slings or protective hooks for end lifting should be preferred.

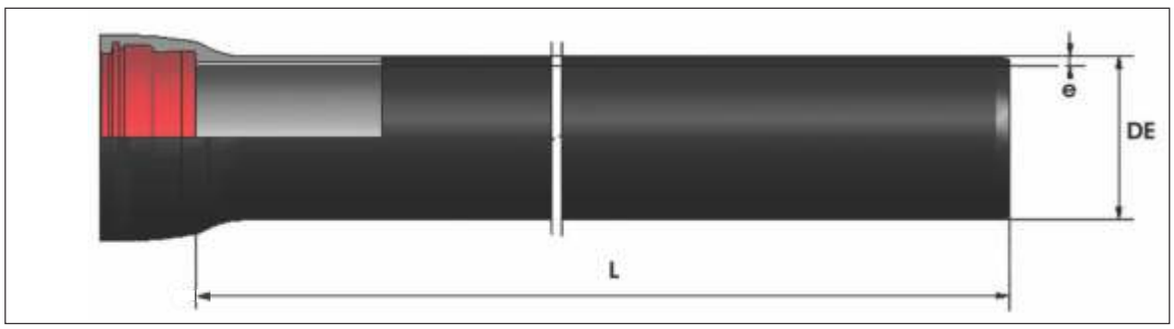
Pipes can be stored in bundles or can be stacked for every individual diameter. In case of stacking, maximum stack heights given below must be kept (number of layers describes the number of rows that can be made for different diameters).

İstif Yükseklikleri / Stacking Heights

DN	Kat Sayısı No of Layers	DN	Kat Sayısı No of Layers	DN	Kat Sayısı No of Layers	DN	Kat Sayısı No of Layers
80	18	**300**	9	**700**	4	**1500**	2
100	16	**350**	8	**800**	4	**1600**	2
125	14	**400**	7	**900**	3	**1800**	2
150	12	**450**	6	**1000**	3	**2000**	1
200	11	**500**	5	**1200**	3	**2200**	1
250	10	**600**	4	**1400**	3	**-**	-

Not: İstif yükseklikleri K9'a göre verilmiştir. / Stacking height are given according to K9

STANDART TİP MUFLU BAĞLANTI (K9) — STANDARD TYPE JOINT (K9)



DN	Dış Çap External Diameter DE	Toleranslar Limit Deviations		Döküm Et Kalınlığı Iron Wall Thickness e, K9	Beton Kaplama Kalınlığı Cement Mortar Lining Thickness	(-) Tolerans (-) Tolerance $e_{min,}$ K9	Metre Başına Ağırlık Weight per Meter	Muf Ağırlığı Socket Weight	L=6m için Beton Ağırlığı Cement Mortar Weight for L=6m	L=6m için Toplam Ağırlık Total Weight for L=6m	L=8,15m için Beton Ağırlığı Cement Mortar Weight for L=8,15m	L=8,15m için Toplam Ağırlık Total Weight for L=8,15m	Sızdırmazlık Deney Basıncı Leak Tightness Test Pressure (bar)	PFA (bar)	PMA (bar)	PEA (bar)
80	98	+ 1	- 2,7	6,0	4	4,7	12,2	3,4	10,2	87		-	50	85	102	107
100	118	+ 1	- 2,8	6,0	4	4,7	15,1	4,3	12,4	107		-	50	85	102	107
125	144	+ 1	- 2,8	6,0	4	4,7	18,9	5,7	16,0	135		-	50	85	102	107
150	170	+ 1	- 2,9	6,0	4	4,7	22,8	7,1	19,0	163		-	50	79	95	100
200	222	+ 1	- 3,0	6,3	4	4,8	30,6	10,3	25,0	219		-	50	62	74	79
250	274	+ 1	- 3,1	6,8	4	5,2	40,2	14,2	31,0	286		-	50	54	65	70
300	326	+ 1	- 3,3	7,2	4	5,6	50,8	18,6	37,0	360		-	50	49	59	64
350	378	+ 1	- 3,4	7,7	5	6,0	63,2	23,7	73,0	476		-	40	45	54	59
400	429	+ 1	- 3,5	8,1	5	6,4	75,5	29,3	84,0	566		-	40	42	51	56
450	480	+ 1	- 3,6	8,6	5	6,8	89,8	35,6	95,0	669		-	40	40	48	53
500	532	+ 1	- 3,8	9,0	5	7,2	104,3	42,8	106,0	775		-	40	38	46	51
600	635	+ 1	- 4,0	9,9	5	8,0	137,3	59,3	126,0	1009		-	40	36	43	48
700	738	+ 1	- 4,3	10,8	6	8,8	173,9	79,1	178,0	1301		-	32	34	41	46
800	842	+ 1	- 4,5	11,7	6	9,6	215,2	102,6	200,0	1594		-	32	32	38	43
900	945	+ 1	- 4,8	12,6	6	10,4	260,2	129,9	226,0	1917		-	32	31	37	42
1000	1048	+ 1	- 5,0	13,5	6	11,2	309,3	161,2	252,0	2269		-	32	30	36	41
1100	1152	+ 1	- 6,0	14,4	6	12,0	362,6	196,2	279,0	2651		-	25	29	35	40
1200	1255	+ 1	- 5,8	15,3	6	12,8	420,1	237,7	302,0	3060		-	25	28	34	39
1400	1462	+ 1	- 6,6	17,1	6	14,4	547,2	279,3	352,0	3915	470,0	5125,0	25	28	33	38
1500	1565	+ 1	- 7,0	18,0	6	15,2	616,5	316,4	377,3	4393	503,0	5755,0	25	27	32	37
1600	1668	+ 1	- 7,4	18,9	6	16,0	690,3	375,4	402,0	4920	536,0	6433,8	25	27	32	37
1800	1875	+ 1	- 8,2	20,7	7	16,9	868,2	445,0	528,1	6182	704,1	8094,7	25	26	31	36
2000	2082	+ 1	- 9,0	22,5	7	19,2	1048,2	560,0	586,6	7436	782,1	9727,7	25	26	31	36
2200	2288	+ 1	-	24,3	7	20,8	1244,2	680,0	645,0	8790	860,0	11493,6	25	26	31	36

PFA: İzin Verilen İşletme Basıncı / Allowable Operating Pressure (bar)
PMA: İzin Verilen Maksimum İşletme Basıncı / Allowable Maximum Operating Pressure (bar)
PEA: İzin Verilen Saha Test Basıncı / Allowable Field Test Pressure (bar)

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

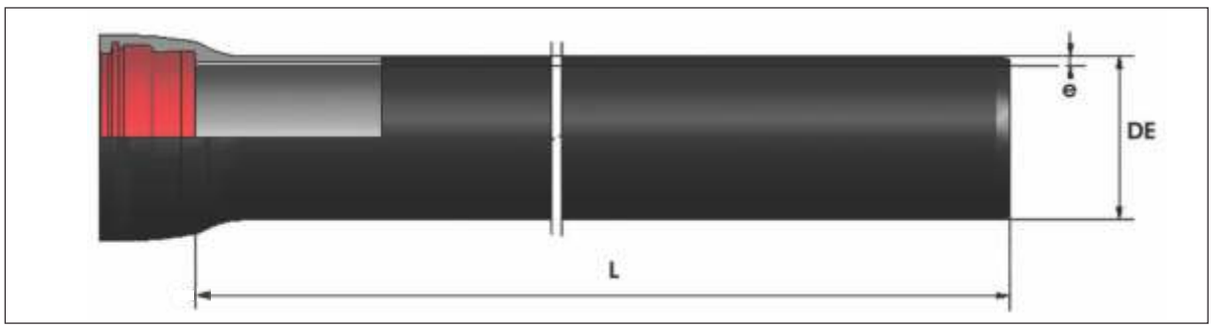



Tercih Edilen Basınç Sınıfı / Preferred Pressure Class

DN	Basınç Sınıfı Pressure Class (bar)	Dış Çap External Diameter DE	Toleranslar Limit Deviations		Nominal Et Kalınlığı Nominal Wall Thickness	Muf Ağırlık Socket Weight	Metre Başına Ağırlık Weight per Meter	L=6 m için Beton ağırlığı Cement Mortar Weight for L=6 m	L=6 m için Toplam Ağırlığı Total Weight for L=6 m	L=8,15 m için Beton Ağırlığı Cement Mortar Weight for L=8,15 m	L=8,15 m için Toplam Ağırlık Total Weight for L=8,15 m
80	40	98	+ 1	- 2,7	4,4	3,4	9,12	10	68,3	-	-
100	40	118	+ 1	- 2,8	4,4	4,3	11,06	12	83,1	-	-
125	40	144	+ 1	- 2,8	4,5	5,7	13,90	16	105,1	-	-
150	40	170	+ 1	- 2,9	4,5	7,1	16,49	19	125,0	-	-
200	40	222	+ 1	- 3,0	4,7	10,3	22,61	25	171,0	-	-
250	40	274	+ 1	- 3,1	5,5	14,2	32,69	31	241,0	-	-
300	40	326	+ 1	- 3,3	6,2	18,6	43,89	37	319,0	-	-
350	30	378	+ 1	- 3,4	6,3	23,7	51,84	73	407,7	-	-
400	30	429	+ 1	- 3,5	6,5	29,3	60,79	84	478,1	-	-
450	30	480	+ 1	- 3,6	6,9	35,6	72,26	95	564,2	-	-
500	30	532	+ 1	- 3,8	7,5	42,8	87,08	106	671,3	-	-
600	30	635	+ 1	- 4,0	8,7	59,3	120,62	126	909,0	-	-
700	25	738	+ 1	- 4,3	8,8	79,1	142,05	178	1109,4	-	-
800	25	842	+ 1	- 4,5	9,6	102,6	176,90	200	1364,0	-	-
900	25	945	+ 1	- 4,8	10,6	129,9	219,26	226	1671,5	-	-
1000	25	1048	+ 1	- 5,0	11,6	161,2	266,14	252	2010,0	-	-
1100	25	1152	+ 1	- 6,0	12,6	196,2	317,81	279	2382,1	-	-
1200	25	1255	+ 1	- 5,8	13,6	237,7	373,74	302	2782,1	-	-
1400	25	1462	+ 1	- 6,6	15,7	279,3	502,66	-	-	352	4728,0
1500	25	1565	+ 1	- 7,0	16,7	316,4	572,39	-	-	503	5484,4
1600	25	1668	+ 1	- 7,4	17,7	375,4	646,63	-	-	536	6181,4
1800	25	1875	+ 1	- 8,2	19,7	445,0	809,09	-	-	704	7743,2
2000	25	2082	+ 1	- 9,0	21,8	560,0	994,22	-	-	782	9445,0
2200	25	2288	+ 1	-	23,8	680,0	1192,92	-	-	860	11262,3

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

T-TİP MUFLU BAĞLANTI (K9) — T-TYPE JOINT (K9)



DN	Dış Çap External Diameter DE	Toleranslar Limit Deviations		Döküm Et Kalınlığı Iron Wall Thickness e, K9	Beton Kaplama Kalınlığı Cement Mortar Lining Thickness	(-) Tolerans (-) Tolerance e_{min} K9	Metre Başına Ağırlık Weight per Meter	Muf Ağırlığı Socket Weight	L=6 m için Beton Ağırlığı Cement Mortar Weight for L=6 m	L=6 m için Toplam Ağırlık Total Weight for L=6 m	L= 8,15 m için Beton Ağırlığı Cement Mortar Weight for L=8,15 m	L=8,15 m için Toplam Ağırlık Total Weight for L=8,15 m	Sızdırmazlık Deney Basıncı Leak Tightness Test Pressure (bar)	PFA (bar)	PMA (bar)	PEA (bar)
80	98	+ 1	- 2,7	6,0	4	4,7	12,2	3,4	10,2	87	-	-	50	85	102	107
100	118	+ 1	- 2,8	6,0	4	4,7	15,1	4,3	12,4	107	-	-	50	85	102	107
125	144	+ 1	- 2,8	6,0	4	4,7	18,9	5,7	16,0	135	-	-	50	85	102	107
150	170	+ 1	- 2,9	6,0	4	4,7	22,8	7,1	19,0	163	-	-	50	79	95	100
200	222	+ 1	- 3,0	6,3	4	4,8	30,6	10,3	25,0	219	-	-	50	62	74	79
250	274	+ 1	- 3,1	6,8	4	5,2	40,2	14,2	31,0	286	-	-	50	54	65	70
300	326	+ 1	- 3,3	7,2	4	5,6	50,8	18,6	37,0	360	-	-	50	49	59	64
350	378	+ 1	- 3,4	7,7	5	6,0	63,2	23,7	73,0	476	-	-	40	45	54	59
400	429	+ 1	- 3,5	8,1	5	6,4	75,5	29,3	84,0	566	-	-	40	42	51	56
450	480	+ 1	- 3,6	8,6	5	6,8	89,8	35,6	95,0	669	-	-	40	40	48	53
500	532	+ 1	- 3,8	9,0	5	7,2	104,3	42,8	106,0	775	-	-	40	38	46	51
600	635	+ 1	- 4,0	9,9	5	8,0	137,3	59,3	126,0	1009	-	-	40	36	43	48
700	738	+ 1	- 4,3	10,8	6	8,8	173,9	79,1	178,0	1301	-	-	32	34	41	46
800	842	+ 1	- 4,5	11,7	6	9,6	215,2	102,6	200,0	1594	-	-	32	32	38	43
900	945	+ 1	- 4,8	12,6	6	10,4	260,2	129,9	226,0	1917	-	-	32	31	37	42
1000	1048	+ 1	- 5,0	13,5	6	11,2	309,3	161,2	252,0	2269	-	-	32	30	36	41
1100	1152	+ 1	- 6,0	14,4	6	12,0	362,6	196,2	279,0	2651	-	-	25	29	35	40
1200	1255	+ 1	- 5,8	15,3	6	12,8	420,1	237,7	302,0	3060	-	-	25	28	34	39
1400	1462	+ 1	- 6,6	17,1	6	14,4	547,2	279,3	352,0	3915	470,0	5125,0	25	28	33	38
1500	1565	+ 1	- 7,0	18,0	6	15,2	616,5	316,4	377,3	4393	503,0	5755,0	25	27	32	37
1600	1668	+ 1	- 7,4	18,9	6	16,0	690,3	375,4	402,0	4920	536,0	6433,8	25	27	32	37
1800	1875	+ 1	- 8,2	20,7	7	16,9	868,2	445,0	528,1	6182	704,1	8094,7	25	26	31	36
2000	2082	+ 1	- 9,0	22,5	7	19,2	1048,2	560,0	586,6	7436	782,1	9727,7	25	26	31	36
2200	2288	+ 1	-	24,3	7	20,8	1244,2	680,0	645,0	8790	860,0	11493,6	25	26	31	36

PFA: İzin Verilen İşletme Basıncı / Allowable Operating Pressure (bar)
PMA: İzin Verilen Maksimum İşletme Basıncı / Allowable Maximum Operating Pressure (bar)
PEA: İzin Verilen Saha Test Basıncı / Allowable Field Test Pressure (bar)

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"




Tercih Edilen Basınç Sınıfı / Preferred Pressure Class

DN	Basınç Sınıfı Pressure Class (bar)	Dış Çap External Diameter DE	Toleranslar Limit Deviations		Nominal Et Kalınlığı Nominal Wall Thickness	Muf Ağırlık Socket Weight	Metre Başına Ağırlık Weight per Meter	L=6 m için Beton ağırlığı Cement Mortar Weight for L=6 m	L=6 m için Toplam Ağırlığı Total Weight for L=6 m	L=8,15 m için Beton Ağırlığı Cement Mortar Weight for L=8,15 m	L=8,15 m için Toplam Ağırlık Total Weight for L=8,15 m
80	40	98	+ 1	- 2,7	4,4	3,4	9,12	10	68,3	-	-
100	40	118	+ 1	- 2,8	4,4	4,3	11,06	12	83,1	-	-
125	40	144	+ 1	- 2,8	4,5	5,7	13,90	16	105,1	-	-
150	40	170	+ 1	- 2,9	4,5	7,1	16,49	19	125,0	-	-
200	40	222	+ 1	- 3,0	4,7	10,3	22,61	25	171,0	-	-
250	40	274	+ 1	- 3,1	5,5	14,2	32,69	31	241,0	-	-
300	40	326	+ 1	- 3,3	6,2	18,6	43,89	37	319,0	-	-
350	30	378	+ 1	- 3,4	6,3	23,7	51,84	73	407,7	-	-
400	30	429	+ 1	- 3,5	6,5	29,3	60,79	84	478,1	-	-
450	30	480	+ 1	- 3,6	6,9	35,6	72,26	95	564,2	-	-
500	30	532	+ 1	- 3,8	7,5	42,8	87,08	106	671,3	-	-
600	30	635	+ 1	- 4,0	8,7	59,3	120,62	126	909,0	-	-
700	25	738	+ 1	- 4,3	8,8	79,1	142,05	178	1109,4	-	-
800	25	842	+ 1	- 4,5	9,6	102,6	176,90	200	1364,0	-	-
900	25	945	+ 1	- 4,8	10,6	129,9	219,26	226	1671,5	-	-
1000	25	1048	+ 1	- 5,0	11,6	161,2	266,14	252	2010,0	-	-
1100	25	1152	+ 1	- 6,0	12,6	196,2	317,81	279	2382,1	-	-
1200	25	1255	+ 1	- 5,8	13,6	237,7	373,74	302	2782,1	-	-
1400	25	1462	+ 1	- 6,6	15,7	279,3	502,66	-	-	352	4728,0
1500	25	1565	+ 1	- 7,0	16,7	316,4	572,39	-	-	503	5484,4
1600	25	1668	+ 1	- 7,4	17,7	375,4	646,63	-	-	536	6181,4
1800	25	1875	+ 1	- 8,2	19,7	445,0	809,09	-	-	704	7743,2
2000	25	2082	+ 1	- 9,0	21,8	560,0	994,22	-	-	782	9445,0
2200	25	2288	+ 1	-	23,8	680,0	1192,92	-	-	860	11262,3

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

DEPREME DAYANIKLI TİP BAĞLANTILI DÜKTİL DEMİR BORULAR / DUCTILE IRON PIPES WITH EARTHQUAKE RESISTANT TYPE CONNECTIONS

Deprem sırasında, sıvılaşma nedeniyle toprak deformasyonunun oluşabileceği yerlere ve toprak çökmesi görülen ıslah edilmiş toprak gibi yumuşak zeminlere boru hattı döşenmesi gerekirse, çıkmaya dirençli, genleşme/büzülme ve sapma kabiliyetine sahip depreme dayanıklı bağlantılı borular kullanılmalıdır.

Deprem sonucu kalıcı yer deformasyonu oluşan bölgelerde, düktil demir boruların muflu bağlantı bölgesi oluşabilecek boru ucunun muftan çıkması veya borunun mufa doğru itilmesi ile mufun ve boru ucunun deforme olmasını engellemek için özel depreme dayanıklı tip bağlantılı düktil demir borular üretilmektedir. Bu boruların muf kısımları standart üretim boruların muflarına göre daha uzun dizayna sahip "uzun standart tip muflu" olarak üretilmekte ve mufun içinde standart tip contanın yanı sıra borunun muftan çıkmasını engelleyen kauçukla desteklenmiş çelik segman kullanılmaktadır. Borunun uç kısmına açılan çentik, çelik segmana takılarak borunun çıkmasını engellemektedir. Böylece deprem sonucu boru hattında oluşabilecek hasar oranı minimuma indirilmektedir.

In cases where pipelines are to be laid in locations where ground deformation could be induced by liquefaction during an earthquake, and where ground subsidence is anticipated in soft soil such as reclaimed ground, a pipeline having earthquake-resistant joints with slip-out resistance as well as an expansion/contraction and deflection capability should be used.

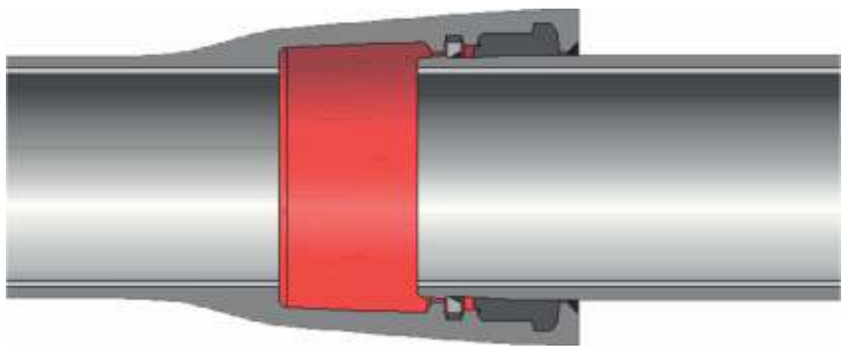
For areas where permanent ground deformation occurs, ductile iron pipes with special earthquake resistant type connections are manufactured in order to avoid the deformation of the socket and pipe end by pushing the pipe towards the socket or displacement of the pipe end from the socket, which may occur at the socket connection area of the ductile iron pipes. The socket parts of those pipes are manufactured with "long standard-type sockets", which has longer design than the standard manufactured pipes' sockets and inside the socket standard-type gasket is used together with the rubber backed steel ring, which prevents the pipe displacing from the socket. The groove opened to the end of the pipe prevents the pipe from displacing by attaching the steel ring. By this way the damage rate at the pipeline because of the earthquake is minimized.

SMS depreme dayanıklı bağlantıları aşağıdaki şekilde işlev görür; / SMS earthquake-resistance joint perform as;

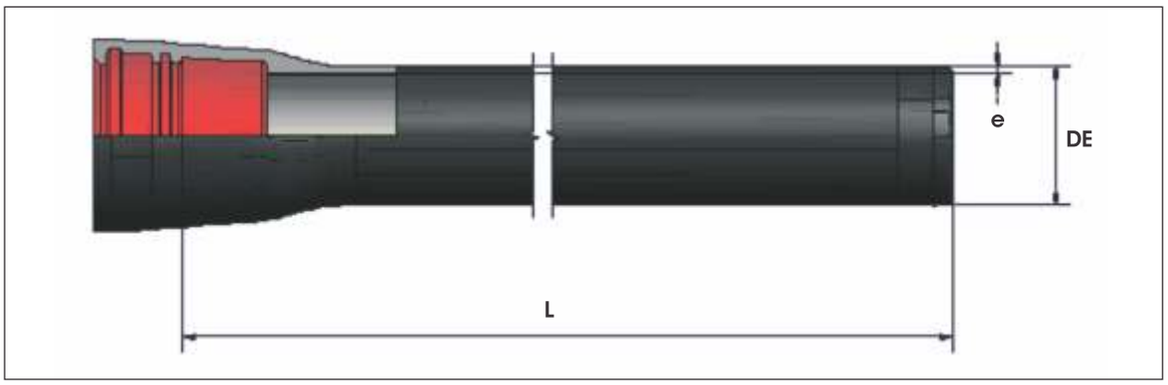
Genleşme/			Expansion/		
Büzülme performansı:	Sınıf S-1	L'nin ± %1'i	Contraction performance:	Class S-1	± 1% of L
Çıkma direnci	: Sınıf A	3 d kN veya daha fazla	Slip-out resistance	: Class A	3 d kN or more
Bağlantı sapma açısı	: M-2	±7.5° ila <15°	Joint deflection angle	: M-2	± 7.5° to < 15°

L: unsur uzunluğu (mm) / component length (mm)
d: nominal boru çapı (mm) / is nominal pipe diameter (mm)

Değerler ISO 16134:2006 (E) Tablo 2'ye uygundur. / Which conforms the values mentioned in ISO 16134:2006 (E) table 2.



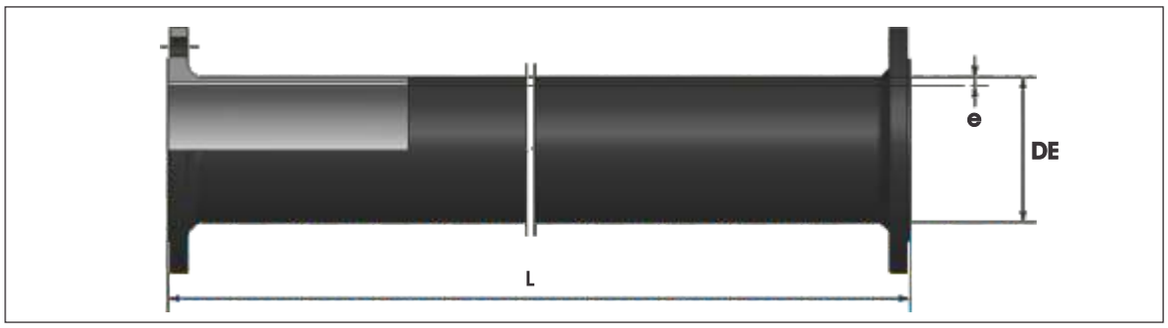


DN	Dış Çap External Diameter DE	Döküm Et Kalınlığı Iron Wall Thickness e, K9	Beton Kaplama Kalınlığı Cement Mortar Lining Thickness	Metre Başına Ağırlık Weight per Meter	Muf Ağırlığı Socket Weight	L=6m için Beton Ağırlığı Cement Mortar Weight for L=6m	L=6m için Toplam Ağırlık Total Weight for L=6m
80	98	6,0	4	12,2	5,7	10,2	89
100	118	6,0	4	15,1	7,3	12,4	110
125	144	6,0	4	18,9	9,7	16,0	139
150	170	6,0	4	22,8	12,1	19,0	168
200	222	6,3	4	30,6	17,5	25,0	226
250	274	6,8	4	40,2	24,1	31,0	296
300	326	7,2	4	50,8	31,6	37,0	373
350	378	7,7	5	63,2	40,3	73,0	492
400	429	8,1	5	75,5	49,8	84,0	586
500	532	9,0	5	104,3	72,7	106,0	804
600	635	9,9	5	137,3	100,8	126,0	1050
700	738	10,8	6	173,9	134,4	178,0	1355
800	842	11,7	6	215,2	174,4	200,0	1665

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

FLANŞLI BORULAR — FLANGED PIPES



DN	Dış Çap External Diameter DE	Döküm Et Kalınlığı, Cast Wall Thickness e, K9	Metre Başına Ağırlık Weight Per Meter	L=6 m için Toplam Ağırlık Total Weight for L=6m		
				PN 10	PN 16	PN 25
80	98	6,0	12,2	79	79	79
100	118	6,0	15,1	97	97	98
125	144	6,0	18,9	121	121	123
150	170	6,0	22,8	147	147	149
200	222	6,3	30,6	197	197	201
250	274	6,8	40,2	260	260	267
300	326	7,2	50,8	330	330	341
350	378	7,7	63,2	407	414	430
400	429	8,1	75,5	486	497	519
450	480	8,6	89,9	606	634	590
500	532	9,0	104,3	669	700	723
600	635	9,9	137,3	885	938	967
700	738	10,8	173,9	1124	1155	1224
800	842	11,7	215,2	1401	1439	1538
900	945	12,6	260,2	1690	1738	1858
1000	1048	13,5	309,3	2019	2102	2257
1100	1152	14,4	362,7	2313	2487	2692
1200	1255	15,3	420,1	2762	2891	2990
1400	1462	17,1	547,2	3579	3715	4019
1500	1565	18,0	618,4	4005	4215	4598
1600	1668	18,9	690,3	4555	4759	5113
1800	1875	20,7	946,0	6148	6400	6900
2000	2082	22,5	1233,0	7956	8262	9100
2200	2288	24,3	1335,0	8700	9035	10250

* Daha yüksek basınçlar için firmamız ile iletişime geçiniz. / For higher pressures, please get in contact with SMS.

PE SERİSİ BORULAR (ARMADoc Serisi)

Yüksek Yoğunluklu Polietilen (HDPE) Kaplanmış Düktil Demir Borular
Samsun Makina PE serisi düktil demir borular, çok yüksek aşındırıcı topraklarda kullanım için tasarlanmıştır. Son kat PE kaplı borular EN 14628 Avrupa standardına uygun olarak üretilmektedir. Müşterinin talebine göre çinko kaplamasız, direkt düktil demir boru üzerine veya minimum 200 g/m^2 çinko ile kaplanmış boruların üzerine yüksek yoğunluklu polietilen (HDPE) kaplama malzemesi ekstrüde edilerek uygulanır. PE kaplama malzemesi WRAS içmesuyuna uygunluk belgesine sahiptir.

EN 545, EN 598, ISO 2531 ve ISO 7186'ya uygun düktil demir boruların dış korozyon koruması için, fabrikada uygulanan PE kaplama iki tabakadan oluşur:
- Yapışkan bir tabaka
- Yapıştırıcının uygulanmasından hemen sonra, ekstrüde edilmiş PE malzemesinin yassı bant olarak sarılması ile son kat olarak uygulandığı ikinci tabaka

Polietilen kaplamanın kalınlığından dolayı, düktil demir boruların korunması, sadece yüksek aşındırıcı topraklara karşı değil, kaldırma ve nakliye sırasında oluşabilecek hasarlara karşı da tamamen sağlanmaktadır. PE serisi boruların minimum kaplama kalınlıkları diğer (bitüm, epoksi, polyüretan, vb.) kaplama türlerinin çok üzerindedir.

Dışı PE Kaplanmış Boru		
DN	**Standart Kalınlık (µm)**	**Arttırılmış Kalınlık (µm)**
80 -100	1800	2500
125 - 250	2000	2500
300 - 450	2200	3000
500 - 700	2500	3500
800 - 1400	3000	3500
1500 - 2000	3500	4000

SMS üretimi PE kaplı borular, EN 14628 standardının aşağıdaki performans gereksinimlerini karşılamak için gerekli tüm uygunluk testlerine tabi tutulmuştur.

Parametre	**Performans Gereksinimleri**
Soyulma Direnci	10N (Zn-kaplı yüzeyde)
Darbe Dayanımı	Şekil 2, Bölge A
Zedelenme Direnci	< 0,3 mm
Kopma Uzaması	> %200
0.1 M NaCl'de Özgül Kaplama Direnci	>10^8 Ωm^2
Direnç Oranı	> 0,8
100 Gün, 100°C'de Isı Yaşlanması	< ± %35
Xenon Ark Radyasyonu Altında, 100 Günde Işık Yaşlanması	< ± %35
Yapışkanın Sabunlaşma Özelliği	Sabunlaşma İndisi < 3 mg KOH/g

Sipariş aşamasında, EN 545, EN 598, vb. standartlarına göre genel ürün sipariş tanımlamasının yanı sıra müşteri tarafından verilmesi gereken bilgiler aşağıdaki gibidir:
- EN 14628 standardına uygun olarak dışı PE kaplı boru
- Kaplama türü
  - Çinko kaplama üzeri PE uygulaması, standart kalınlık,
  - Çinko kaplama üzeri PE uygulaması, arttırılmış kalınlık
  - Çinko kaplamasız, direkt düktil demir boru üzeri PE uygulanması, standart kalınlık veya
  - Çinko kaplamasız, direkt düktil demir boru üzeri PE uygulanması, arttırılmış kalınlık




PE SERIES PIPES (ARMADoc Series)

High Density Polyethylene (HDPE) Coated Ductile Iron Pipes
Samsun Makina PE series ductile iron pipes are designed for use in very high corrosive soils. PE coated ductile iron pipes are produced according to the EN 14628 standard. According to customer requirements high density polyethylene (HDPE) coating material is extruded and applied on the pipes either not zinc-coated or coated with minimum 200 g/m^2 zinc. PE coating material has WRAS approval for suitability of drinking water.

PE coating for the external corrosion protection of ductile iron pipes conforming to EN 545, EN 598, ISO 2531 and ISO 7186 generally consists of two factory applied layers:
- An adhesive layer applied
- An extruded PE compound outer layer applied by the flat die wrapping extrusion method immediately following the application of the adhesive.

Due to the thickness of the polyethylene coating, ductile iron pipes are fully protected not only against the high corrosive soils but also against the damages during lifting and transportation. The coating thicknesses of PE series pipes are much higher than other coating types (bitumen, epoxy, polyurethane, etc).

PE External Coated Pipe		
DN	**Standard Thickness (µm)**	**Increased Thickness (µm)**
80 - 100	1800	2500
125 - 250	2000	2500
300 - 450	2200	3000
500 - 700	2500	3500
800 - 1400	3000	3500
1500 - 2000	3500	4000

The SMS pipes have been conformity tested to fulfill the below performance requirements of the EN 14628 standard.

Parameter	**Performances**
Pealing Strength	10N (Zn-Coated Surfaces)
Impact Strength	Fig 2, Range A
Indentation Resistance	< 0,3 mm
Elongation at Break	> 200%
Specific Coating Resistance in 0.1 M NaCl	$>10^8\ \Omega\ m^2$
Ratio of Resistance	> 0,8
Heat Aging 100 Days 100 °C	< ± 35%
Light Aging 100 Days Xenon Arc Radiation	< ± 35%
Saponification Properties of Adhesive	Saponification Value < 3 mg KOH/g

The following order information shall be supplied by the purchaser besides the standard product data according to EN 545, EN 598, etc.:
- PE coated DI pipe in accordance to EN 14628 standard
- Coating method either
  - Standard thickness, pipe zinc-coated,
  - Increased thickness, pipe zinc-coated,
  - Standard thickness, pipe not zinc-coated or
  - Increased thickness, pipe not zinc-coated

PU SERİSİ BORULAR (TERRAPENoc Serisi)

Poliüretan (PU) Kaplanmış Düktil Demir Borular
Samsun Makina PU serisi düktil demir borular, yüksek aşındırıcı topraklarda kullanım için tasarlanmıştır. Son kat PU kaplı borular EN 15189 Avrupa standardına uygun olarak üretilmektedir. EN 545, EN 598, ISO 2531 ve ISO 7186'ya uygun düktil demir boruların dış korozyon koruması için fabrikada, çift beslemeli, sıcak havasız püskürtme yöntemiyle uygulanan PU kaplamalar 50°C'ye kadar çalışma sıcaklıklarında kullanıma uygundur. Son kat poliüretan kaplaması EN ISO 8501-1 standardına göre SA 2,5 yüzey kalitesine göre grit püskürtme metodu ile pas, kir, yağ, gres ve nemden arındırılmış düktil demir borulara uygulanır. Uygulama öncesi borular yüzey neminden tamamen arındırılmak için ısıtılır.

Poliüretan (PU) kaplama malzemesi, boru çapından bağımsız olarak tüm borular minimum 900 μm kalınlıkta olacak şekilde, boruların üzerine püskürtülerek uygulanır. Tek kat uygulamada 1000 μm kalınlığa ulaşılır. Poliüretan kaplamanın kalınlığından ve yapısından dolayı, düktil demir boruların korunması, sadece yüksek aşındırıcı topraklara karşı değil, kaldırma ve nakliye sırasında oluşabilecek hasarlara karşı da tamamen sağlanmaktadır.

PU kaplama malzemesi WRAS içmesuyuna uygunluk belgesine sahiptir. Hem iç hem de dış kaplamalara uygundur.

Poliüretan (PU) malzemenin fiziksel özellikleri aşağıdaki gibidir:

Fiziksel Parametreler	Özellikleri
Komponent Sayısı	Çift Komponentli
Kuru Film Rengi	Bej
23°C'deki Yoğunluğu	1.2 g/ml
Kuru Film Sertliği	> 70 Shore D

SMS üretimi borular, EN 15189 standardının aşağıdaki performans gereksinimlerini karşılamak için gerekli tüm uygunluk testlerine tabi tutulmuştur.

Parametre	Performans Gereksinimleri
Kimyasal Dayanım, 100 Gün	
- Saf Su	< %15 Ağırlık Artışı Daldırma Sonrası ve < %2 Ağırlık Artışı Kuruduktan Sonra
- %10'luk Sülfürik Asit	< %10 Ağırlık Artışı Daldırma Sonrası ve < %4 Ağırlık Artışı Kuruduktan Sonra
Darbe Dayanımı	Minimum 8 J/mm PU Kaplı Boru Gövdesinde
Batma (Zedelenme) Direnci	10 MPa'da < 10%
Kopma Uzaması	> %2.5
0.1 M NaCl'de Özgül Kaplama Direnci, 100 Gün	10^8 Ωm^2
Direnç Oranı, 70 Gün/100 Gün	> 0,8
Gözeneksizlik (Holiday) Testi	Kıvılcım Olmaması
Yapışma Testi	> 8 MPa, 23°C'de
Kalınlık	Minimum 900 μm, (x-2σ >700 m -> x: 10 Ölçüm Ortalaması, σ :Standart Sapma)

Sipariş aşamasında, EN 545, EN 598, vb. standartlarına göre genel ürün sipariş tanımlamasının yanı sıra müşteri tarafından verilmesi gereken bilgiler aşağıdaki gibidir:
- EN 15189 standardına uygun olarak dışı PU kaplı boru,
- Boru muf ve spigot kısımları kaplaması konusunda üretici ile anlaşma.




PU SERIES PIPES (TERRAPENoc Series)

Polyurethane (PU) Coated Ductile Iron Pipes
Samsun Makina PU series ductile iron pipes are designed for use in very high corrosive soils. PE coated ductile iron pipes are produced according to the EN 15189 standard. Factory applied PU coating for the external corrosion protection of ductile iron pipes conforming to EN 545, EN 598, ISO 2531 and ISO 7186 generally consists of double fed, hot airless spraying application systems for using temperatures up to 50°C. Before application of PU coating as final layer, the surface of pipe is prepared by grit blasting and be in compliance with level SA 2,5 of EN ISO 8501-1 to clean and remove rust, loose constituent material, dirt, oil and grease. After the blasting, pipes are heated to remove the moisture.

Polyurethane (PU) coating material is applied by spraying on all pipes, minimum 900 μm thickness, regardless of pipe diameter. Thickness of 1000 μm is achieved in single coat application. Due to the thickness of the polyethylene coating, ductile iron pipes are fully protected not only against the high corrosive soils but also against the damages during lifting and transportation.

PU coating material has WRAS approval for conformity to drinking water. It is suitable for both internal and external coatings.

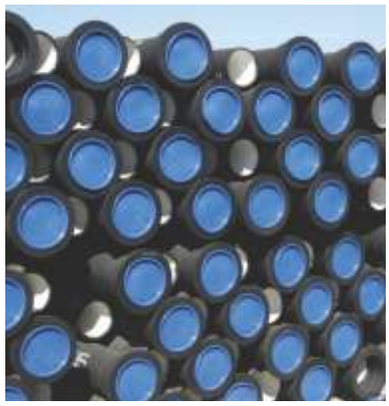
Physical properties of the Polyurethane (PU) material are as follow:

Physical Parameters	Properties
Number of Component	Double Component
Dry Film Color	Beige
Density at 23°C	1.2 g/ml
Dry Film Hardness	> 70 Shore D

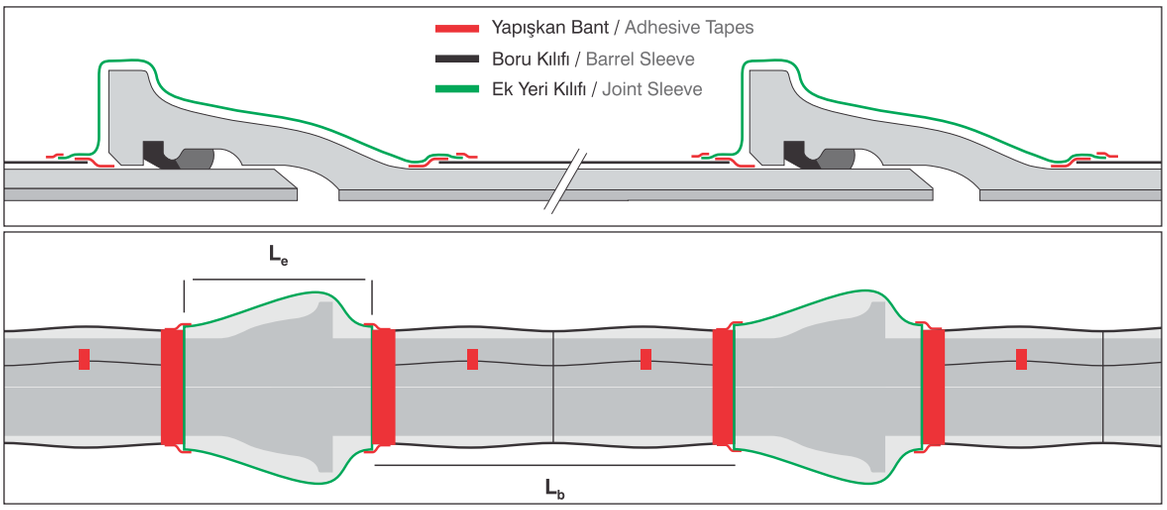
SMS produced pipes have been subjected to all necessary conformity tests to meet the following performance requirements of EN 15189:

Parameter	Performances
Chemical Resistance, 100 Days	
- In Deionized Water	< 15% Weight Increase After Immersion and < 2% Weight Loss After Drying
- In 10% Sulphuric Acid	< 10% Weight Increase After Immersion and < 4% Weight Loss After Drying
Impact Strength	Minimum 8 J/mm on PU Coated Pipe Barrel
Indentation Resistance	At 10 MPa < 10%
Elongation at Break	> 2.5%
Specific Coating Resistance in 0.1 M NaCl, 100 Days	10^8 Ωm^2
Ratio of Resistance, 70days/100 Days	> 0,8
Non-porosity (Holiday) Test	No Electrical Break
Adhesion Test	> 8 MPa, at 23°C
Thickness	Minimum 900 μm, (x-2σ> 700 μm -> x: Average of 10 Mearurements,σ:Standard Deviation)

The following order information shall be supplied by the purchaser besides the standard product data according to EN 545, EN 598, etc.:
- PU coated DI pipe in accordance to EN 15189 standard
- The type of coating used for pipe ends

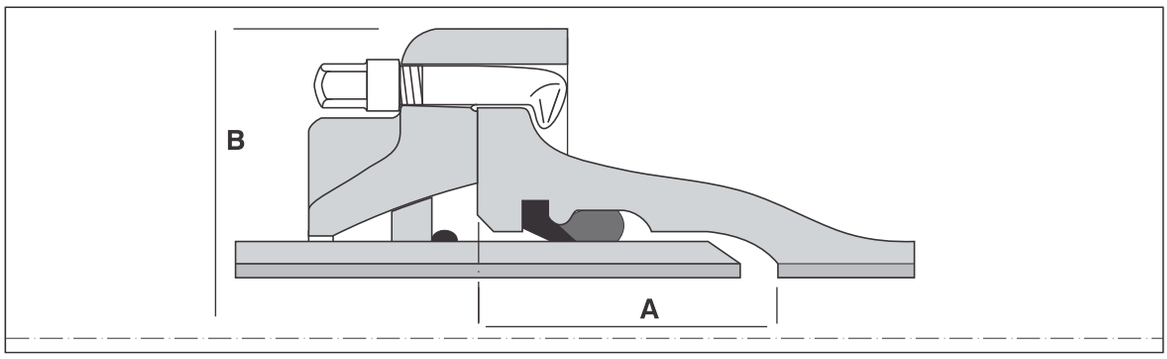
POLİETİLEN KILIFLAMA — POLYETHYLENE SLEEVING



DN	Boru Pipe Barrel Sleeve		Ek Yeri Pipe Joint Sleeve		Kalınlık Thickness	Yapışkan Bant Adhesive Tapes		Ağırlık Weight	
	Açınım Eni Width W_b	Boy Length L_b	Açınım Eni Width W_e	Boy Length L_e	t	Miktar Quantity	Boy Length	Boru Kılıfı Barrel Sleeve	Ek Yeri Kılıfı Joint Sleeve
	m	m	m	m	µm	adet/boru per pipe	m/boru m per pipe	kg/m	kg/m
80	0,35	5,80	0,35	0,80	200	4	1,8	0,13	0,13
100	0,35	5,80	0,35	0,80	200	4	1,8	0,13	0,13
125	0,40	5,80	0,40	0,80	200	4	2,2	0,15	0,15
150	0,45	5,80	0,45	0,80	200	4	2,6	0,17	0,17
200	0,56	5,80	0,56	0,80	200	4	3,4	0,21	0,21
250	0,67	5,80	0,67	0,80	200	4	4,4	0,25	0,25
300	0,70	5,80	0,70	0,80	200	4	5,2	0,26	0,26
350	0,85	5,80	0,85	0,80	200	4	6,0	0,32	0,32
400	0,94	5,80	0,94	0,80	200	4	6,8	0,35	0,35
450	1,10	5,80	1,10	0,80	200	4	7,6	0,41	0,41
500	1,15	5,80	1,15	0,80	200	4	8,4	0,43	0,43
600	1,30	5,80	1,30	0,80	200	4	10,0	0,48	0,48
700	1,60	5,80	1,60	0,80	200	4	11,6	0,59	0,59
800	1,80	5,80	1,80	0,80	200	4	13,2	0,67	0,67
900	2,20	5,80	2,20	0,80	200	4	16,4	1,50	1,50
1000	2,20	5,80	2,20	0,80	400	4	16,4	1,50	1,50
1100	2,30	5,80	2,30	0,80	400	4	18,2	1,71	1,71
1200	2,50	5,80	2,50	0,80	400	4	19,8	1,86	1,86
1400	2,80	5,80	2,80	0,80	400	4	23,0	2,08	2,08
1500	3,10	5,80	3,10	0,80	400	4	26,2	2,30	2,30
1600	3,10	5,80	3,10	0,80	400	4	26,2	2,30	2,30
1800	3,50	5,80	3,50	0,80	400	4	30,0	2,60	2,60
2000	4,00	5,80	4,00	0,80	400	4	34,0	3,00	3,00
2200	4,30	5,80	4,30	0,80	400	4	37,0	3,50	3,50

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

TESPİT HALKALI BAĞLANTI — ANCHORED JOINT WITH LOCKING RING

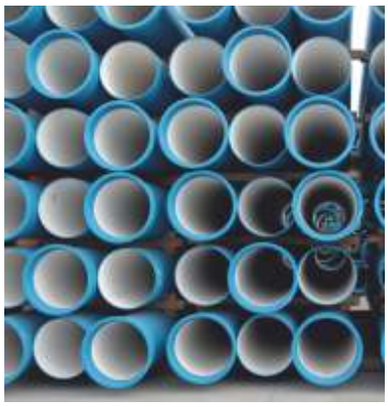


Temelde soketli bağlantı ile aynıdır. İlave olarak, tespit halkası, destek halkası, kaynak halkası ve özel cıvata ve somundan meydana gelen bir destek mekanizması mevcuttur. "Esnek Flanşlı bağlantı" olarak düşünülebilir. Kendinden tespitli contanın aksine bu bağlantı kolayca sökülebilir.

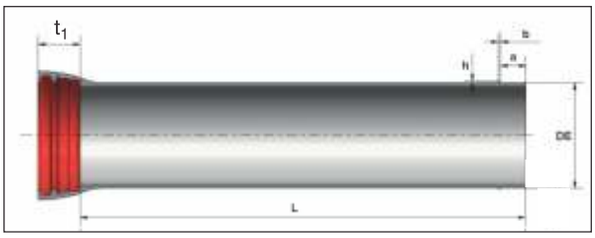
Basically it is same with the socket type connections. Additionally it has a support mechanism made by locking ring, supporting ring, welding ring and special bolt and nut. It could be considered as "Resilient Flanged Connection". Contrary to the self fixed gasket this connection could be dismantled easily.

DN	Dış Çap External Diameter DE	Tolerans Limit Deviations		A	B	Cıvata / Bolt			Ağırlık / Weight			
						Adet Number	Çap x Uzunluk Diameter x Length	Tespit Halkası Locking Ring	Destek Halkası Supporting Ring	Conta Gasket	Cıvata Bolt	Dönme Açısı Spin Angle
80	98	+ 1	- 2,7	85	232	4	M20x70	3,5	0,55	0,15	0,31	2,5°
100	118	+ 1	- 2,8	88	253	4		4,8	0,48	0,20		
125	144	+ 1	- 2,8	93	285	4		7,9	0,68	0,24		
150	170	+ 1	- 2,9	93	308	6		7,5	0,93	0,29		
200	222	+ 1	- 3,0	100	368	10		9,5	1,50	0,38		
250	274	+ 1	- 3,1	105	462	8	M27x110	21,0	2,80	0,50	0,90	2,5°
300	326	+ 1	- 3,3	110	518	12		28,0	3,70	0,71		
350	378	+ 1	- 3,4	110	573	12		28,5	4,50	0,90	0,90	2°
400	429	+ 1	- 3,5	110	630	14		37,7	4,50	1,10		
450	480	+ 1	- 3,6	120	680	14		41,0	5,50	1,32		
500	532	+ 1	- 3,8	120	738	16		57,0	6,70	1,54		
600	635	+ 1	- 4,0	120	847	20		67,2	9,60	2,16		
700	738	+ 1	- 4,3	150	964	24	M27x120	109,0	10,60	2,87	0,93	1,5°
800	842	+ 1	- 4,5	150	1075	30		140,0	11,20	3,67		
900	945	+ 1	- 4,8	150	1185	36		184,0	13,60	4,61		
1000	1048	+ 1	- 5,0	158	1300	40		211,0	15,30	5,59		
1100	1152	+ 1	- 6,0	161	1415	40		232,0	17,00	7,68		
1200	1255	+ 1	- 5,8	165	1535	40		222,0	21,00	9,34		
1400	1462	+ 1	- 6,6	245	1795	48	M27x140	245,0	25,70	11,90	1,08	1,5°
1500	1565	+ 1	- 7,0	255	1900	52	M27x150	260,0	30,50	14,10	1,10	1,5°
1600	1668	+ 1	- 7,4	265	2003	56		275,0	38,00	15,10		

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

SEKMANLI KİLİTLİ BORU - SK-TİP
SELF ANCHORED JOINT WITH SEGMENTS - SK-TYPE





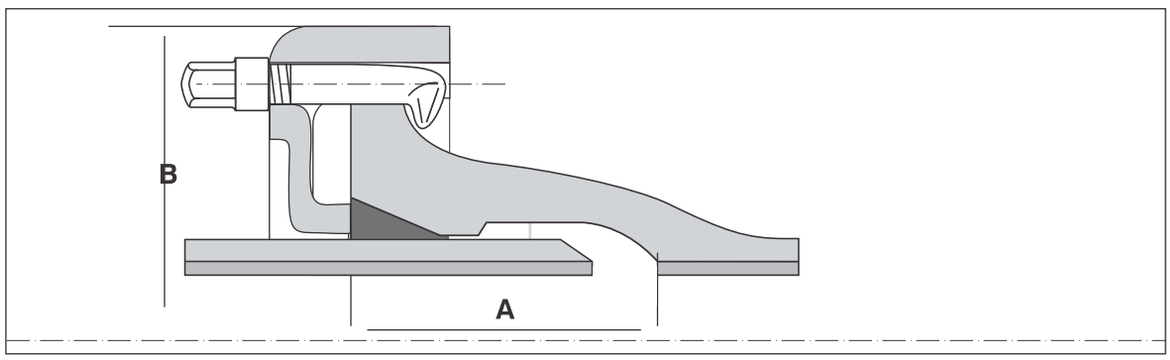
DN	L	t_1	a	b	h	Dönme Açısı Spin Angle	Kilit Adedi Segments
80	6000	130	82	8	6	2,5°	3
100	6000	140	88	8	6	2,5°	3
125	6000	147	93	8	6	2,5°	4
150	6000	152	95	8	6	2,5°	4
200	6000	155	95	8	6	2,5°	5
250	6000	162	97	8	6	2,5°	5
300	6000	168	108	8	6	2,5°	6
350	6000	169	107	8	6	2°	7
400	6000	170	107	8	6	2°	7
450	6000	172	108	8	6	2°	8
500	6000	175	110	8	6	2°	8
600	6000	185	120	8	6	2°	8
700	6000	212	130	8	6	1,5°	10
800	6000	220	135	8	6	1,5°	10
900	6000	225	135	8	6	1,5°	13
1000	6000	243	147	8	6	1,5°	14
1100	6000	237	152	8	6	1,5°	15
1200	6000	239	154	8	6	1,5°	16
1400	8000	324	230	8	6	1,5°	18
1500	8000	336	238	8	6	0,75°	20
1600	8000	360	247	11	6	0,75°	21
1800	8000	376	250	11	6	0,75°	25
2000	8000	403	250	11	6	0,75°	30

t_1: Muf Boyu
a: Kaynak Çemberinin Spigot Uca Mesafesi
b: Kaynak Genişliği
h: Kaynak Yüksekliği

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"




EKSPRES (MEKANİK) BAĞLANTI — EXPRESS JOINT



Ekspres bağlantıların montaj ve demontajı son derece kolaydır. Açısal sapmalara müsade eden bu mekanik bağlantı tipinde sızdırmazlık, cıvata ve somun yardımıyla sabitlenen kontra bileziğin kauçuk contayı yuvasına basmasıyla sağlanır.

The assembly and dismantle of the express connection are very easy. The impermeability in this mechanical type of connection, which lateral deflections are allowed, is provided with the locking ring, which is fixed by the help of the bolt and nut, pushing the rubber gasket to its recess

DN	Dış Çap External Diameter DE	A	B	Cıvata / Bolt		Ağırlık / Weight		
				Adet Number	Çap x Uzunluk Diameter x Length	Kontra Bilezik Locking Ring	Bilezik Conta Gasket	Cıvata Bolt
80	98	90	236	3	22x70	4,0	0,08	0,39
100	118	92	257	3		4,3	0,11	
125	144	95	285	3		4,8	0,15	
150	170	98	311	4		5,5	0,17	
200	222	104	364	5		7,0	0,25	
250	274	104	417	6		9,0	0,31	
300	326	105	474	7		11,0	0,44	
350	378	108	529	8		12,5	0,57	
400	429	110	582	9		15,0	0,64	
450	480	113	669	8	27x102	24,0	0,81	0,79
500	532	115	734	10		28,0	0,90	
600	635	120	836	12		37,0	1,30	
700	738	145	958	16		53,0	3,14	
800	842	145	1068	18		66,0	4,07	
900	945	145	1178	20		80,0	5,12	
1000	1048	145	1289	24		94,0	6,39	
1200	1255	150	1514	30		107,0	9,07	
1400	1462	245	1765	40		120,0	12,50	
1500	1565	265	1865	40		139,0	16,30	
1600	1668	265	1970	48		150,0	20,70	
1800	1875	270	1980	48		170,0	24,30	
2000	2082	290	2195	48		192,0	28,00	
2200	2288	310	2400	48		213,0	33,30	

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

BORU BOYUTLARI - EN 545:2010'a göre DIMENSIONS OF PIPES ACCORDING TO EN 545:2010

DN	Dış Çap External Diameter DE			Minimum Et Kalınlığı / Minimum Wall Thickness							EN 598:2009 (Minimum)
	Nominal Çap Nominal Diameter	Toleranslar Limit Deviations		Class 20	Class 25	Class 30	Class 40	Class 50	Class 64	Class 100	
80	98	+1	-2,7	-	-	-	3,0	3,5	4,0	4,7	3,5
100	118	+1	-2,8	-	-	-	3,0	3,5	4,0	4,7	3,5
125	144	+1	-2,8	-	-	-	3,0	3,5	4,0	5,0	3,5
150	170	+1	-2,9	-	-	-	3,0	3,5	4,0	5,9	3,5
200	222	+1	-3,0	-	-	-	3,1	3,9	5,0	7,7	3,5
250	274	+1	-3,1	-	-	-	3,9	4,8	6,1	9,5	3,7
300	326	+1	-3,3	-	-	-	4,6	5,7	7,3	11,2	3,7
350	378	+1	-3,4	-	-	4,7	5,3	6,6	8,5	13,0	4,3
400	429	+1	-3,5	-	-	4,8	6,0	7,5	9,6	14,8	4,6
450	480	+1	-3,6	-	-	5,1	6,8	8,4	10,7	16,6	4,9
500	532	+1	-3,8	-	-	5,6	7,5	9,3	11,9	18,3	5,2
600	635	+1	-4,0	-	-	6,7	8,9	11,1	14,2	21,9	5,8
700	738	+1	-4,3	-	6,8	7,8	10,4	13,0	16,5	-	7,6
800	842	+1	-4,5	-	7,5	8,9	11,9	14,8	18,8	-	8,3
900	945	+1	-4,8	-	8,4	10,0	13,3	16,6	-	-	9,0
1000	1048	+1	-5,0	-	9,3	11,1	14,8	18,4	-	-	10,7
1100	1152	+1	-6,0	8,2	10,2	12,2	16,2	20,2	-	-	12,0
1200	1255	+1	-5,8	8,9	11,1	13,3	17,7	22,0	-	-	12,8
1400	1462	+1	-6,6	10,4	12,9	15,5	-	-	-	-	14,4
1500	1565	+1	-7,0	11,1	13,9	16,6	-	-	-	-	15,1
1600	1668	+1	-7,4	11,9	14,8	17,7	-	-	-	-	16,0
1800	1875	+1	-8,2	13,3	16,6	19,9	-	-	-	-	17,6
2000	2082	+1	-9,0	14,8	18,4	22,1	-	-	-	-	19,2

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

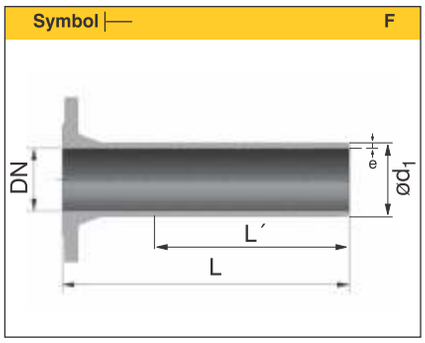
ek parçaları

fittings

SAMSUN MAKİNA SANAYİ A.Ş.




Flanşlı Spigotlar / Flanged Spigots

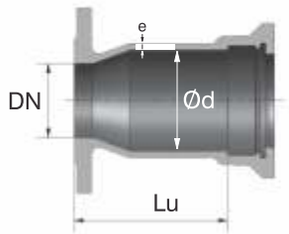


DN	Ød1	L	L´	e	W			
					PN 10	PN 16	PN 25	PN 40
80	98	350	215	7,0	8	8	8,0	8
100	118	360	215	7,2	10	10	10,5	12
125	144	370	220	7,5	13	13	14,0	15
150	170	380	225	7,8	16	16	18,0	19
200	222	400	230	8,4	23	25	27,0	30
250	274	420	240	9,0	32	35	37,0	46
300	326	440	250	9,6	44	47	49,0	63
350	378	460	260	10,2	60	65	68,0	90
400	429	480	270	10,8	69	74	81,0	106
450	480	500	280	11,4	84	90	102,0	140
500	532	520	290	12,0	100	110	125,0	160
600	635	560	310	13,2	138	159	173,0	195
700	738	600	330	14,4	188	201	240,0	–
800	842	600	330	15,6	240	270	310,0	–
900	945	600	330	16,8	290	305	370,0	–
1000	1048	600	330	18,0	350	388	460,0	–
1100	1152	600	330	19,2	420	439	620,0	–
1200	1255	600	330	20,4	460	530	–	–
1400	1462	710	390	22,8	700	730	–	–
1500	1565	750	410	24,0	815	890	–	–
1600	1668	780	430	25,2	970	1040	–	–
1800	1875	850	470	27,6	1260	1330	–	–
2000	2082	920	500	30,0	1600	1700	–	–
2200	2280	990	500	32,4	2050	2160	–	–

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Flanşlı Soketler / Flanged Sockets

Symbol EU

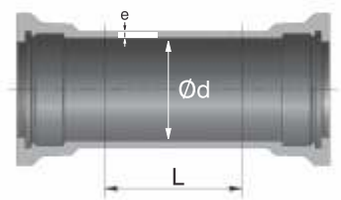


DN	Ød	Lu		e	W			
		A	B		PN 10	PN 16	PN 25	PN 40
80	109	130	105	7,0	8,5	8,5	8,5	10,0
100	130	130	110	7,2	10,5	10,5	11,0	13,0
125	156	135	115	7,5	13,0	13,0	14,0	15,0
150	183	135	120	7,8	16,0	16,0	18,0	19,5
200	235	140	120	8,4	22,0	22,0	24,0	27,5
250	288	145	125	9,0	32,0	32,0	35,0	41,5
300	340	150	130	9,6	43,0	44,0	50,0	54,0
350	393	155	135	10,2	54,0	56,0	60,0	70,0
400	445	160	140	10,3	60,0	64,0	75,0	100,0
450	498	165	145	11,4	72,0	80,0	93,0	112,0
500	550	170	–	12,0	90,0	99,0	115,0	126,0
600	655	180	–	13,2	120,0	144,0	160,0	184,0
700	760	190	–	14,4	175,0	185,0	205,0	–
800	865	200	–	15,6	230,0	252,0	270,0	–
900	970	210	–	16,8	271,0	290,0	340,0	–
1000	1075	220	–	18,0	340,0	360,0	440,0	–
1100	1180	230	–	19,2	400,0	490,0	670,0	–
1200	1285	240	–	20,4	530,0	600,0	–	–
1400	1477	310	–	22,8	740,0	796,0	–	–
1500	1580	330	–	24,0	930,0	1050,0	–	–
1600	1683	330	–	25,0	1070,0	1144,0	–	–
1800	1889	350	–	27,0	1250,0	1400,0	–	–
2000	2095	370	–	30,0	1440,0	1700,0	–	–
2200	2300	390	–	32,0	1800,0	1910,0	–	–




Kayar Manşonlar / Collars

Symbol U

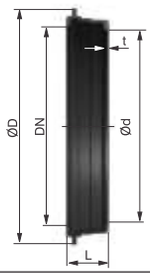


DN	Ød	L	e	W
80	109	160	7,0	8,1
100	130	160	7,2	9,9
125	156	165	7,5	12,9
150	183	165	7,8	15,9
200	235	170	8,4	23,5
250	288	175	9,0	31,5
300	340	180	9,6	41,0
350	393	185	10,2	52,0
400	445	190	10,3	64,0
450	498	195	11,4	87,0
500	550	200	12,0	123,0
600	655	210	13,2	140,0
700	760	220	14,4	188,0
800	865	230	15,6	226,0
900	970	240	16,8	282,0
1000	1075	250	18,0	349,0
1100	1180	260	19,2	430,0
1200	1285	270	20,4	560,0
1400	1477	340	22,8	816,0
1500	1580	350	24,0	900,0
1600	1683	360	25,0	1094,0
1800	1889	380	27,0	1214,0
2000	2095	400	30,0	1570,0
2200	2300	420	32,0	1907,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Standart Tip Rögar Bağlantı Parçası
Standard Type Manhole Connection Piece

SAS

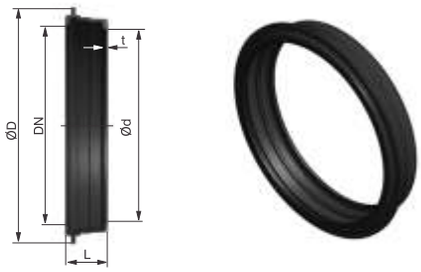


DN	ØD	Ød	t	L	W
150	256	154	10	100	5,0
200	309	204	10	100	6,5
250	362	255	10	110	8,7
300	417	306	10	110	10,4
350	473	356	10	110	13,1
400	525	406	10	110	14,8
450	585	456	10	110	18,0
500	632	510	10	110	21,5
600	738	610	10	120	26,8
700	845	720	10	160	37,1
800	950	820	10	150	53,0
900	1055	925	10	165	63,5
1000	1160	1025	10	175	73,5
1200	1470	1225	15	190	300,0
1400	1755	1425	25	280	385,0
1600	1975	1625	25	300	475,0
1800	2195	1825	25	310	615,0
2000	2425	2030	25	315	980,0




T-Tip Rögar Bağlantı Parçası
T-Type Manhole Connection Piece

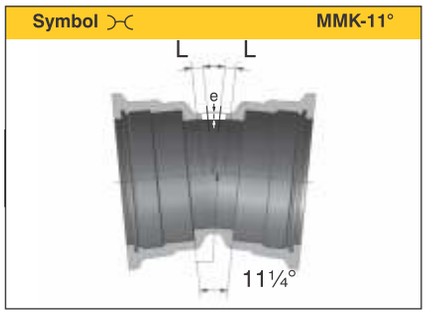
SAS



DN	ØD	Ød	t	L	W
150	260	154	10	100	6,0
200	310	204	10	100	7,5
250	360	255	10	110	9,5
300	415	306	10	110	12,0
350	470	356	10	110	14,5
400	520	406	10	110	16,0
450	585	456	10	110	18,0
500	635	510	10	110	19,5
600	730	610	10	120	28,0
700	845	720	10	130	54,0
800	950	820	10	160	57,0
900	1050	925	10	175	76,0
1000	1160	1025	10	185	82,0

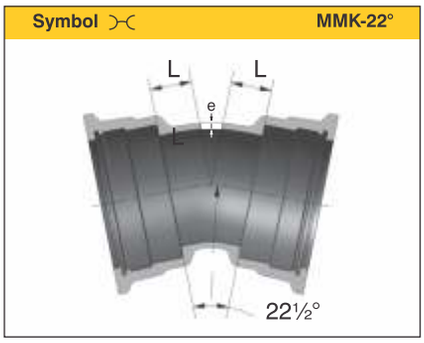
Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Çift Soketli Dirsekler 11¼°
Double Socket Bends 11¼°



DN	L	e	W
80	30	7,0	7,5
100	30	7,2	10,0
125	35	7,5	11,9
150	35	7,8	16,0
200	40	8,4	24,0
250	50	9,0	30,5
300	55	9,6	45,0
350	60	10,2	60,0
400	65	10,8	73,0
450	70	11,4	88,0
500	75	12,0	103,0
600	85	13,2	144,0
700	95	14,4	198,0
800	110	15,6	265,0
900	120	16,8	363,0
1000	130	18,0	445,0
1100	140	19,2	510,0
1200	150	20,4	588,0
1400	130	22,8	810,0
1500	140	24,0	970,0
1600	140	25,2	1107,0
1800	155	27,6	1300,0
2000	165	30,0	1530,0
2200	190	32,4	1950,0

Çift Soketli Dirsekler 22½°
Double Socket Bends 22½°



DN	L	e	W
80	40	7,0	7,7
100	40	7,2	9,9
125	50	7,5	13,5
150	55	7,8	18,0
200	65	8,4	24,0
250	75	9,0	33,5
300	85	9,6	50,0
350	95	10,2	67,0
400	110	10,8	83,0
450	120	11,4	91,0
500	130	12,0	113,0
600	150	13,2	157,0
700	175	14,4	227,0
800	195	15,6	297,0
900	220	16,8	383,0
1000	240	18,0	480,0
1100	260	19,2	598,0
1200	285	20,4	737,0
1400	260	22,8	998,0
1500	270	24,0	1180,0
1600	280	25,2	1370,0
1800	305	27,6	1530,0
2000	330	30,0	1990,0
2200	355	32,4	2520,0



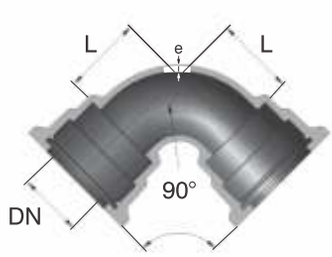

Çift Soketli Dirsekler 45°
Double Socket Bends 45°

Symbol MMK-45°

DN	L	e	W
80	55	7,0	8,0
100	65	7,2	11,0
125	75	7,5	14,1
150	85	7,8	19,0
200	110	8,4	31,0
250	130	9,0	42,0
300	150	9,6	55,0
350	175	10,2	81,0
400	195	10,8	91,0
450	220	11,4	124,0
500	240	12,0	146,0
600	200	13,2	212,0
700	330	14,4	310,0
800	370	15,6	410,0
900	415	16,8	570,0
1000	460	18,0	714,0
1100	505	19,2	914,0
1200	550	20,4	1100,0
1400	515	22,8	1370,0
1500	540	24,0	1590,0
1600	565	25,2	1850,0
1800	610	27,6	2200,0
2000	660	30,0	3010,0
2200	710	32,4	3690,0

Çift Soketli Dirsekler 90°
Double Socket Bends 90°

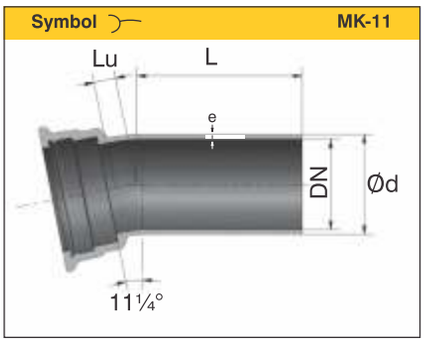
Symbol MMQ-90°



DN	L	e	W
80	100	7,0	9,0
100	120	7,2	11,4
125	145	7,5	16,0
150	170	7,8	20,5
200	220	8,4	33,0
250	270	9,0	53,0
300	320	9,6	71,0
350	370	10,2	98,0
400	420	10,8	124,0
450	470	11,4	168,0
500	520	12,0	199,0
600	620	13,2	360,0
700	720	14,4	449,0
800	820	15,6	615,0
900	920	16,8	830,0
1000	1020	18,0	1170,0
1100	1120	19,2	1510,0
1200	1220	20,4	1650,0
1400	1220	22,8	2100,0
1500	1250	24,0	2390,0
1600	1270	25,2	2820,0
1800	1300	27,6	3200,0
2000	1320	30,0	4050,0
2200	1360	32,4	5140,0

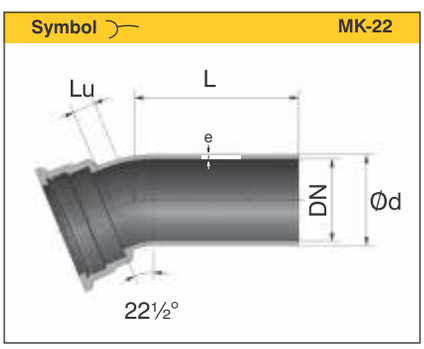
Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Tek Soketli Dirsekler 11¼° / Single Socket Bends 11¼°



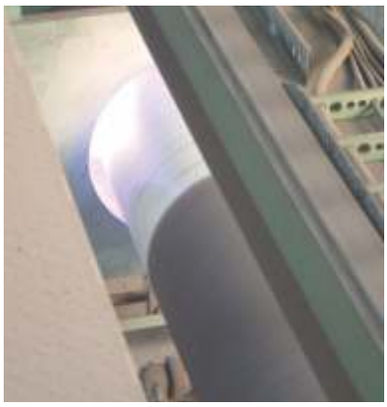
DN	L	Lu	e	Ød	W
80	240	30	7,0	98	7,6
100	243	33	7,2	118	9,8
125	261	36	7,5	144	14,0
150	284	40	7,8	170	18,0
200	311	46	8,4	222	27,0
250	255	50	9,0	274	37,8
300	260	60	9,6	326	47,0
350	235	65	10,2	378	46,0
400	238	70	10,8	429	66,9
450	240	75	11,4	480	75,0
500	250	85	12,0	532	83,2
600	287	95	13,2	635	163,0
700	340	110	14,4	738	249,0
800	375	125	15,6	842	286,0

Tek Soketli Dirsekler 22½° / Single Socket Bends 22½°



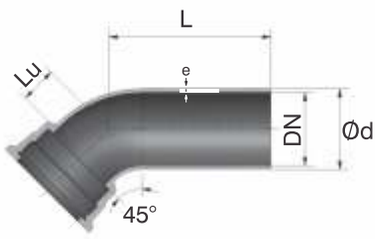
DN	L	Lu	e	Ød	W
80	248	38	7,0	98	8,1
100	253	43	7,2	118	9,7
125	274	49	7,5	144	15,1
150	299	55	7,8	170	18,4
200	331	66	8,4	222	19,2
250	260	75	9,0	274	37,8
300	265	90	9,6	326	50,2
350	270	100	10,2	378	52,0
400	278	110	10,8	429	76,7
450	290	120	11,4	480	83,0
500	300	135	12,0	532	97,0
600	357	155	13,2	635	163,0
700	420	190	14,4	738	336,0
800	455	205	15,6	842	460,0






Tek Soketli Dirsekler 45° / Single Socket Bends 45°

Symbol MK-45°



DN	L	Lu	e	Ød	W
80	265	55	7,0	98	8,4
100	274	65	7,2	118	10,8
125	301	76	7,5	144	16,2
150	331	87	7,8	170	20,5
200	374	109	8,4	222	33,5
250	300	130	9,0	274	44,3
300	315	155	9,6	326	59,4
350	345	175	10,2	378	68,0
400	368	200	10,8	429	91,0
450	420	220	11,4	480	106,0
500	405	240	12,0	532	187,0
600	529	285	13,2	635	250,5
700	610	380	14,4	738	441,0
800	625	375	15,6	842	570,0

Tek Soketli Dirsekler 90° / Single Socket Bends 90°

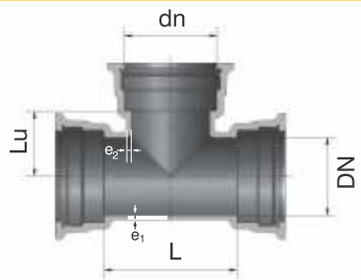
Symbol MQ-90°

DN	L	Lu	e	Ød	W
80	312	102,4	7,0	98	9,0
100	333	123	7,2	118	11,2
125	374	148,8	7,5	144	18,4
150	419	174,5	7,8	170	25,4
200	491	226	8,4	222	43,8
250	583	280	9,0	274	76,1
300	660	330	9,6	326	83,2
350	580	410	10,2	378	139,0
400	625	430	10,8	429	186,3
450	670	490	11,4	480	210,0
500	715	550	12,0	532	235,4
600	805	645	13,2	635	314,0
700	900	720	14,4	738	473,0
800	1080	800	15,6	842	644,5

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Tümü Soketli T'ler / All Socket T

Symbol **MMB**



Nominal Çap / Nominal Diameter		L	Lu	e_1	e_2	W
DN	dn					
80	80	170	85	7,0	7,0	13,4
100	80	170	95	7,2	7,0	16,0
	100	190	95	7,2	7,2	17,5
125	80	170	105	7,5	7,0	20,5
	100	195	110	7,5	7,2	21,6
	125	225	110	7,5	7,5	23,2
150	80	170	120	7,8	7,0	23,5
	100	195	120	7,8	7,2	25,0
	150	255	125	7,8	7,8	30,0
200	80	175	145	8,4	7,0	34,0
	100	200	145	8,4	7,2	36,0
	150	255	150	8,4	7,8	41,5
	200	315	155	8,4	8,4	48,5
250	100	200	170	9,0	7,2	45,5
	150	260	175	9,0	7,8	52,5
	200	315	180	9,0	8,4	60,0
	250	375	190	9,0	9,0	67,5
300	100	205	195	9,6	7,2	52,0
	150	260	200	9,6	7,8	59,5
	200	320	205	9,6	8,4	68,0
	300	435	220	9,6	9,6	84,5
350	100	205	260	10,2	7,2	67,5
	150	325	270	10,2	7,8	81,5
	200	325	270	10,2	8,4	86,0
	300	440	285	10,2	9,6	104,0
	350	495	290	10,2	10,2	116,0
400	100	210	285	10,8	7,2	79,0
	150	325	295	10,8	7,8	94,5
	200	325	295	10,8	8,4	99,0
	300	440	310	10,8	9,6	119,0
	400	560	320	10,8	10,8	144,0
450	150	330	320	11,4	7,8	110,0
	200	330	320	11,4	8,4	114,0
	300	445	335	11,4	9,6	136,0
	400	560	345	11,4	10,8	163,0
	450	620	350	11,4	11,4	176,0
500	150	330	345	12,0	7,8	127,0
	200	330	345	12,0	8,4	131,0
	300	450	360	12,0	9,6	156,0
	400	565	370	12,0	10,8	184,0
	500	680	380	12,0	12,0	214,0
600	150	340	395	13,2	7,8	164,0
	200	340	395	13,2	8,4	167,0
	300	455	410	13,2	9,6	196,0
	400	570	420	13,2	10,8	229,0
	600	800	440	13,2	13,2	298,0
700	200	345	445	14,4	7,2	235,0
	300	460	460	14,4	7,8	268,0
	400	575	470	14,4	8,4	306,0
	600	810	490	14,4	10,8	385,0

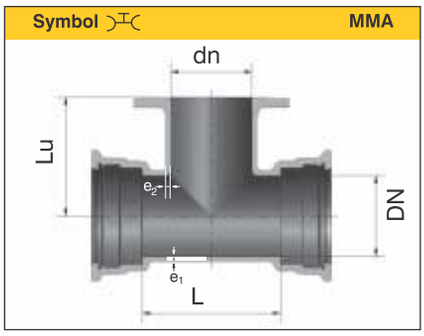



Tümü Soketli T'ler / All Socket T

Nominal Çap Nominal Diameter		L	Lu	e_1	e_2	W
DN	dn					
	700	925	500	14,4	14,4	437
800	200	350	495	15,6	8,4	293
	300	465	510	15,6	9,6	332
	400	580	520	15,6	10,8	376
	600	1045	540	15,6	13,2	531
	800	1045	585	15,6	15,6	531
900	200	355	545	16,8	8,4	362
	400	590	570	16,8	10,8	459
	600	1170	590	16,8	13,2	681
	800	1170	615	16,8	15,6	727
	900	1170	625	16,8	16,8	757
1000	200	360	595	18,0	8,4	440
	400	595	620	18,0	10,8	552
	600	1290	640	18,0	13,2	857
	800	1290	665	18,0	15,6	900
	1000	1290	685	18,0	18,0	962
1100	400	600	670	19,2	10,8	656
	600	830	690	19,2	13,2	785
	800	1065	715	19,2	15,6	940
	1000	1295	735	19,2	18,0	1107
	1100	1410	745	19,2	19,2	1202
1200	400	605	720	20,4	10,8	785
	600	840	740	20,4	13,2	933
	800	1070	765	20,4	15,6	1101
	1000	1300	785	20,4	18,0	1282
	1200	1535	805	20,4	20,4	1500
1400	600	1030	840	22,8	13,2	1406
	800	1260	865	22,8	15,6	1608
	1000	1495	885	22,8	18,0	1826
	1200	1725	905	22,8	20,4	2070
	1400	1960	930	22,8	22,8	2363
1500	600	1035	890	24,0	13,2	1624
	800	1270	915	24,0	15,6	1850
	1000	1500	935	24,0	18,0	2083
	1200	1730	955	24,0	20,4	2344
	1400	1965	980	24,0	22,8	2652
	1500	2080	990	24,0	24,0	2822
1600	600	1040	940	25,2	13,2	1848
	800	1275	965	25,2	15,6	2095
	1000	1505	985	25,2	18,0	2347
	1200	1740	1010	25,2	20,4	2635
	1400	1970	1030	25,2	22,8	2953
	1600	2200	1050	25,2	25,2	3312
1800	600	1055	1040	27,6	13,2	2079
	800	1285	1065	27,6	15,6	2357
	1000	1520	1085	27,6	18,0	2658
	1200	1750	1110	27,6	20,4	2957
	1400	1980	1130	27,6	22,8	3291
	1600	2215	1150	27,6	25,2	3644
	1800	2445	1175	27,6	27,6	4041
2000	600	1065	1140	30,0	13,2	2558
	800	1300	1165	30,0	15,6	2894
	1000	1530	1185	30,0	18,0	3238
	1200	1760	1210	30,0	20,4	3584
	1400	1995	1230	30,0	22,8	3971
	1600	2225	1250	30,0	25,2	4361
	1800	2460	1275	30,0	27,6	4800
	2000	2690	1295	30,0	30,0	5268
2200	800	1310	1265	32,4	15,6	3463
	1000	1540	1285	32,4	18,0	3860
	1200	1775	1310	32,4	20,4	4267
	1400	2005	1330	32,4	22,8	4697
	1600	2240	1350	32,4	25,2	5144
	1800	2470	1375	32,4	27,6	5622
	2000	2700	1395	32,4	30,0	6126
	2200	2935	1415	32,4	32,4	6676

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Flanş Branşmanlı Çift Soketli T'ler / Double Socket T with Flanged Branch



Nominal Çap Nominal Diameter		L	Lu	e_1	e_2	W		
DN	dn					PN 10	PN 16	PN 25
80	80	170	165	7,0	7,0	14,0	14,0	14,0
100	80	175	165	7,2	7,0	16,7	16,7	16,7
	100	190	180	7,2	7,2	17,9	17,9	18,4
125	80	170	190	7,5	7,0	18,9	19,0	21,6
	100	195	195	7,5	7,2	20,5	21,0	22,7
	125	225	200	7,5	7,5	22,1	22,1	24,3
150	80	170	205	7,8	7,0	24,5	24,5	24,5
	100	195	210	7,8	7,2	26,0	26,0	26,5
	150	255	220	7,8	7,8	31,0	31,0	32,0
200	80	175	235	8,4	7,0	35,0	35,0	35,0
	100	200	240	8,4	7,2	37,0	37,0	37,5
	150	255	250	8,4	7,8	42,5	42,5	43,5
	200	315	260	8,4	8,4	48,8	48,0	50,0
250	100	200	270	9,0	7,2	45,5	45,5	46,0
	150	260	280	9,0	7,8	52,5	52,5	53,5
	200	315	290	9,0	8,4	58,5	58,5	60,5
	250	375	300	9,0	9,0	66,5	66,5	70,0
300	100	205	300	9,6	7,2	52,5	52,5	53,0
	150	260	310	9,6	7,8	59,5	59,5	60,5
	200	320	320	9,6	8,4	67,0	67,0	69,0
	300	435	340	9,6	9,6	85,0	85,0	90,5
350	100	205	330	10,2	7,2	68,0	68,0	68,5
	150	325	350	10,2	7,8	82,0	82,0	83,0
	200	325	350	10,2	8,4	85,0	85,0	87,0
	300	440	370	10,2	9,6	105,0	105,0	110,0
	350	495	380	10,2	10,2	114,0	117,0	125,0
400	100	210	360	10,8	7,2	79,5	79,5	80,0
	150	270	370	10,8	7,8	89,5	89,5	90,5
	200	325	380	10,8	8,4	98,5	98,5	100,0
	300	440	400	10,8	9,6	120,0	120,0	125,0
	400	560	420	10,8	10,8	143,0	148,0	159,0
450	100	215	390	11,4	7,2	93,5	93,5	94,0
	150	270	400	11,4	7,8	111,0	111,0	112,0
	200	330	410	11,4	8,4	114,0	114,0	116,0
	300	445	430	11,4	9,6	138,0	138,0	143,0
	400	560	450	11,4	10,8	163,0	167,0	178,0
	450	620	460	11,4	11,4	176,0	184,0	195,0
500	100	215	420	12,0	7,2	108,0	108,0	109,0
	150	330	440	12,0	7,8	129,0	129,0	130,0
	200	330	440	12,0	8,4	132,0	131,0	133,0
	300	450	460	12,0	9,6	159,0	158,0	164,0
	400	565	480	12,0	10,8	185,0	190,0	201,0
	500	680	500	12,0	12,0	216,0	229,0	240,0
600	100	220	480	13,2	7,2	139,0	139,0	139,0
	150	340	500	13,2	7,8	166,0	166,0	167,0
	200	340	500	13,2	8,4	169,0	168,0	170,0
	300	455	520	13,2	9,6	200,0	200,0	205,0
	400	570	540	13,2	10,8	232,0	236,0	247,0
	600	800	580	13,2	13,2	307,0	330,0	343,0
700	100	345	525	14,4	7,2	229,0	229,0	230,0
	150	345	525	14,4	7,8	232,0	232,0	233,0
	200	345	525	14,4	8,4	235,0	235,0	237,0
	400	575	555	14,4	10,8	305,0	309,0	320,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"



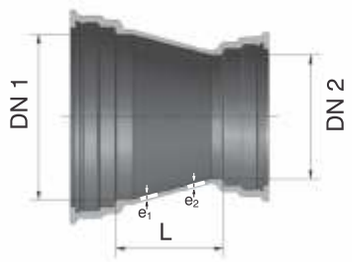

Flanş Branşmanlı Çift Soketli T'ler / Double Socket T with Flanged Branch

Nominal Çap Nominal Diameter		L	Lu	e_1	e_2	W		
DN	dn					PN 10	PN 16	PN 25
	600	810	585	14,4	13,2	386	409	422
	700	925	600	14,4	14,4	435	445	480
800	100	350	585	15,6	7,2	288	288	288
	150	350	585	15,6	7,8	291	291	292
	200	350	585	15,6	8,4	294	294	296
	400	580	615	15,6	10,8	376	381	392
	600	1045	645	15,6	13,2	535	558	571
	800	1045	675	15,6	15,6	584	596	645
900	150	355	645	16,8	7,8	361	361	362
	200	355	645	16,8	8,4	364	364	366
	400	590	675	16,8	10,8	462	467	478
	600	1170	705	16,8	13,2	688	710	724
	800	1170	735	16,8	15,6	735	746	796
	900	1170	750	16,8	16,8	760	773	829
1000	150	360	705	18,0	7,8	439	439	440
	200	360	705	18,0	8,4	442	442	444
	400	595	735	18,0	10,8	556	561	572
	600	1290	765	18,0	13,2	867	890	903
	800	1290	795	18,0	15,6	912	924	974
	1000	1290	825	18,0	18,0	972	1004	1077
1100	200	370	765	19,2	8,4	534	534	536
	400	600	795	19,2	10,8	663	667	678
	600	830	825	19,2	13,2	799	821	835
	800	1065	855	19,2	15,6	956	968	1017
	1000	1295	885	19,2	18,0	1124	1156	1229
	1100	1410	900	19,2	19,2	1219	1246	1328
1200	200	375	825	20,4	8,4	647	647	649
	400	605	855	20,4	10,8	794	799	810
	600	840	885	20,4	13,2	950	973	986
	800	1070	915	20,4	15,6	1152	1134	1183
	1000	1300	945	20,4	18,0	1306	1337	1410
	1200	1535	975	20,4	20,4	1522	1568	1652
1400	400	800	950	22,8	10,8	1234	1238	1249
	600	1030	980	22,8	13,2	1424	1447	1460
	800	1260	1010	22,8	15,6	1631	1643	1692
	1000	1495	1040	22,8	18,0	1851	1883	1956
	1200	1725	1070	22,8	20,4	2095	2140	2225
	1400	1960	1100	22,8	22,8	2353	2391	2544
1500	400	805	1005	24,0	10,8	1434	1439	1450
	600	1035	1035	24,0	13,2	1645	1668	1681
	800	1270	1065	24,0	15,6	1877	1889	1938
	1000	1500	1095	24,0	18,0	2113	2144	2218
	1200	1730	1125	24,0	20,4	2375	2420	2505
	1400	1965	1155	24,0	22,8	2648	2686	2839
	1500	2080	1170	24,0	24,0	2802	2873	3026
1600	400	810	1060	25,2	10,8	1638	1642	1653
	600	1040	1090	25,2	13,2	1871	1893	1907
	800	1275	1120	25,2	15,6	2125	2137	2186
	1000	1505	1150	25,2	18,0	2382	2413	2487
	1200	1740	1180	25,2	20,4	2668	2714	2798
	1400	1970	1210	25,2	22,8	2956	2934	3147
	1600	2200	1240	25,2	25,2	3298	3371	3542
1800	600	1055	1200	27,6	13,2	2103	2126	2139
	800	1285	1230	27,6	15,6	2400	2411	2461
	1000	1520	1260	27,6	18,0	2709	2740	2813
	1200	1750	1290	27,6	20,4	3035	3081	3165
	1400	1980	1320	27,6	22,8	3365	3403	3556
	1600	2215	1350	27,6	25,2	3749	3822	3993
	1800	2445	1380	27,6	27,6	4128	4205	4420
2000	600	1065	1310	30,0	13,2	2588	2611	2624
	800	1300	1340	30,0	15,6	2944	2956	3005
	1000	1530	1370	30,0	18,0	3299	3330	3404
	1200	1760	1400	30,0	20,4	3675	3721	3805
	1400	1995	1430	30,0	22,8	4060	4098	4252
	1600	2225	1460	30,0	25,2	4485	4557	4729
	1800	2460	1490	30,0	27,6	4910	4987	5201
	2000	2690	1520	30,0	30,0	5374	5475	5825
2200	800	1310	1450	32,4	15,6	3522	3534	3583
	1000	1540	1480	32,4	18,0	3933	3964	4037
	1200	1775	1510	32,4	20,4	4372	4417	4502
	1400	2005	1540	32,4	22,8	4804	4842	4995
	1600	2240	1570	32,4	25,2	5288	5360	5531
	1800	2470	1600	32,4	27,6	5755	5832	6046
	2000	2700	1630	32,4	30,0	6260	6360	6710
	2200	2935	1660	32,4	32,4	6843	6960	—

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Çift Soketli Redüksiyonlar / Double Socket Tapers

Symbol MMR

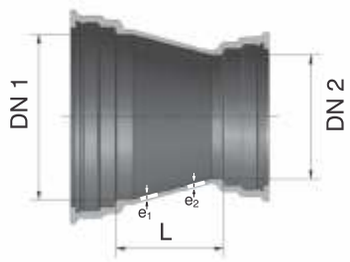


DN 1	DN 2	L	e_1	e_2	W
80	65	80	7,0	7,0	8,0
100	65	120	7,2	7,0	9,3
	80	90	7,2	7,0	9,2
125	65	180	7,5	7,0	12,0
	80	140	7,5	7,0	11,3
	100	100	7,5	7,2	11,8
150	80	190	7,8	7,0	16,5
	100	150	7,8	7,2	15,7
	125	100	7,8	7,5	15,7
200	80	280	8,4	7,0	22,7
	100	250	8,4	7,2	20,5
	125	200	8,4	7,5	22,7
	150	150	8,4	7,8	22,1
250	80	300	9,0	7,0	33,0
	100	300	9,0	7,2	30,0
	125	300	9,0	7,5	31,3
	150	250	9,0	7,8	34,6
	200	150	9,0	8,4	34,6
300	100	350	9,6	7,2	43,0
	150	350	9,6	7,8	44,0
	200	250	9,6	8,4	43,2
	250	150	9,6	9,0	41,0
350	150	360	10,2	7,8	67,0
	200	360	10,2	8,4	59,0
	250	260	10,2	9,0	57,0
	300	160	10,2	9,6	53,0
400	200	400	10,8	8,4	75,0
	250	360	10,8	9,0	68,0
	300	260	10,8	9,6	61,0
	350	160	10,8	10,2	57,0




Çift Soketli Redüksiyonlar / Double Socket Tapers

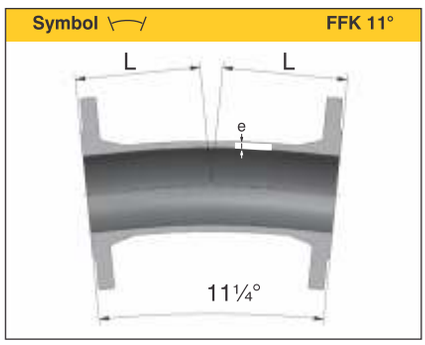
Symbol MMR



DN 1	DN 2	L	e_1	e_2	W
450	300	360	11,4	9,6	88,0
	350	260	11,4	10,2	83,0
	400	160	11,4	10,8	78,0
500	250	460	12,0	9,0	127,4
	300	460	12,0	9,6	124,0
	350	360	12,0	10,2	102,0
	400	260	12,0	10,8	96,0
	450	160	12,0	12,0	91,0
600	300	500	13,2	9,6	157,0
	350	500	13,2	10,2	149,0
	400	460	13,2	10,8	143,0
	500	260	13,2	12,0	130,0
700	400	500	14,4	10,8	235,0
	500	480	14,4	12,0	200,0
	600	280	14,4	13,2	179,0
800	500	680	15,6	12,0	301,0
	600	480	15,6	13,2	276,0
	700	280	15,6	14,4	247,0
900	700	480	16,8	14,4	363,0
	800	280	16,8	15,6	340,0
1000	800	480	18,0	15,6	450,0
	900	280	18,0	16,8	410,0
1100	1000	280	19,2	18,0	440,0
1200	1000	480	20,4	20,4	630,0
1400	1200	360	22,8	22,8	750,0
1500	1400	260	24,0	22,8	890,0
1600	1400	360	25,2	18,0	1010,0
1800	1600	360	27,6	25,2	1200,0
2000	1800	360	30,0	27,6	1430,0
2200	2000	360	32,4	30,0	1745,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

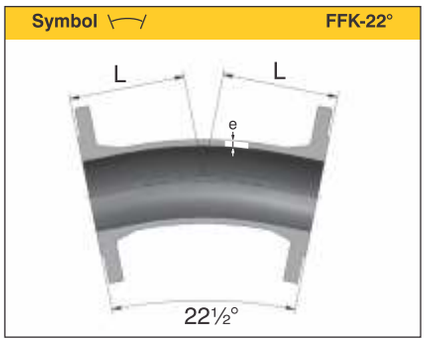
Çift Flanşlı Dirsekler 11¼° / Double Flanged Bends 11¼°



DN	L	e	W		
			PN 10	PN 16	PN 25
80	110	7,0	9	9	9,0
100	115	7,2	11	11	12,0
125	120	7,5	15	15	16,7
150	130	7,8	19	19	21,0
200	145	8,4	28	28	32,0
250	165	9,0	39	39	46,0
300	175	9,6	52	52	64,0
350	190	10,2	62	68	83,0
400	205	10,8	77	86	108,0
450	210	11,4	100	115	140,0
500	220	12,0	111	139	161,0
600	235	13,2	162	210	239,0
700	250	14,4	210	235	310,0
800	265	15,6	280	305	405,0
900	280	16,8	340	367	495,0
1000	310	18,0	440	505	653,0
1100	325	19,2	540	610	772,0
1200	345	20,4	720	810	985,0
1400	345	22,8	910	1000	–
1500	345	24,0	1106	1250	–
1600	345	25,2	1250	1410	–
1800	345	27,6	1550	1706	–
2000	375	30,0	1700	1910	–
2200	405	32,4	2180	2450	–



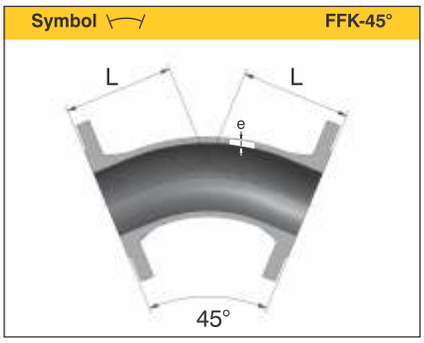

Çift Flanşlı Dirsekler 22½° / Double Flanged Bends 22½°



DN	L	e	W		
			PN 10	PN 16	PN 25
80	120	7,0	9,4	9,4	9,4
100	130	7,2	11,0	11,0	12,5
125	140	7,5	15,5	15,5	16,7
150	150	7,8	19,7	19,7	21,0
200	170	8,4	28,0	29,0	32,0
250	190	9,0	42,0	42,0	50,0
300	210	9,6	56,0	56,0	67,0
350	230	10,2	69,0	74,0	90,0
400	250	10,8	95,0	104,0	121,0
450	260	11,4	125,0	150,0	165,0
500	270	12,0	145,0	179,0	190,0
600	290	13,2	185,0	235,0	253,0
700	310	14,4	238,0	262,0	334,0
800	330	15,6	320,0	349,0	450,0
900	350	16,8	395,0	424,0	546,0
1000	370	18,0	494,0	561,0	711,0
1100	390	19,2	610,0	670,0	840,0
1200	410	20,4	739,0	842,0	1020,0
1400	430	22,8	985,0	1074,0	–
1500	450	24,0	1147,0	1295,0	–
1600	470	25,2	1360,0	1530,0	–
1800	480	27,6	1640,0	1800,0	–
2000	500	30,0	2000,0	2205,0	–
2200	520	32,4	2600,0	2830,0	–

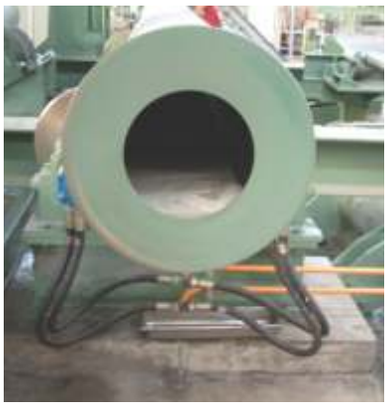
Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Çift Flanşlı Dirsekler 45° / Double Flanged Bends 45°

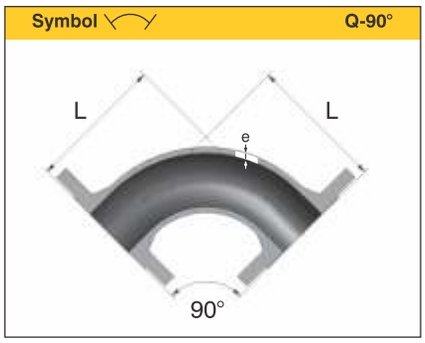


DN	L	e	W		
			PN 10	PN 16	PN 25
80	130	7,0	10,0	10,3	10,3
100	140	7,2	12,6	12,6	12,6
125	150	7,5	17,5	17,5	19,0
150	160	7,8	21,6	21,6	23,0
200	180	8,4	28,0	29,0	31,0
250	350	9,0	57,0	59,0	62,0
300	400	9,6	78,0	80,0	88,0
350	298	10,2	82,0	89,0	98,0
400	324	10,8	102,0	111,0	129,0
450	350	11,4	128,0	136,0	158,0
500	375	12,0	150,0	175,0	198,0
600	426	13,2	236,0	263,0	294,0
700	478	14,4	310,0	335,0	404,0
800	529	15,6	415,0	442,0	536,0
900	581	16,8	531,0	567,0	671,0
1000	632	18,0	688,0	751,0	890,0
1100	694	19,2	860,0	920,0	1075,0
1200	750	20,4	1070,0	1178,0	1350,0
1400	775	22,8	1435,0	1510,0	–
1500	810	24,0	1700,0	1850,0	–
1600	845	25,2	2270,0	2400,0	–
1800	910	27,6	2650,0	2820,0	–
2000	980	30,0	3250,0	3450,0	–
2200	980	32,4	3950,0	4300,0	–





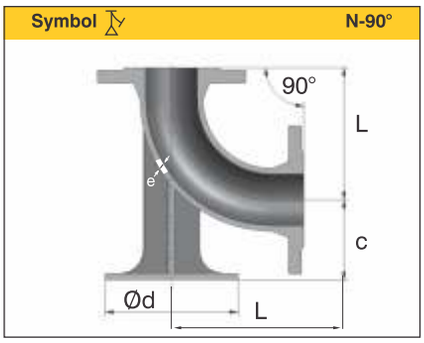

Çift Flanşlı Dirsekler 90° / Double Flanged Bends 90°



DN	L	e	W		
			PN 10	PN 16	PN 25
80	165	7,0	10,2	10,2	11,0
100	180	7,2	13,0	13,0	13,5
125	200	7,5	19,0	21,0	22,0
150	220	7,8	24,0	24,0	27,0
200	260	8,4	31,0	32,0	34,5
250	350	9,0	50,0	53,0	57,0
300	400	9,6	70,0	74,0	81,0
350	450	10,2	95,0	111,0	123,0
400	500	10,8	136,0	147,0	191,0
450	550	11,4	174,0	185,0	209,0
500	600	12,0	206,0	220,0	235,0
600	700	13,2	277,0	325,0	353,0
700	800	14,4	395,0	416,0	480,0
800	900	15,6	545,0	572,0	670,0
900	1000	16,8	710,0	745,0	850,0
1000	1100	18,0	970,0	1130,0	1240,0
1100	1200	19,2	1170,0	1230,0	1380,0
1200	1300	20,4	1453,0	1562,0	1720,0
1400	1350	22,8	2000,0	2100,0	–
1500	1400	24,0	2280,0	2430,0	–
1600	1450	25,2	2660,0	2810,0	–
1800	1500	27,6	3350,0	3500,0	–
2000	1550	30,0	4150,0	4370,0	–
2200	1600	32,4	5200,0	5500,0	–

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

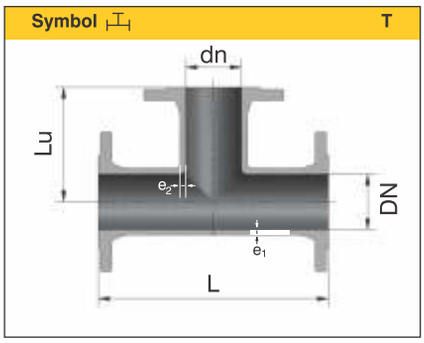
Çift Flanşlı Ayaklı Dirsekler 90° / Duckfoot Bends 90°



DN	L	e	c	Ød	W		
					PN 10	PN 16	PN 25
80	165	7,0	110	180	15	15	15
100	180	7,2	125	200	19	19	19
125	200	7,5	140	225	27	27	29
150	220	7,8	160	250	34	34	36
200	260	8,4	190	300	52	52	56
250	350	9,0	225	350	84	85	90
300	400	9,6	255	400	116	118	122
350	450	10,2	290	450	139	145	162
400	500	10,8	320	500	199	205	225
450	550	11,4	355	550	245	261	283
500	600	12,0	385	600	310	336	360
600	700	13,2	450	700	475	520	546
700	800	14,4	515	800	684	710	775
800	900	15,6	580	900	950	972	1071
900	1000	16,8	645	1000	1250	1280	1390
1000	1100	18,0	710	1100	1630	1700	1850
1100	1200	19,2	775	1200	2100	2150	2300
1200	1300	20,4	840	1300	2600	2700	2860




Tümü Flanşlı T'ler / All Flanged T



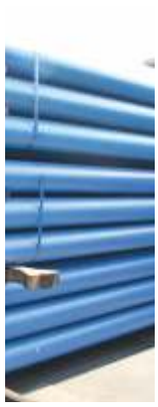
Nominal Çap Nominal Diameter		L	Lu	e_1	e_2	W		
DN	dn					PN 10	PN 16	PN 25
80	80	330	165	7,0	7,0	14,9	14,9	14,9
100	80	360	175	7,2	7,0	17,4	17,4	18,4
	100	360	180	7,2	7,2	18,2	18,2	19,7
125	80	400	190	7,5	7,0	25,4	25,4	30,0
	100	400	195	7,5	7,2	27,0	27,0	26,0
	125	400	200	7,5	7,5	28,1	28,1	32,5
150	80	440	205	7,8	7,0	27,0	27,0	29,0
	100	440	210	7,8	7,2	28,0	28,0	30,5
	150	440	220	7,8	7,8	31,0	31,0	34,0
200	80	520	235	8,4	7,0	39,5	39,0	43,0
	100	520	240	8,4	7,2	40,5	40,0	44,5
	150	520	250	8,4	7,8	43,5	43,0	48,0
	200	520	260	8,4	8,4	47,0	46,5	52,5
250	100	700	275	9,0	7,2	62,5	62,0	69,5
	150	700	325	9,0	7,8	67,0	66,0	74,5
	200	700	325	9,0	8,4	70,5	69,5	79,0
	250	700	350	9,0	9,0	76,5	75,5	86,0
300	100	800	300	9,6	7,2	85,5	84,5	96,0
	150	800	350	9,6	7,8	89,5	89,0	101,0
	200	800	350	9,6	8,4	93,0	92,5	105,0
	300	800	400	9,6	9,6	106,0	105,0	121,0
350	100	850	325	10,2	7,2	106,0	111,0	127,0
	150	850	325	10,2	7,8	109,0	114,0	131,0
	200	850	325	10,2	8,4	111,0	117,0	134,0
	300	850	425	10,2	9,6	126,0	131,0	153,0
	350	850	425	10,2	10,2	131,0	139,0	162,0
400	100	900	350	10,8	7,2	131,0	140,0	163,0
	150	900	350	10,8	7,8	134,0	143,0	166,0
	200	900	350	10,8	8,4	137,0	146,0	170,0
	300	900	450	10,8	9,6	152,0	160,0	188,0
	400	900	450	10,8	10,8	162,0	175,0	208,0
450	100	950	375	11,4	7,2	159,0	174,0	197,0
	150	950	375	11,4	7,8	161,0	177,0	200,0
	200	950	375	11,4	8,4	164,0	180,0	204,0
	300	950	475	11,4	9,6	179,0	194,0	222,0
	400	950	475	11,4	10,8	189,0	209,0	242,0
	450	950	475	11,4	11,4	194,0	218,0	250,0
500	100	1000	400	12,0	7,2	193,0	220,0	241,0
	150	1000	400	12,0	7,8	195,0	222,0	244,0
	200	1000	400	12,0	8,4	198,0	225,0	248,0
	300	1000	500	12,0	9,6	213,0	239,0	266,0
	400	1000	500	12,0	10,8	222,0	254,0	286,0
	500	1000	500	12,0	12,0	235,0	275,0	307,0
600	150	1100	450	13,2	7,8	275,0	320,0	348,0
	200	1100	450	13,2	8,4	278,0	323,0	352,0
	300	1100	550	13,2	9,6	292,0	338,0	370,0
	400	1100	550	13,2	10,8	301,0	351,0	389,0
	600	1100	550	13,2	13,2	328,0	396,0	436,0
700	200	650	525	14,4	8,4	255,0	276,0	347,0
	300	760	540	14,4	9,6	289,0	310,0	385,0
	400	870	555	14,4	10,8	323,0	348,0	429,0
	600	1200	585	14,4	13,2	426,0	469,0	552,0
	700	1200	600	14,4	14,4	448,0	479,0	584,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

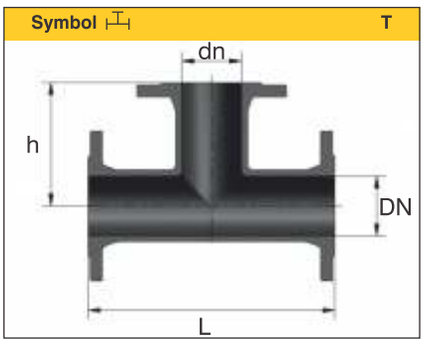
Tümü Flanşlı T'ler / All Flanged T

Nominal Çap Nominal Diameter		L	Lu	e_1	e_2	W		
DN	dn					PN 10	PN 16	PN 25
800	200	690	585	15,6	8,4	335	358	459
	300	800	600	15,6	9,6	375	398	502
	400	910	615	15,6	10,8	415	443	552
	600	1350	645	15,6	13,2	566	612	724
	800	1350	675	15,6	15,6	615	651	798
900	200	730	645	16,8	8,4	412	438	554
	400	950	675	16,8	10,8	506	536	661
	600	1500	705	16,8	13,2	721	770	897
	800	1500	735	16,8	15,6	768	806	968
	900	1500	750	16,8	16,8	793	832	1002
1000	200	770	705	18,0	8,4	517	580	729
	400	990	735	18,0	10,8	625	692	850
	600	1650	765	18,0	13,2	921	1007	1167
	800	1650	795	18,0	15,6	967	1041	1237
	1000	1650	825	18,0	18,0	1027	1121	1341
1100	400	980	795	19,2	10,8	756	814	988
	600	1210	825	19,2	13,2	887	963	1139
	800	1470	855	19,2	15,6	1037	1103	1315
	1000	1690	885	19,2	18,0	1200	1286	1522
	1100	1800	900	19,2	19,2	1293	1374	1618
1200	400	1070	855	20,4	10,8	908	1005	1184
	600	1240	885	20,4	13,2	1056	1170	1352
	800	1470	915	20,4	15,6	1222	1326	1544
	1000	1700	945	20,4	18,0	1400	1523	1765
	1200	1950	975	20,4	20,4	1609	1746	1999
1400	600	1550	980	22,8	13,2	1537	1636	1955
	800	1760	1010	22,8	15,6	1737	1825	2180
	1000	2015	1040	22,8	18,0	1946	2054	2433
	1200	2215	1070	22,8	20,4	2182	2304	2695
	1400	2435	1100	22,8	22,8	2430	2544	3003
1500	600	1575	1035	24,0	13,2	1759	1926	2245
	800	1805	1065	24,0	15,6	1979	2134	2489
	1000	2040	1095	24,0	18,0	2207	2382	2761
	1200	2245	1125	24,0	20,4	2460	2650	3040
	1400	2465	1155	24,0	22,8	2721	2903	3362
	1500	2575	1170	24,0	24,0	2871	3086	3545
1600	600	1600	1090	25,2	13,2	2023	2191	2547
	800	1835	1120	25,2	15,6	2263	2420	2812
	1000	2065	1150	25,2	18,0	2511	2688	3104
	1200	2300	1180	25,2	20,4	2784	2975	3402
	1400	2495	1210	25,2	22,8	3063	3246	3742
	1600	2715	1240	25,2	25,2	3396	3613	4128
1800	600	1655	1200	27,6	13,2	2516	2693	3135
	800	1885	1230	27,6	15,6	2801	2967	3445
	1000	2120	1260	27,6	18,0	3093	3279	3781
	1200	2350	1290	27,6	20,4	3408	3608	4121
	1400	2555	1320	27,6	22,8	3727	3919	4501
	1600	2775	1350	27,6	25,2	4094	4321	4921
	1800	2995	1380	27,6	27,6	4462	4693	5337
2000	600	1705	1310	30,0	13,2	3101	3325	4038
	800	1955	1340	30,0	15,6	3437	3650	4399
	1000	2170	1370	30,0	18,0	3778	4011	4784
	1200	2395	1400	30,0	20,4	4140	4388	5171
	1400	2635	1430	30,0	22,8	4505	4745	5597
	1600	2835	1460	30,0	25,2	4916	5190	6061
	1800	3055	1490	30,0	27,6	5320	5599	6513
	2000	3275	1520	30,0	30,0	5771	6074	7123
2200	800	1780	1450	32,4	15,6	3823	4069	—
	1000	2000	1480	32,4	18,0	4218	4483	—
	1200	2220	1510	32,4	20,4	4632	4912	—
	1400	2440	1540	32,4	22,8	5048	5320	—
	1600	2660	1570	32,4	25,2	5508	5814	—
	1800	2880	1600	32,4	27,6	5959	6270	—
	2000	3100	1630	32,4	30,0	6448	6783	—
	2200	3320	1660	32,4	32,4	7007	7358	—



Tümü Flanşlı T'ler (Kısa) / All Flanged T (short pattern)

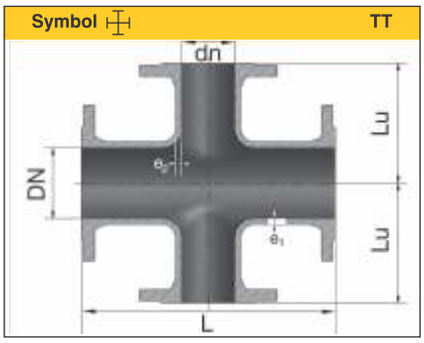


DN	dn	L	h	W		
				PN 10	PN 16	PN 25
250	80	405	265	47	47	54
	100	425	270	51	51	59
	150	485	280	57	57	65
	200	540	290	64	64	73
	250	600	300	73	72	84
300	80	425	295	61	61	70
	100	450	300	66	66	77
	150	505	310	74	74	85
	200	565	320	82	82	94
	250	620	330	93	93	105
	300	680	340	102	102	117
350	100	470	330	80	86	103
	150	530	340	88	94	112
	200	585	350	98	104	122
	250	645	360	110	117	138
	350	760	380	129	138	163
400	100	490	360	96	107	130
	150	550	370	106	117	141
	200	610	380	116	127	152
	250	665	390	128	137	164
	300	725	400	140	158	186
450	100	515	390	115	135	164
	150	570	400	128	147	173
	200	630	410	141	168	183
	250	690	420	156	175	194
	300	745	430	169	188	205
	400	860	450	194	204	228
500	100	535	420	137	167	191
	200	650	440	161	192	217
	400	885	480	218	254	289
600	200	700	500	223	276	307
	400	930	540	292	350	390
	600	1165	580	360	380	410

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"




Tümü Flanşlı TT'ler / All Flanged Cross TT

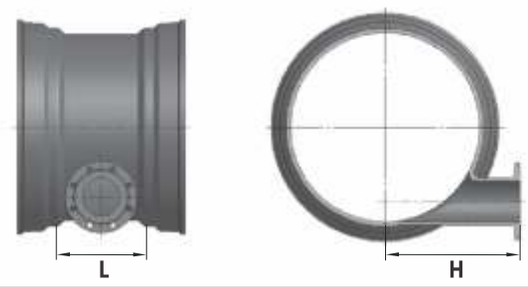


DN	dn	L	Lu	e_1	e_2	W	
						PN 10	PN 16
100	100	360	180	7,2	7,2	28,6	28,6
125	100	400	195	7,5	7,2	35,5	35,5
	125	400	200	7,5	7,5	36,7	36,7
150	100	440	210	7,8	7,2	40,5	40,5
	125	440	215	7,8	7,5	43,0	43,0
	150	440	220	7,8	7,8	48,6	48,6
200	100	520	240	8,4	7,2	54,0	54,0
	150	520	250	8,4	7,8	62,1	62,1
	200	520	260	8,4	8,4	71,3	71,3
250	100	700	275	9,0	7,2	104,0	104,0
	125	700	275	9,0	7,5	107,0	107,0
	150	700	300	9,0	7,8	111,0	111,0
	200	700	325	9,0	8,4	124,5	124,5
	250	700	350	9,0	9,0	119,3	119,3
300	100	800	300	9,6	7,2	148,0	148,0
	150	800	325	9,6	7,8	152,0	152,0
	200	800	350	9,6	8,4	177,0	164,0
	250	800	375	9,6	9,0	174,0	174,0
	300	800	400	9,6	9,6	203,0	203,0
350	100	850	325	10,2	7,2	136,5	142,5
	300	850	425	10,2	9,6	184,0	190,0
	350	850	425	10,2	10,2	209,0	203,0
400	100	900	350	10,8	7,2	168,0	178,0
	150	900	350	10,8	7,8	173,0	183,0
	200	900	350	10,8	8,4	177,5	188,0
	250	900	350	10,8	9,0	197,5	193,0
	300	900	450	10,8	9,6	212,0	225,0
	350	900	450	10,8	10,2	234,0	247,0
	400	900	450	10,8	10,8	268,0	273,0
450	150	950	375	11,4	7,8	306,0	324,0
	450	950	375	11,4	11,4	314,0	341,0
500	150	1000	400	12,0	7,8	355,0	383,0
	200	1000	400	12,0	8,4	358,0	386,0
	250	1000	400	12,0	9,0	362,0	390,0
	300	1000	500	12,0	9,6	392,0	420,0
	400	1000	500	12,0	10,8	397,0	430,0
	500	1000	500	12,0	12,0	365,0	450,0
600	200	1100	450	13,2	8,4	334,0	384,0
	250	1100	450	13,2	9,0	339,0	389,0
	300	1100	550	13,2	9,6	397,0	447,0
	350	1100	550	13,2	10,2	401,0	453,0
	400	1100	550	13,2	10,8	406,0	469,0
	500	1100	550	13,2	12,0	440,0	503,0
	600	1100	550	13,2	13,2	555,0	572,0
700	500	1200	600	14,4	12,0	640,0	655,0
	700	1200	600	14,4	14,4	691,0	729,0
800	600	1350	675	15,6	13,2	710,0	763,0
	800	1350	675	15,6	15,6	745,0	795,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Soketli T Tahliye Branşmanlı / Double Socket T with Flanged Discharge

MMAT



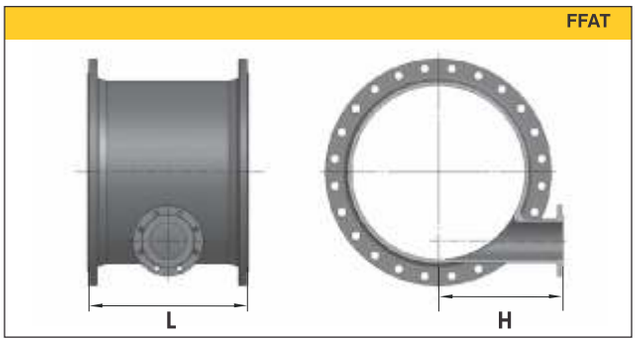
DN	dn	L	H	W		
				PN 10	PN 16	PN 25
200	80	175	250	37,5	37,5	37,5
250	80	180	275	47,0	47,0	47,0
300	80	205	300	59,0	59,0	59,0
350	100	325	325	78,5	78,5	79,0
400	100	270	350	92,5	92,5	93,0
450	100	285	375	129,0	129,0	137,0
500	100	330	400	158,0	158,0	177,0
600	100	340	450	189,0	189,0	194,0
700	150	345	500	255,0	255,0	271,0
800	150	350	550	316,0	316,0	325,0
900	150	355	600	453,0	459,0	474,0
1000	200	360	650	482,0	481,0	483,0
1100	200	440	700	578,0	578,0	580,0
1200	200	445	750	699,0	698,0	700,0
1400	250	800	950	1230,0	1234,0	1245,0
1500	250	805	1005	1415,0	1417,0	1425,0
1600	300	810	1060	1611,0	1613,0	1619,0
1800	400	1055	1200	2010,0	2016,0	2022,0
2000	600	1065	1310	2595,0	2619,0	2634,0
2200	600	1310	1450	3470,0	3483,0	3500,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"




Flanşlı T Tahliye Branşmanlı / All Flanged Discharge T

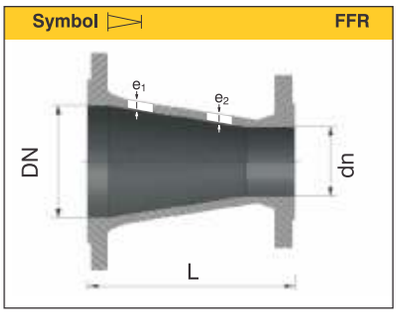
FFAT



DN	dn	L	H	W		
				PN 10	PN 16	PN 25
200	80	520	250	40,5	42,0	44,0
250	80	405	275	62,0	62,0	69,0
300	80	425	300	85,0	85,0	96,0
350	100	470	325	107,0	113,0	129,0
400	100	490	350	133,0	142,0	165,0
450	100	515	375	161,0	177,0	199,0
500	100	535	400	195,0	222,0	244,0
600	100	700	450	223,0	276,0	307,0
700	150	650	500	340,0	370,0	–
800	150	690	550	428,0	439,0	–
900	150	730	600	476,0	484,0	–
1000	200	770	650	546,0	629,0	–
1200	200	850	750	779,0	871,0	–

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Çift Flanşlı Redüksiyonlar / Double Flanged Tapers

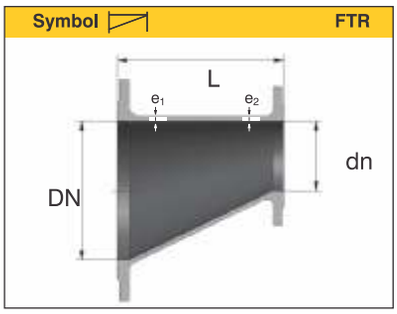


DN	dn	L	e_1	e_2	W		
					PN 10	PN 16	PN 25
80	65	200	7,0	7,0	9,5	9,5	10,3
100	80	200	7,2	7,0	11,5	11,5	13,5
125	80	200	7,5	7,0	12,5	12,9	19,4
	100	200	7,5	7,2	13,6	13,6	18,5
150	80	200	7,8	7,0	15,0	15,4	16,2
	100	200	7,8	7,2	16,0	16,4	16,4
	125	200	7,8	7,5	17,0	17,0	19,0
200	100	300	8,4	7,2	23,7	23,7	27,0
	125	300	8,4	7,5	24,5	24,5	25,0
	150	300	8,4	7,8	26,5	26,5	36,2
250	100	300	9,0	7,2	30,0	30,0	48,0
	125	300	9,0	7,5	33,5	33,5	34,0
	150	300	9,0	7,8	35,6	35,6	41,0
	200	300	9,0	8,4	34,0	34,0	44,0
300	100	300	9,6	7,2	37,0	38,0	40,0
	125	300	9,6	7,5	36,0	36,0	41,0
	150	300	9,6	7,8	36,7	36,7	45,0
	200	300	9,6	8,4	40,0	40,0	47,5
	250	300	9,6	9,0	46,0	46,0	88,0
350	150	300	10,2	7,8	47,0	51,0	60,0
	200	300	10,2	8,4	51,0	69,0	74,0
	250	300	10,2	9,0	55,6	51,6	77,0
	300	300	10,2	9,6	56,0	63,2	72,0
400	200	300	10,8	8,4	54,5	65,0	72,0
	250	300	10,8	9,0	62,0	75,0	86,4
	300	300	10,8	9,6	62,6	64,8	86,0
	350	300	10,8	10,2	74,0	75,6	106,5
450	350	300	11,4	10,2	96,0	99,0	104,0
	400	300	11,4	10,8	93,0	104,0	118,0
500	250	600	12,0	9,0	120,0	138,3	168,0
	300	600	12,0	9,6	135,0	159,3	190,0
	350	600	12,0	10,2	149,6	176,0	210,0
	400	600	12,0	10,8	143,0	173,0	215,0
600	300	600	13,2	9,6	175,0	201,0	217,0
	350	600	13,2	10,2	162,0	207,0	221,0
	400	600	13,2	10,8	203,0	230,0	240,0
	500	600	13,2	12,0	197,0	235,0	249,0
700	350	600	14,4	10,2	251,6	255,0	261,0
	400	600	14,4	10,8	263,0	281,0	287,0
	500	600	14,4	12,0	285,0	308,0	322,0
	600	600	14,4	13,2	315,0	346,0	399,0
800	400	600	15,6	10,8	264,5	275,0	285,0
	500	600	15,6	12,0	356,4	389,0	399,0
	600	600	15,6	13,2	361,3	416,0	475,0
	700	600	15,6	14,4	413,0	447,0	500,0
900	500	600	16,8	12,0	320,0	398,0	410,0
	600	600	16,8	13,2	357,0	410,0	432,0
	700	600	16,8	14,4	374,0	390,0	424,0
	800	600	16,8	15,6	392,0	432,0	536,0
1000	600	600	18,0	13,2	372,0	421,0	520,0
	700	600	18,0	14,4	375,0	427,0	540,0
	800	600	18,0	15,6	545,0	583,0	704,0
	900	600	18,0	16,8	550,0	612,0	730,0
1200	1000	790	20,4	18,0	690,0	717,0	870,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

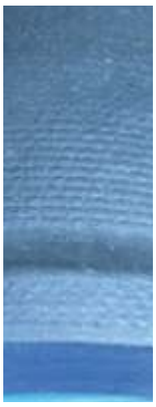



Çift Flanşlı Eksantrik Redüksiyonlar / Double Flanged Eccentric Tapers

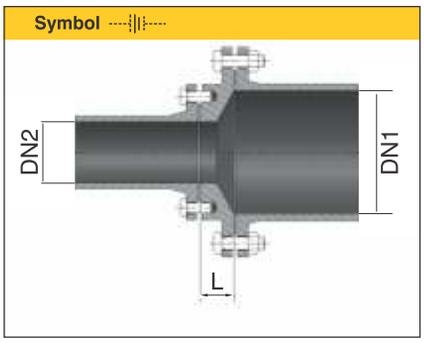


DN	dn	L	e_1	e_2	W	
					PN 10	PN 16
125	100	200	7,5	7,2	16,5	16,5
150	100	300	7,8	7,2	20,0	20,0
200	150	300	8,4	7,8	30,0	30,0
250	200	300	9,0	8,4	42,0	43,0
300	200	300	9,6	8,4	53,0	55,0
300	250	300	9,6	9,0	55,0	58,0
350	250	300	10,2	9,0	83,0	90,0
400	300	300	10,8	9,6	105,0	115,0
450	400	300	11,4	10,8	143,0	165,0
500	400	600	12,0	10,8	182,0	197,0
600	500	600	13,2	12,0	266,0	277,0
700	600	600	14,4	13,2	310,0	322,0
800	600	600	15,6	13,2	370,0	396,0
900	700	600	16,8	14,4	470,0	494,0
1000	800	600	18,0	15,6	530,0	564,0

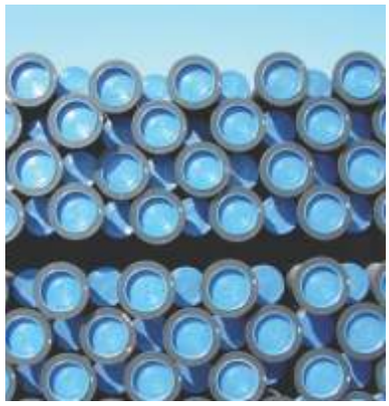
Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"



Redüksiyon Flanşları / Reducing Flanges

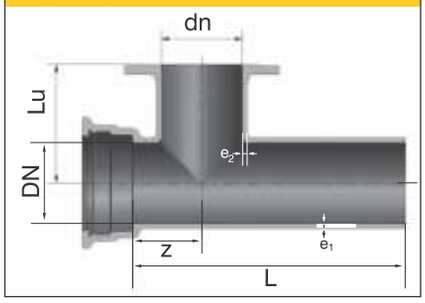


DN1	DN2	L	W	
			PN 10	PN 16
150	100	30	12,0	12,0
200	100	40	12,0	12,0
	150	40	11,5	11,5
250	100	42	25,0	25,0
	150	42	22,0	22,0
	200	42	19,0	19,0
300	150	46	29,0	29,0
	200	46	27,0	27,0
350	100	48	57,0	57,0
	150	48	55,0	55,0
	200	48	50,0	50,0
400	100	38	54,0	54,0
	150	38	50,0	50,0
	200	38	48,0	48,0
	250	50	46,0	46,0
	300	50	44,0	44,0
450	100	47	75,0	75,0
	150	47	79,0	79,0
	200	47	83,0	83,0
	250	50	89,0	89,0
	300	50	94,0	94,0
	400	50	103,0	103,0
500	150	47	93,0	93,0
	200	47	90,0	90,0
	300	47	86,0	86,0
	400	47	71,0	71,0
600	150	45	145,0	145,0
	300	45	124,0	124,0
	400	45	118,0	118,0
700	500	56	103,0	103,0
1000	700	63	240,0	240,0
	800	68	252,0	252,0

Flanş Branşmanlı Tek Soketli T'ler / Single Socket T with Flanged Branch

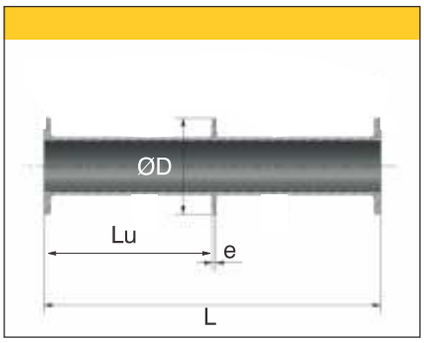
Symbol

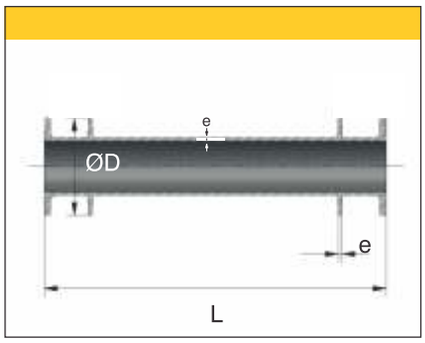


Nominal Çap Nominal Diameter		L	Lu	z	e_1	e_2	W
DN	dn						
80	80	400	180	106	7,0	7,0	15,7
100	80	400	200	120	7,2	7,0	18,4
	100	400	200	120	7,2	7,2	18,8
125	80	425	190	112	7,5	7,0	22,5
	100	425	195	112	7,5	7,2	23,5
	125	425	200	112	7,5	7,5	26,0
150	100	450	210	128	7,8	7,2	29,2
	125	450	210	128	7,8	7,5	28,5
	150	450	210	128	7,8	7,8	30,4
200	100	600	250	190	8,4	7,2	51,0
	150	600	275	240	8,4	7,8	58,0
300	100	800	300	260	9,6	7,2	79,0
	150	800	300	260	9,6	7,8	83,0
	200	800	350	260	9,6	8,4	93,0
400	100	800	350	260	10,8	7,2	110,0
	150	800	375	260	10,8	7,8	113,0
	200	800	400	260	10,8	8,4	122,0
450	100	600	390	108	11,4	7,2	125,0
	150	600	400	135	11,4	7,8	138,0
	200	600	410	165	11,4	8,4	147,0
	250	600	420	195	11,4	9,0	158,0
	300	600	430	223	11,4	9,6	165,0
	400	600	450	280	11,4	10,8	185,0
	450	600	460	310	11,4	11,4	195,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Duvar Geçiş Boruları / Anchoring Pipes





Flanş boru parçaları K9, K10 flanş boru gövdesine kaynaklanmıştır.
Flange pipe pieces with welded on flanges pipe body K9, K10.

Flanş boru parçaları K12, flanş boru gövdesi ile dökülmüştür.
Flange pipe pieces with cast on flanges pipe body K12.

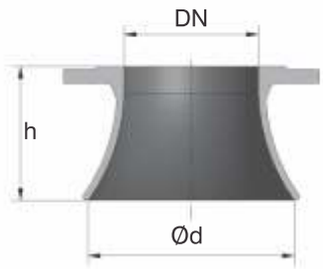
Nominal Çap Nominal Diameter	Boru Gövdesi / Pipe Body						Flanşlı / Flanges W			
	K=9		K=10		K=12					
DN	e	kg/m	e	kg/m	e	kg/m	PN 10	PN 16	PN 25	PN 40
80	6,0	12,2	6,0	12,2	7,0	14,1	3,0	3,0	3,5	3,5
100	6,0	15,1	6,1	15,1	7,2	17,7	3,6	3,6	4,0	4,5
150	6,0	22,8	6,5	23,5	7,8	28,0	5,5	5,5	6,0	9,2
200	6,4	30,6	7,0	33,3	8,4	39,7	7,5	7,5	10,0	15,7
250	6,8	40,2	7,5	44,3	9,0	52,8	10,0	10,0	15,0	25,4
300	7,2	50,8	8,0	56,3	9,6	67,3	13,0	13,0	20,0	36,3
350	7,7	63,2	8,5	69,6	10,2	83,1	15,0	17,5	29,0	–
400	8,1	75,5	9,0	83,7	10,8	100,0	18,0	23,0	37,0	–
500	9,0	105,0	10,0	116,0	12,0	138,2	25,0	38,0	55,0	–
600	9,9	137,0	11,0	152,0	13,2	182,0	34,0	56,0	79,0	–
700	10,8	174,0	12,0	193,0	14,4	231,0	47,0	58,0	91,0	–
800	11,7	215,0	13,0	239,0	15,6	286,0	64,0	75,0	124,0	–
900	12,6	360,0	14,0	289,0	16,8	346,0	74,0	87,0	143,0	–
1000	13,5	310,0	15,0	344,0	18,0	411,0	93,0	125,0	198,0	–
1100	14,4	363,0	16,0	402,0	19,2	482,0	114,0	140,0	221,0	–
1200	15,3	420,0	17,0	466,0	20,4	558,0	138,0	185,0	270,0	–
1400	17,1	547,0	19,0	607,0	22,8	727,0	175,0	215,0	367,0	–
1500	18,0	617,0	20,0	683,0	24,0	819,0	201,0	273,0	427,0	–
1600	18,9	690,0	21,0	766,0	25,2	917,0	245,0	320,0	488,0	–
1800	20,7	850,0	23,0	943,0	27,6	1129,0	291,0	370,0	–	–
2000	22,5	1026,0	25,0	1139,0	30,0	1363,0	340,0	445,0	–	–
2200	24,3	1209,0	27,0	1345,0	32,4	1613,0	425,0	542,0	–	–

* L ve Lu müşteri tarafından tanımlanır. / L & Lu mentioned by customer.




Flanşlı Emme Çanları / Flanged Bell Mouths

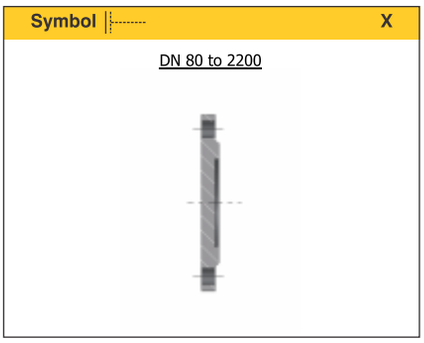
Symbol



DN	Ød	h	W	
			PN 10	PN 16
80	150	130	5,2	5,2
100	175	135	6,2	6,2
125	200	145	8,6	8,6
150	230	150	10,1	10,1
200	290	170	15,0	14,8
250	345	185	21,0	20,5
300	405	205	28,5	28,5
350	460	220	35,5	35,5
400	520	240	45,0	45,0
450	575	255	54,0	54,0
500	635	275	67,0	67,0
600	750	310	96,5	120,0
700	865	345	135,0	146,0
800	980	380	182,0	197,0
900	1095	415	231,0	250,0
1000	1210	450	297,0	331,0
1100	1325	485	370,0	397,0
1200	1440	520	457,0	512,0
1400	1670	590	646,0	702,0
1500	1785	625	763,0	851,0
1600	1900	660	906,0	995,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Kör Flanşlar / Blank Flanges

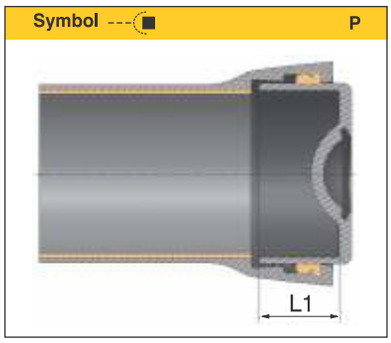


Nominal Çap Nominal Diameter	W		
DN	PN 10	PN 16	PN 25
80	4,0	4,0	4,5
100	4,6	4,6	5,7
125	6,0	6,0	6,5
150	7,6	7,6	9,0
200	11,0	11,0	14,0
250	17,0	18,0	21,0
300	25,0	25,0	31,0
350	32,5	37,0	46,5
400	40,5	48,5	63,0
450	50,0	63,5	79,0
500	62,0	83,0	100,0
600	94,0	130,0	154,0
700	136,0	169,0	220,0
800	189,0	235,0	309,0
900	244,0	307,0	402,0
1000	319,0	413,0	539,0
1100	405,0	518,0	674,0
1200	504,0	659,0	842,0
1400	687,0	904,0	1192,0
1500	808,0	1092,0	1417,0
1600	955,0	1280,0	1664,0
1800	1240,0	1687,0	2223,0
2000	1630,0	2226,0	2986,0
2200	2014,0	2782,0	–

Flanş bağlantı çapları DIN EN 1092-2'ye göre yapılmaktadır. / Flange connection dimentions according to DIN EN 1092-2




Son Kapama / Cap



DN	L	O / W	L1	P / W
80	82	6	95	2,5
100	88	7	100	3,0
125	88	9	100	5,5
150	88	14	105	6,0
200	90	22	110	9,0
250	96	28	117	14,5
300	104	37	119	22,0

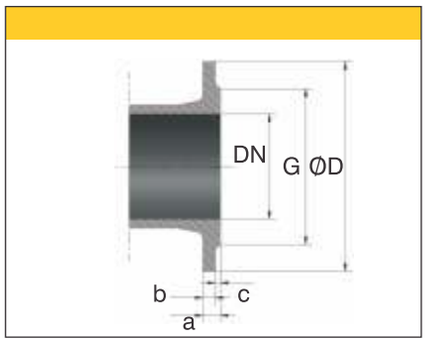
Dn300 sonrası çaplarda, borunun konumuna göre EU ve kör flanş veya F ve kör flanş kullanılması tavsiye edilmektedir.

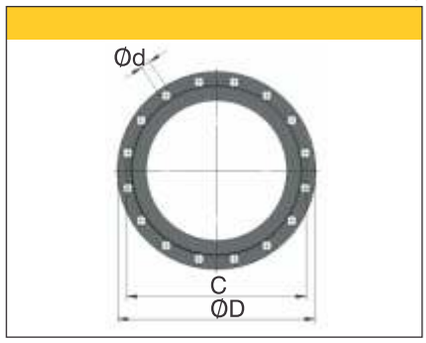
The diameters over DN300, it is recommended to be used EU with blank flange or F with blank flange based on the position of the pipe.

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Flanş Boyut Detayları / Flange Dimensions

PN 10



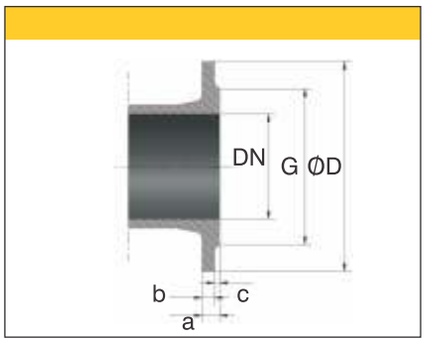


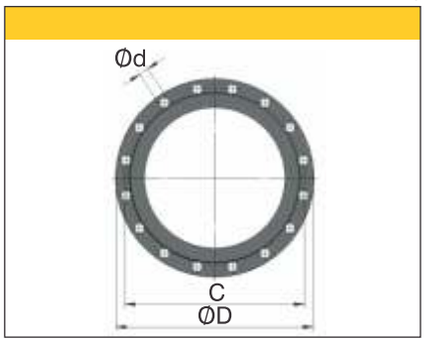
DN	ØD	C	G	Kalınlık / Thickness			Cıvata / Bolts			W
				a	b	c	Adet Number	Ød	Ölçü Dimension	
PN 10										
80	200	160	132	19,0	16,0	3	8	19	M 16	3,0
100	220	180	156	19,0	16,0	3	8	19	M 16	3,6
125	250	210	184	19,0	16,0	3	8	19	M 16	4,5
150	285	240	211	19,0	16,0	3	8	23	M 20	5,5
200	340	295	266	20,0	17,0	3	8	23	M 20	7,5
250	400	350	319	22,0	19,0	3	12	23	M 20	10,0
300	455	400	370	24,5	20,5	4	12	23	M 20	13,0
350	505	460	429	24,5	20,5	4	16	23	M 20	15,0
400	565	515	480	24,5	20,5	4	16	28	M 24	18,0
450	615	565	530	25,5	21,5	4	20	28	M 24	21,0
500	670	620	582	26,5	22,5	4	20	28	M 24	25,0
600	780	725	682	30,0	25,0	5	20	31	M 27	34,0
700	895	840	794	32,5	27,5	5	24	31	M 27	47,0
800	1015	950	901	35,0	30,0	5	24	34	M 30	64,0
900	1115	1050	1001	37,5	32,5	5	28	34	M 30	74,0
1000	1230	1160	1112	40,0	35,0	5	28	37	M 33	93,0
1100	1340	1270	1218	42,5	37,5	5	32	37	M 33	114,0
1200	1455	1380	1328	45,0	40,0	5	32	41	M 36	138,0
1400	1675	1590	1530	46,0	41,0	5	36	44	M 39	175,0
1500	1785	1700	1640	47,5	42,5	5	36	44	M 39	201,0
1600	1915	1820	1750	49,0	44,0	5	40	50	M 45	245,0
1800	2115	2020	1950	52,0	47,0	5	44	50	M 45	291,0
2000	2325	2230	2150	55,0	50,0	5	48	50	M 45	340,0
2200	2550	2440	2370	59,0	53,0	6	52	56	M 52	425,0




Flanş Boyut Detayları / Flange Dimensions

PN 16



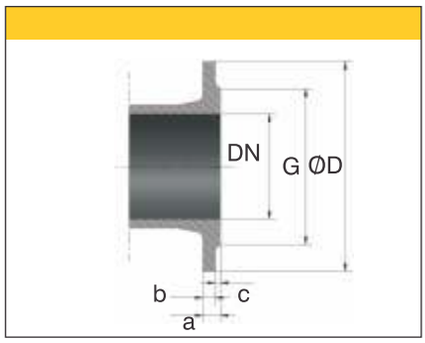


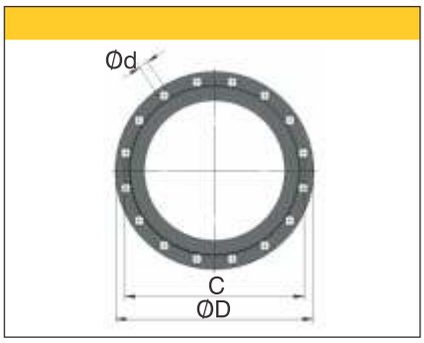
DN	ØD	C	G	Kalınlık / Thickness			Cıvata / Bolts			W
				a	b	c	Adet Number	Ød	Ölçü Dimension	
PN 16										
80	200	160	132	19,0	16,0	3	8	19	M 16	3,0
100	220	180	156	19,0	16,0	3	8	19	M 16	3,6
125	250	210	184	19,0	16,0	3	8	19	M 16	4,5
150	285	240	211	19,0	16,0	3	8	23	M 20	5,5
200	340	295	266	20,0	17,0	3	12	23	M 20	7,5
250	400	355	319	22,0	19,0	3	12	28	M 24	10,0
300	455	410	370	24,5	20,5	4	12	28	M 24	13,0
350	520	470	429	26,5	22,5	4	16	28	M 24	17,5
400	580	525	480	28,0	24,0	4	16	31	M 27	23,0
450	640	585	548	30,0	26,0	4	20	31	M 27	30,0
500	715	650	609	31,5	27,5	4	20	34	M 30	38,0
600	840	770	720	36,0	31,0	5	20	37	M 33	56,0
700	910	840	794	39,5	34,5	5	24	37	M 33	58,0
800	1025	950	901	43,0	38,0	5	24	41	M 36	75,0
900	1125	1050	1001	46,5	41,5	5	28	41	M 36	87,0
1000	1255	1170	1112	50,0	45,0	5	28	44	M 39	125,0
1100	1355	1270	1218	53,5	48,5	5	32	44	M 39	140,0
1200	1485	1390	1328	57,0	52,0	5	32	50	M 45	185,0
1400	1685	1590	1530	60,0	55,0	5	36	50	M 45	215,0
1500	1820	1710	1640	62,5	57,5	5	36	57	M 52	273,0
1600	1930	1820	1750	65,0	60,0	5	40	57	M 52	320,0
1800	2130	2020	1950	70,0	65,0	5	44	57	M 52	370,0
2000	2345	2230	2150	75,0	70,0	5	48	62	M 56	445,0
2200	2555	2440	2370	81,0	75,0	6	52	62	M 56	542,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Flanş Boyut Detayları / Flange Dimensions

PN 25

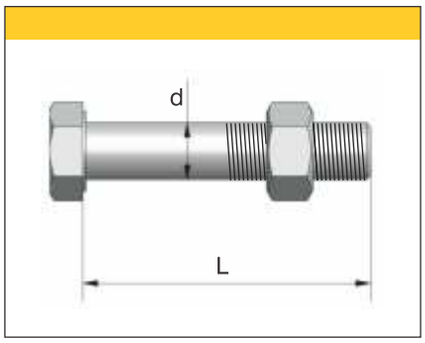




DN	ØD	C	G	Kalınlık / Thickness			Cıvata / Bolts			W
				a	b	c	Adet Number	Ød	Ölçü Dimension	
PN 25										
80	200	160	132	19,0	16,0	3	8	19	M 16	3,5
100	235	190	156	19,0	16,0	3	8	23	M 20	4,0
125	270	220	184	19,0	16,0	3	8	28	M 24	5,0
150	300	250	211	20,0	17,0	3	8	28	M 24	6,0
200	360	310	274	22,0	19,0	3	12	28	M 24	10,0
250	425	370	330	24,5	21,5	3	12	31	M 27	15,0
300	485	430	389	27,5	23,5	4	16	31	M 27	20,0
350	555	490	448	30,0	26,0	4	16	34	M 30	29,0
400	620	550	503	32,0	28,0	4	16	37	M 33	37,0
450	670	600	548	34,5	30,5	4	20	37	M 33	45,0
500	730	660	609	36,5	32,5	4	20	37	M 33	55,0
600	845	770	720	42,0	37,0	5	20	41	M 36	79,0
700	960	875	820	46,5	41,5	5	24	44	M 39	91,0
800	1085	990	928	51,0	46,0	5	24	50	M 45	124,0
900	1185	1090	1028	55,5	50,5	5	28	50	M 45	143,0
1000	1320	1210	1140	60,0	55,0	5	28	57	M 52	198,0
1100	1420	1310	1240	64,5	59,5	5	32	57	M 52	221,0
1200	1530	1420	1350	69,0	64,0	5	32	57	M 52	270,0
1400	1755	1640	1560	74,0	69,0	5	36	62	M 56	367,0
1500	1865	1750	1678	77,5	72,5	5	36	62	M 56	427,0
1600	1975	1860	1780	81,0	76,0	5	40	62	M 56	488,0
1800	2195	2070	1985	88,0	83,0	5	44	70	M 64	750,0
2000	2425	2300	2210	95,0	90,0	5	48	70	M 64	890,0
2200	2625	2500	2410	105,0	99,0	6	52	70	M 64	1150,0



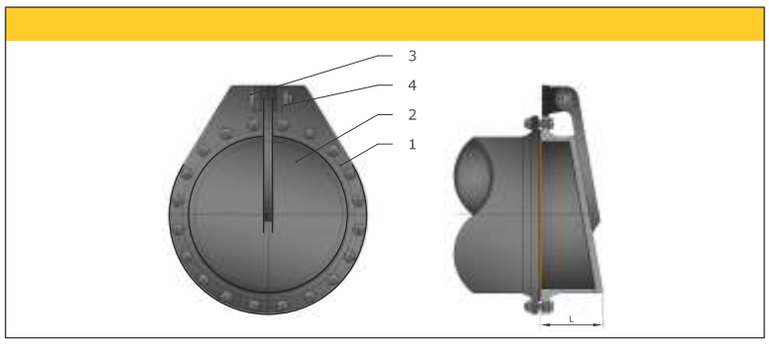

Cıvata ve Somunlar / Bolts & Nuts



DN	PN 10		PN 16		PN 25	
	dxL	Cıvata (adet) Bolt (pcs)	dxL	Cıvata (adet) Bolt (pcs)	dxL	Cıvata (adet) Bolt (pcs)
80	M 16*75	8	M 16*75	8	M 16*75	8
100	M 16*75	8	M 16*75	8	M 20*75	8
125	M 16*75	8	M 16*75	8	M 24*75	8
150	M 20*75	8	M 20*75	8	M 24*85	8
200	M 20*80	8	M 20*80	8	M 24*85	8
250	M 20*85	12	M 24*85	12	M 27*95	12
300	M 20*90	12	M 24*95	12	M 27*100	12
350	M 20*90	16	M 24*100	16	M 30*120	16
400	M 24*95	16	M 27*110	16	M 33*120	16
450	M 24*95	20	M 27*110	20	M 33*130	20
500	M 24*100	20	M 30*120	20	M 33*130	20
600	M 27*110	20	M 33*130	20	M 36*150	20
700	M 27*120	24	M 33*140	24	M 39*160	24
800	M 30*130	24	M 36*150	24	M 45*170	24
900	M 30*130	28	M 36*160	28	M 45*180	28
1000	M 33*140	28	M 39*160	28	M 52*200	28
1100	M 33*140	32	M 39*170	32	M 52*210	32
1200	M 36*150	32	M 45*180	32	M 52*220	32
1400	M 39*160	36	M 45*190	36	M 56*230	36
1500	M 39*160	36	M 52*200	36	M 56*240	36
1600	M 45*170	40	M 52*210	40	M 56*250	40
1800	M 45*170	44	M 52*220	44	M 64*300	44
2000	M 45*180	48	M 56*230	48	M 64*300	48
2200	M 52*200	52	M 56*240	52	M 64*375	52

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

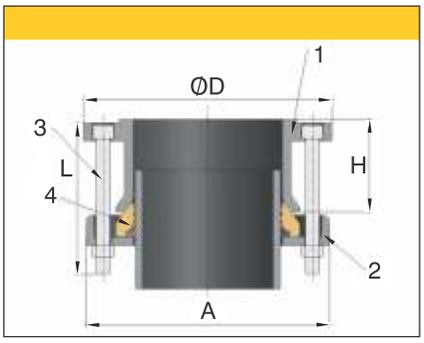
Kurbağalık / Flap Valve



No	**Parça İsmi** / Part Name	**Malzeme** / Material
1	Gövde / Body	EN GJS-400-15 / 500-7
2	Kapak / Gate	EN GJS-400-15 / 500-7
3	Cıvata / Bolt	8x8 Galvanizli / 8x8 Galvanized
4	Somun / Nut	8x8 Galvanizli / 8x8 Galvanized

DN	L	**Flanşlı** / Flange W
80	80	9,5
100	80	13,0
125	80	16,5
150	80	22,0
200	100	35,0
250	105	60,0
300	105	70,0

Düktil / CTP / Çelik Borulara Uygun Geniş Toleranslı Flanş Adaptörü
Universal Flange Adaptor for DI / GRP / Steel Pipes



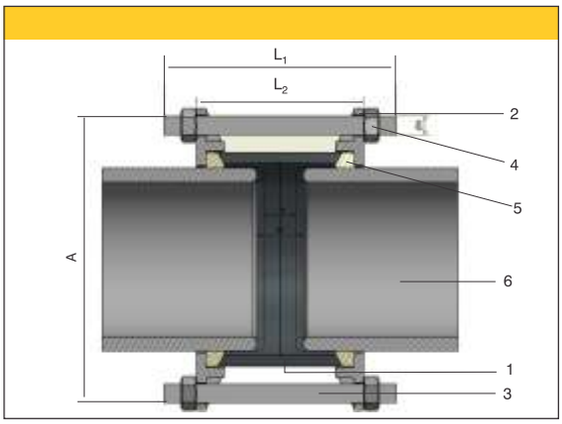
No	Parça İsmi / Part Name	Malzeme / Material	Standart Standard
1	Gövde / Body	Düktil Demir / Ductile Iron GGG400-10	EN 1563
2	Son Halka / And Ring	Düktil Demir / Ductile Iron GGG400-10	EN 1563
3	Cıvata ve Somun / Bold and Nut	Çelik 8x8 Çinko/Dacro / Steel 8x8 Zinced/Dacro	–
4	Conta / Gasket	EPDM / NBR	EN 681
	Kaplama / Coating	Füzyon Bağlamalı Epoksi / Fusion Bonded Epoxy	–

DN	Aralık Range	PN 10 - 16					
		Cıvata / Bolt		A	ØD	H	W
		L	adet/pcs				
50	59-72	125	2	165	195	78	3,5
65	72-85	125	2	185	190	78	3,9
80	88-103	125	4	185	216	78	4,5
100	109-128	125	4	218	225	78	6,0
125	132-146	125	4	150	288	78	7,0
150	159-182	125	4	272	288	78	7,8
175	192-210	125	4	312	345	78	11,6
200	218-235	130	4	335	345	78	12,0
250	272-289	130	6	405	455	85	14,5
300	315-332	130	6	460	455	85	18,5
350	374-391	130	8	510	520	108	41,5
400	400-429	150	8	489	580	108	49,5
400	418-435	160	8	580	580	108	51,2
400	425-442	160	8	580	580	108	52,8
450	455-472	160	10	620	640	108	57,2
450	476-493	160	10	640	640	108	61,6
500	500-532	160	10	683	715	114	67,1
500	527-544	180	10	690	715	114	68,2
500	555-572	180	10	715	715	114	69,5
500	566-583	180	10	715	715	150	70,5
500	582-599	200	10	715	715	150	71,5
600	600-630	200	10	790	840	114	82,5
600	630-647	180	10	820	840	114	84,7
600	645-662	180	10	830	840	114	85,8
600	662-679	200	10	840	840	150	86,9
600	675-692	200	10	840	840	150	90,2

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"




Düktil Demir Borular için Esnek Kaplin
Flexible Coupling for Ductile Iron Pipe



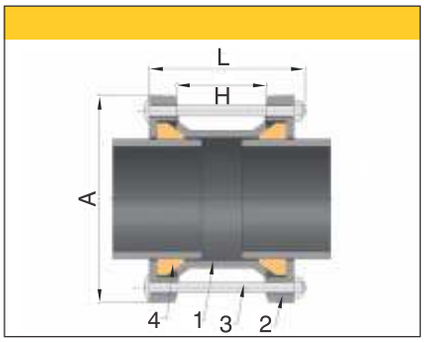
No	Parça İsmi / Part Name	Malzeme / Material
1	Gövde / Body	Düktil Demir / Ductile Iron EN GJS 400-15 / 500-7
2	Tutucu / Retainer	Düktil Demir / Ductile Iron EN GJS 400-15 / 500-7
3	Saplama / Stud	Galvanizli Çelik / Zinc Coated Steel
4	Somun / Nut	8x8 Galvanizli / 8x8 Galvanized
5	Sızdırmazlık Halkası / Seal Ring	EPDM/NBR
6	Boru / Pipe	Düktil Demir / Ductile Iron

PN 10 - 16				
DN	L_1	L_2	±e	Ød
100	150	108	20	M12 (4 Adet / Pcs)
150	150	108	20	M12 (4 Adet / Pcs)
200	150	108	20	M12 (4 Adet / Pcs)
250	170	130	25	M12 (4 Adet / Pcs)
300	170	130	25	M12 (6 Adet / Pcs)
350	210	164	30	M12 (6 Adet / Pcs)
400	210	170	30	M16 (8 Adet / Pcs)
450	230	170	30	M16 (8 Adet / Pcs)
500	230	170	30	M16 (10 Adet / Pcs)
600	260	200	30	M16 (10 Adet / Pcs)
700	260	200	30	M16 (12 Adet / Pcs)
800	290	228	30	M16 (12 Adet / Pcs)
900	290	228	30	M16 (14 Adet / Pcs)
1000	310	250	30	M16 (14 Adet / Pcs)
1200	360	300	30	M16 (16 Adet / Pcs)
1400	360	300	30	M16 (18 Adet / Pcs)
1600	360	300	30	M16 (20 Adet / Pcs)

PN 25-40 basınç oranları için SMS'ye danışınız. / If required, flexible couplings with PN 25-40 pressure ratings can be produced.

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"

Düktil / CTP / Çelik Borulara Uygun Geniş Toleranslı Kaplin
Universal Coupling for DI / GRP / Steel Pipes



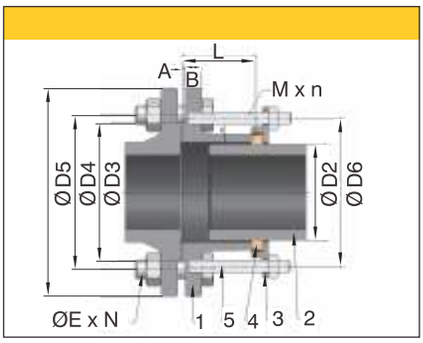
No	Parça İsmi / Part Name	Malzeme / Material	Standart Standard
1	Gömlek / Sleeve	Çelik-Düktil Demir / Steel-Ductile Iron	–
2	Son Halka / And Ring	Düktil Demir / Ductile Iron GGG400-10	EN 1563
3	Cıvata ve Somun / Bold and Nut	Çelik 8x8 Galvanizli / Steel 8x8 Galvanized	–
4	Conta / Gasket	EPDM / NBR	EN 681
	Kaplama / Coating	Füzyon Bağlamalı Epoksi / Fusion Bonded Epoxy	–

DN	Aralık Range	Cıvata / Bolt		A	H	W
		L	adet/pcs			
50	59-72	M 12 x 180	2	165	98	3,0
65	72-85	M 12 x 180	2	185	98	4,0
80	88-103	M 12 x 180	4	185	98	4,1
100	109-128	M 12 x 180	4	218	98	4,8
125	132-146	M 12 x 200	4	250	98	6,3
150	159-182	M 12 x 200	4	272	98	7,2
175	192-210	M 12 x 220	4	312	135	12,0
200	218-235	M 12 x 220	4	335	135	12,5
250	272-289	M 12 x 220	6	405	135	19,0
300	315-332	M 12 x 200	8	460	135	22,0
300	322-339	M 12 x 240	6	435	102	10,4
300	340-360	M 12 x 240	6	455	102	22,0
300	357-368	M 12 x 240	8	510	130	31,9
350	374-391	M 12 x 240	8	510	130	33,0
400	400-429	M 12 x 240	8	589	130	38,5
400	418-435	M 12 x 240	8	580	130	39,6
400	425-442	M 12 x 240	8	580	130	40,7
450	455-472	M 12 x 240	10	715	130	45,1
450	476-493	M 12 x 240	10	640	130	47,3
500	527-544	M 12 x 240	10	690	130	53,9
500	555-572	M 12 x 240	10	715	130	55,0
500	566-583	M 12 x 240	10	715	130	55,0
500	582-599	M 12 x 240	10	715	130	57,2
600	600-630	M 12 x 260	10	790	130	71,5
600	662-679	M 12 x 260	10	840	130	77,0

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"



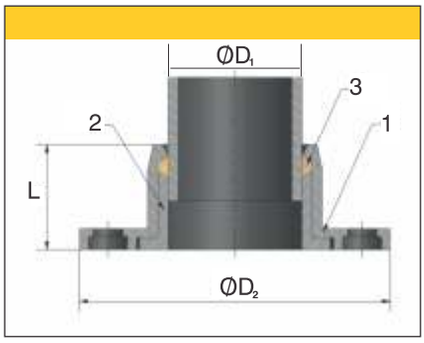

Düktil Demir Borular için Flanş Adaptörü / Flange Adaptor for Ductile Iron Pipe



No	Parça İsmi / Part Name	Malzeme / Material
1	Gövde / Body	Düktil Demir / Ductile Iron GGG400-10
2	Boru / Pipe	Düktil Demir / Ductile Iron GGG400-10
3	Tutucu / Retainer	Düktil Demir / Ductile Iron GGG400-10
4	Halka / Ring	EPDM / NBR
5	Saplama / Stud	Galvanizli Çelik / Steel Galvanized

DN	ØD2	ØD3	ØD4	ØD5	ØD6	L	t	A	B	ØE	N	M	n	W
80	98	132	160	200	166	73	7,0	3	16,0	19	8	12	4	7,5
100	118	156	180	220	187	76	7,5	3	16,0	19	8	12	4	8,3
125	144	584	210	250	210	76	7,5	3	16,0	19	8	12	4	11,7
150	170	211	240	285	240	76	8,0	3	16,0	23	8	12	4	13,9
200	222	266	295	340	295	76	8,5	3	17,0	23	12	12	6	19,5
250	274	319	355	400	355	90	9,0	3	19,0	28	12	12	6	26,9
300	326	370	410	455	410	90	10,0	4	20,5	28	12	12	6	31,9
350	378	429	470	520	470	110	10,5	4	22,5	28	16	16	8	45,2
400	429	480	525	580	525	110	11,0	4	24,0	31	16	16	8	56,6
450	480	544	585	640	585	110	11,5	4	26,0	31	20	16	10	71,5
500	532	609	650	715	650	115	12,0	4	27,5	34	20	16	10	81,3
600	635	720	770	840	770	115	13,5	5	31,0	37	20	16	10	97,5
700	738	794	840	910	840	115	14,5	5	34,5	37	24	16	12	126,0
800	842	901	950	1025	950	115	16,0	5	38,0	40	24	16	12	142,5
900	945	1001	1050	1125	1050	115	17,0	5	41,5	40	28	16	14	183,0
1000	1048	1112	1170	1255	1170	115	18,0	5	45,0	43	28	16	14	204,0
1100	1152	1215	1270	1355	1270	130	19,5	5	48,5	43	32	16	16	253,5
1200	1255	1328	1390	1485	1390	130	20,5	5	52,0	49	32	16	16	303,8
1400	1462	1530	1590	1685	1590	130	23,0	5	55,0	49	36	20	18	432,0
1500	1565	1640	1710	1820	1710	130	24,0	5	57,5	56	36	20	18	634,5
1600	1668	1750	1820	1930	1820	190	25,5	5	60,0	56	40	20	40	837,0
1800	1875	1950	2020	2130	2020	190	28,0	5	65,0	56	44	20	44	936,0
2000	2082	2150	2230	2345	2230	190	30,0	5	70,0	62	48	20	48	1044,0

PE / PVC Borular için Kilitli Tip Flanş Bağlantısı / Restrained Flange Adaptor for PE / PVC Pipe



No	Parça İsmi / Part Name	Malzeme / Material
1	Gövde / Body	Düktil Demir / Ductile Iron
2	Halka / Ring	Pirinç / Brass
3	Kauçuk / Rubber	EPDM / NBR

PN 10 - 16				
DN	ØD1	L	ØD2	W
50	63	55	183	2,42
60	75	58	183	3,08
65	75	58	183	3,08
80	90	60	200	3,96
100	110	68	220	4,40
125	125	70	250	5,17
125	140	75	250	5,28
150	160	80	283	7,59
200	200	93	340	10,56
250	250	75	340	12,65
300	315	100	455	15,07
400	400	120	565	26,40

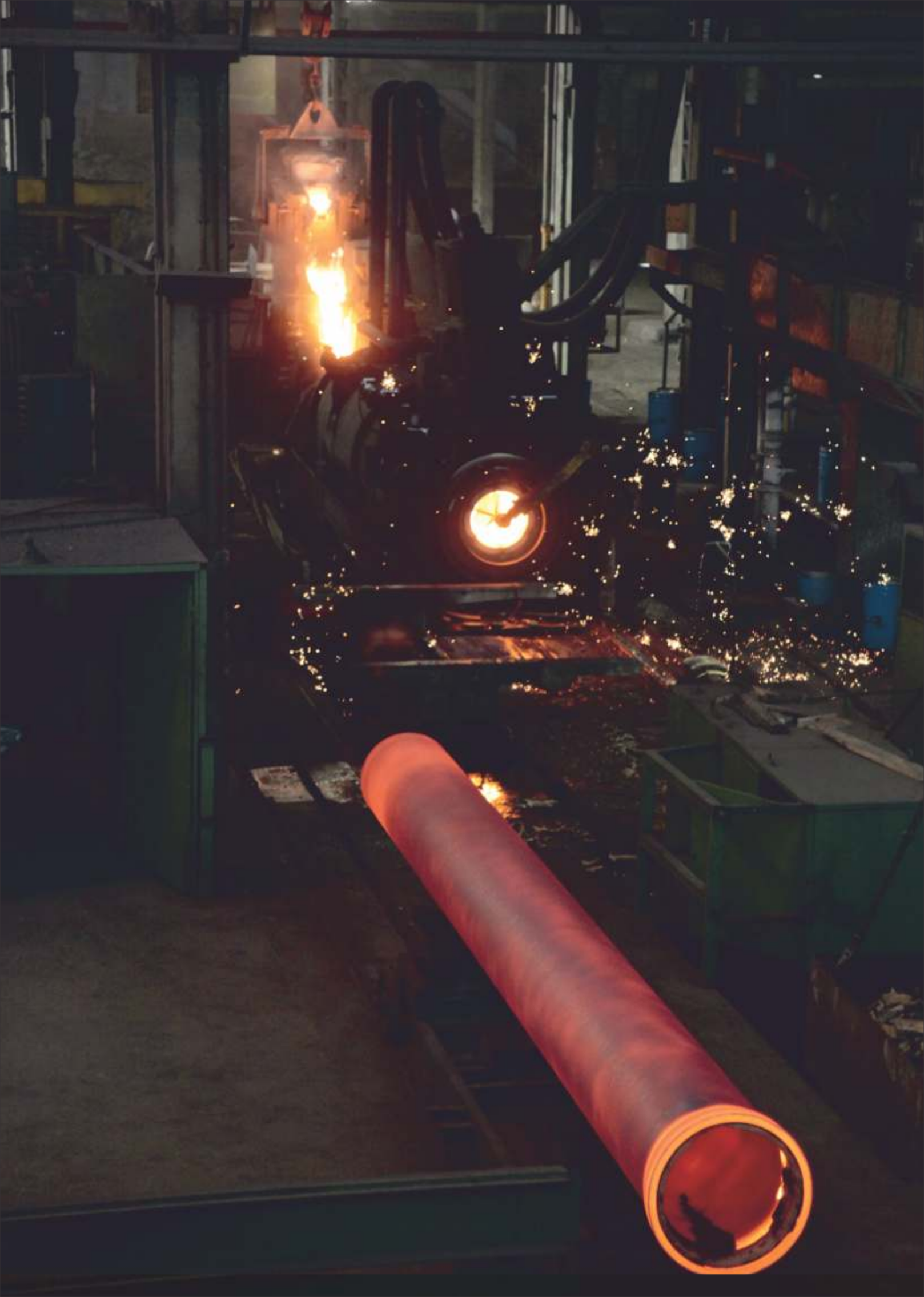
Flanş bağlantısı PVC/PE borularda kullanılır. Contası ve kilitli tip pirinç halkası vardır. Boru bağlantı gövdesine konulup cıvatalar sıkıldığında pirinç halka boruyu çıkmasını önleyecek şekilde sıkar (sabitler).

Gövde GGG40 düktil demir malzemeden yapılmıştır. Conta EPDM olup içme suyuna uygundur. Gövde 250 mikron metreden daha fazla Rilsan ve Reçine epoksi ile kaplanabilir.

Flange adaptor is used in PVC/PE pipe. It has a gasket and a restrained brass rings. When you put the pipe in the adaptor body and fasten the bolts, the brass ring will fix the pipe to avoid to pull out.

The body is made by GGG40 ductile iron material. The gasket is EPDM and suitable for drink water. The body can be Rilsan and Resin epoxy coated with 250 micrometer up.

Ölçü birimi "mm", ağırlık birimi "kg"dır. / Dimensions "mm", weights (W) "kg"



bağlantı ve montaj

joint and assembly

SAMSUN MAKİNA SANAYİ A.Ş.



BAĞLANTI VE MONTAJ / JOINT AND ASSEMBLY

T-Tip ve Standart Tip bağlantılar su endüstrisinde kauçuk bilezik bağlantılı sistemler için mihenk taşı olarak kabul edilmektedir. Eşsiz tasarım bütün koşullar altında çabuk ve efektif montaj sunmaktadır.

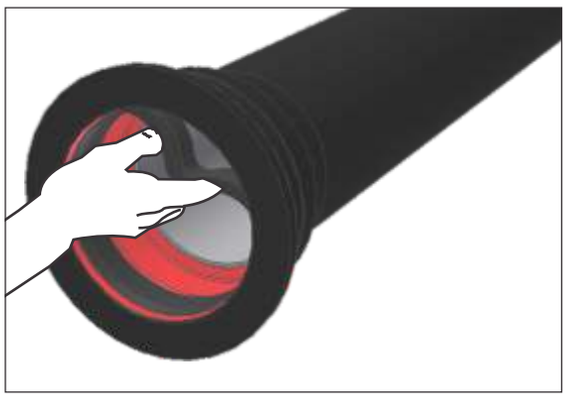
The T-Type and Standard Type joints are considered as the most important point for the rubber ring jointing systems in the water systems. By its unique design quick and effective assembly under all conditions is possible.

Muflu bağlantılı Boru ve Ek Parçaları için Bağlantı Talimatları / Jointing Instructions for Socket-Spigot Pipe and Fittings (Push-on Type)

Contanın Takılması / Gasket Insertion

Conta temizlenmeli, resimde görüldüğü gibi bükülmeli ve mufa yerleştirilmelidir. DN600'den büyük contalar yerleştirilirken iki yerde bükme gereklidir. Contadaki yiv muftaki tutucu ökçe üzerine yerleştirilmelidir. Contanın tutucu topuğu yerine sıkıca yerleşmeli ve borunun ağzından contanın topuğu taşmamalıdır.

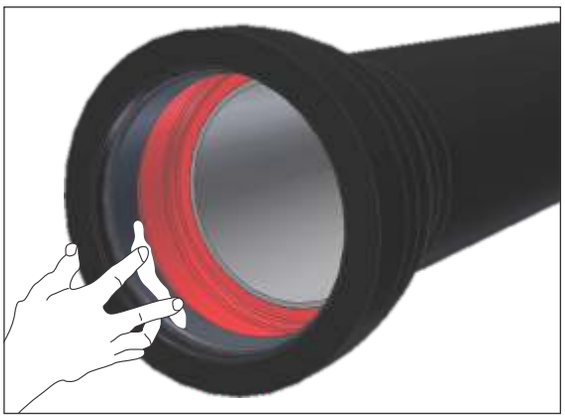
The gasket must be cleaned, flexed as shown and then placed into the socket. When placing gaskets over DN600 flexing in two places is necessary. The groove in the gasket should be placed on the retaining bead in the socket. The retaining heel of the gasket must be firmly bedded in its seat and the heel of the gasket should not poured out of the mouth of the pipe.



Kayganlaştırıcı Sıvı / **Lubricant**

Kayganlaştırıcı sıvı mufla temasta olacak conta yüzeyinin içine, muf kanalına ve borunun mufa giren kısmının 50 mm'sine ince bir film tabakası halinde uygulanmalıdır. Kullanılacak sıvı sadece boru imalatçısının temin ettiği olmalıdır. Boru mufunun yağlandıktan sonra toprağa veya kanal kenarına değmesine izin verilmemelidir.

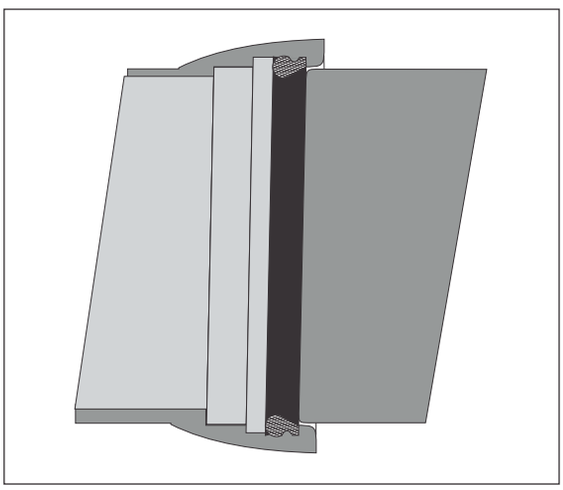
The lubricant must be applied as a thin film layer to the inner surface of the gasket where it will contact with the entering spigot, to chamfer and to the 50 mm part of the pipe entering into the socket. Only the lubricant supplied by the pipe manufacturer must be used. The pipe spigot should not be allowed to touch the ground or trench after it is lubricated.



Borunun Hizalanması / **Pipe Alignment**

Bağlantı yapılacak boru diğer borunun mufuna hizalanmalı ve conta ile temas edene kadar sokulmalıdır. Bağlantının nihai montajı bu pozisyonda yapılmalıdır. Boru spigot uçları pahlıdır. Montaj öncesi, borular kesildiği takdirde; boru spigotunun ucu contaya hasar vermemesi için mutlaka pahlandırılmalıdır. Boruların montaj yönü, akış yönünden bağımsızdır.

The spigot of the pipe to be jointed must be aligned and inserted into the adjacent socket till it contacts with the gasket. Final assembly of the joint must be finalized at this position. The ends of pipe is already chamfered. When the pipe is cut, before assembly, the ends of the pipe to be chamfered for to avaid gasket damage. Installation of the pipe directions is not functionally related to the direction of flow.



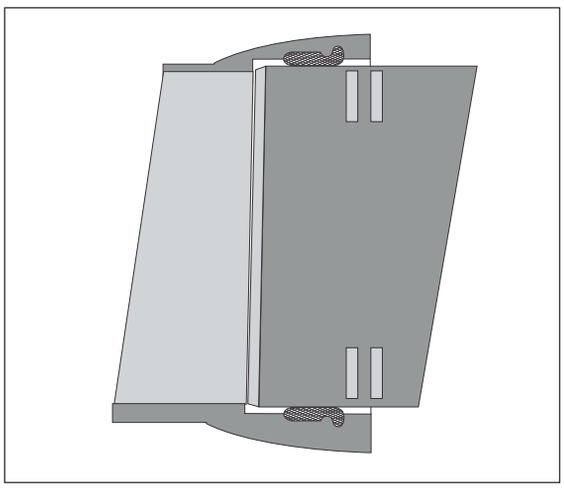



Komple Monte Edilmiş Bağlantı / **Completely Assembled Joint**
Boruların uç kısmında 2 adet beyaz şerit bulunmaktadır. Borunun muflu kısmı, boru ucundaki şerit ile ikinci şeritin ortasına kadar itilerek sokulması sonucunda montaj tamamlanmış olur.

Bağlantı montajında zorlanılması durumunda muf çıkartılmalı ve ikinci kez denemeden önce 90^0 döndürülmelidir. Hala zorluk devam ediyorsa muf çıkartılarak contanın durumu gözden geçirilmelidir.

There are two white stripes at the end of the pipes. The assembly is completed by inserting spigot part of the pipe until the half of the second stripe.

While joint assembly if difficulty is encountered, the spigot must be removed and rotated 90^0 before second attempt. If the difficulty still continues the spigot should be removed and the position of the gasket should be examined.



Sapma / **Deflection**
Bağlantılar DN300'e kadar olan borular için her yöne 5° 'e kadar, DN350 - 800 arası için 4° 'e kadar, DN900 - 1600 arası için 3° 'e kadar ve DN1800 - 2200 arası için 2° 'e kadar saptırılabilir. Bütün muflar oluklu olmalıdır. Bir bağlantı yaparken borular aynı hizada olmalı ve gerekirse sapma bağlantıdan sonra yapılmalıdır.

The joints could be deflected in any direction up to 5° for pipes up to DN300, up to 4° for DN350 - 800, up to 3° for DN900 - 1600 and up to 2° for DN1800 - 2200 pipes. All spigots must be chamfered. While making a joint, pipes should always be in line and if necessary, deflection is to be made after the joint.

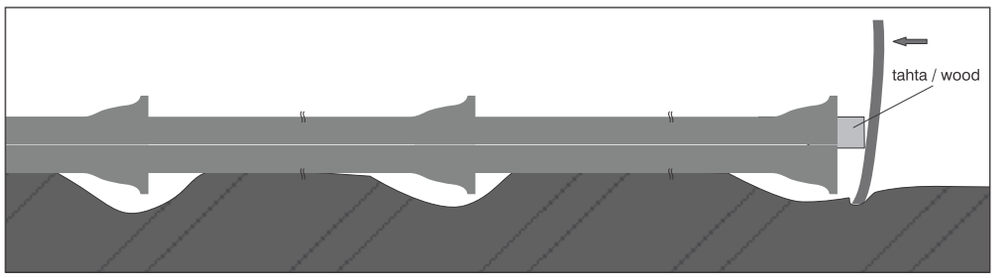
Bağlantının montajı çabuk ve basit olup boyut ve yerel koşullara bağlı olarak aşağıdaki metotların herhangi birisi ile yapılabilir:

Assembly of the joint is quick and simple and due to the size and local conditions, the assembly could be carried out by using any of the following methods:

Manivela Metodu / Crowbar Method

Mufun boru ucuna tam olarak girmesi bir manivela veya uygun bir levye ile borunun ucunun mufun içine doğru itilmesi ile sağlanır.

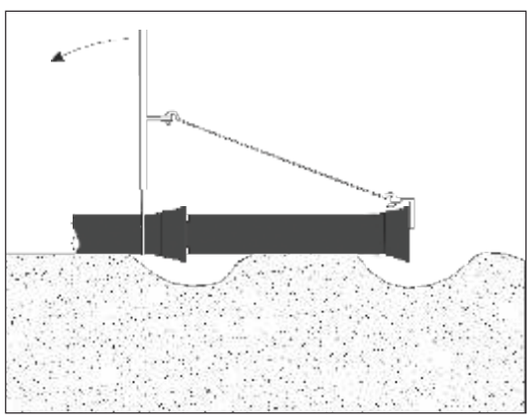
The complete entry of the spigot into the socket could be obtained by shoving with a crowbar or suitable lever against the face of the socket of the entering pipe.



Çatal Alet Metodu / Fork Tool Method

DN100 ila DN150 boru bağlantıları için montaj amaçlı olarak çatal tip alet kullanılabilir. Çatal, döşenen son borunun üzerindeki mufun arkasına yerleştirilir. Bir tarafında delik, diğer tarafında kanca olan tel halat şekilde gösterildiği gibi bağlanarak diğer borunun mufuna tutturulur. Çatal tutamağı ok yönüne çekilir ve muf borunun içine girer. Bu sırada makul bir kuvvet uygulanmalıdır.

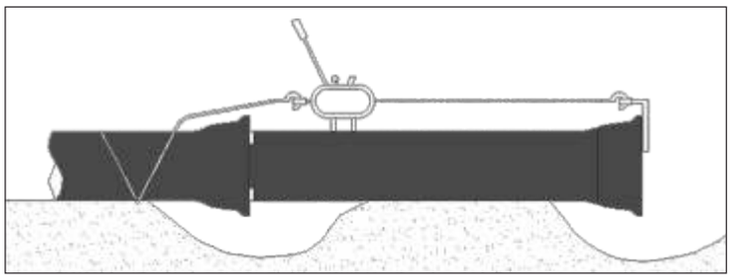
Fork type tool could be used for assembly of DN100 to DN150 pipe joints. The fork is placed over and behind the socket of the last laid pipe. A wire rope, with an eye at one end and a hook at the other end, is connected to the socket of the pipe to be jointed as shown in the picture. The fork handle is pulled in the arrow direction and the spigot enters into the socket. Reasonable force must be applied in this action.

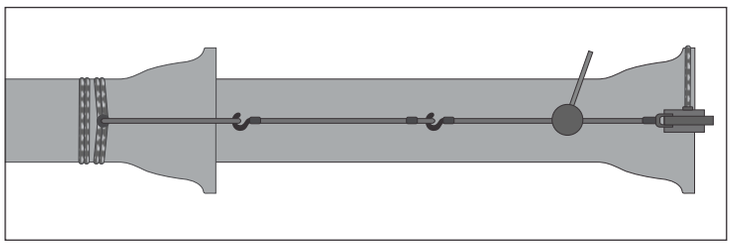


Tirfor veya Gel-Beri Metodu / Tirfor or Come-Along Method

DN 150'den büyük bağlantılar için tel halat veya zincirli gergi şemada gösterildiği gibi kullanılabilir. Bu gergiler piyasadan satın alınabilir.

A wire rope or chain puller could be used for joints over DN150, as given in the figure. Those pullers could be purchased from hardware stores.

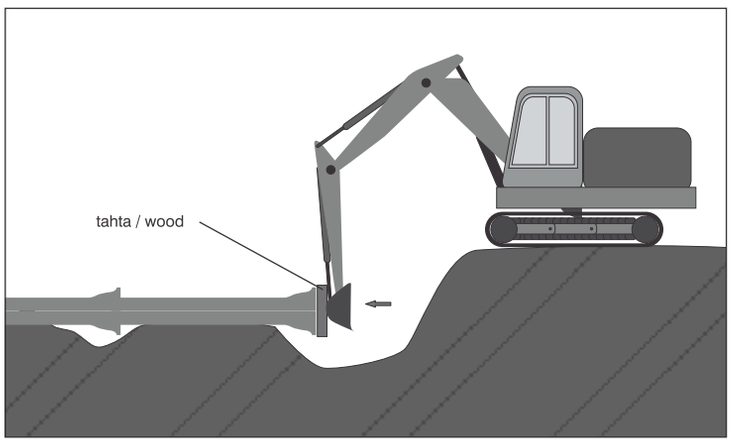




Ekskavatör Metodu / Excavator Method

Kanalın beko veya ekskavatör ile hazırlandığı yerlerde her iki makinede mufu yerine yerleştirmek için kullanılabilir. Bu sistem temel olarak büyük çaplı boruda kullanılır ve boruya hasar vermeyi önlemek için boru ile ekskavatör kovası arasına ağaç takoz yerleştirmek gereklidir.

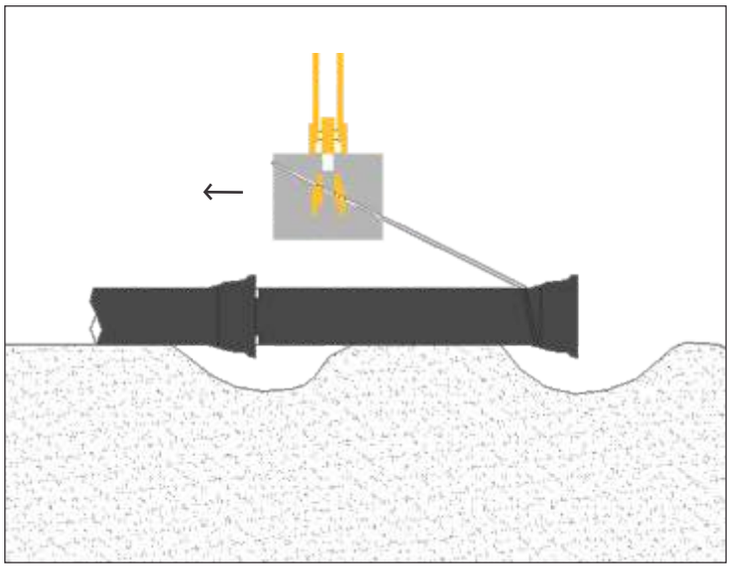
Where a backhoe or excavator excavates the trench, either machine could be used to shove the spigot to its place. This system is basically used on larger diameter pipes and in order to prevent damage to the pipe a timber header must be placed between the pipe and the bucket.



Ekskavatör veya Beko ile Çekme Metodu / Excavator or Backhoe Slewing Method

Bu metotta boru önce bağlantı için muf boru ağzına gelecek şekilde pozisyonlandırılır. Boru çevresine elastik halat sarılır ve beko kovasına bağlanır. Kova daha sonra boruyu mufa doğru çeker.

In this method the pipe is first placed for jointing, with the spigot in the socket entrance. A sheathed webbing sling is encircled the pipe and connected to the excavator or backhoe bucket. Then the bucket is pulled back, drawing the pipe into the socket.

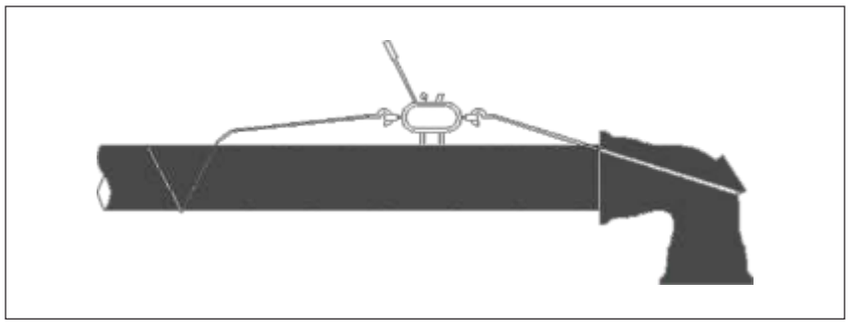


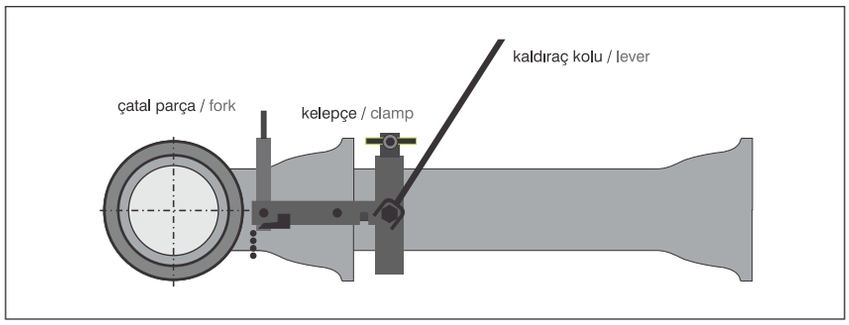


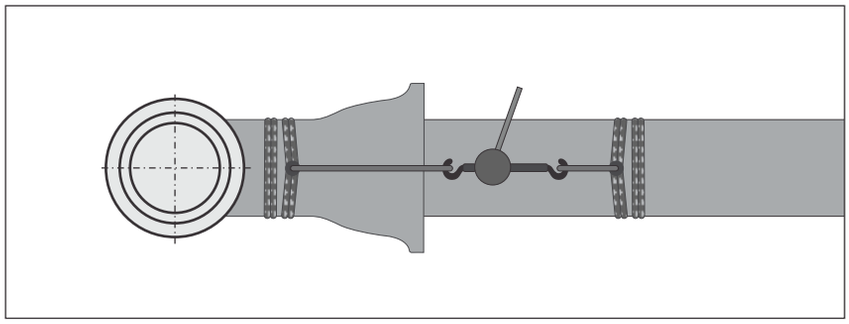

Ek Parçaları / Fittings

Ek parçaları aşağıdaki şekillerde belirtildiği gibi monte edilebilirler. Boru montajında kullanılan ekipmanlar, ek parçalarında da kullanılır.

Fittings could be assembled given in the following diagrams.Equipment used in pipe assembly are also used in fittings.







Açıklama / Description

T-Lok kilitli bağlantının tanımlanmasını sağlamak için boru imalatçıları kimlik bandının kullanılmasını tavsiye etmektedir. Bu, T-Lok bağlantısı yapılan ek yerleri üzerine;

1. PVC bant kullanarak boruya (veya kullanıldığı yerde gömleğe) işaret koymak,
2. Primer boya ile dolgu öncesi işaretleme yapmak ile sağlanır.

In order to provide the identification of the T-Lock restraining joint the pipe manufacturers recommend the use of the identification tape. This should be located over the T-Lock joints by;

1. Marking the pipe (or sleeving where used) using PVC tape
2. Marking over joint with primary paint before back fill.

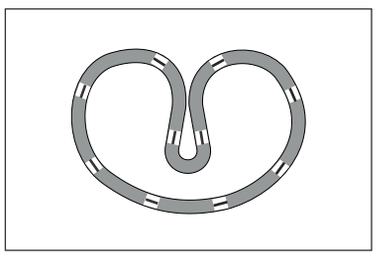
Contanın Yerleştirilmesi / Gasket Insertion

Contanın yerleştirilmesinden önce muftaki bütün çamur, kum, çakıl gibi yabancı maddeler temizlenmelidir. Conta yatağının temiz olmasına dikkat edilmelidir. Yataktaki yabancı maddeler sızıntıya yol açabilir.

Conta temiz bir bezle silinmeli, bükülmeli ve mufa yumru önde olacak şekilde yerleştirilmelidir. Bu şekilde conta muf içinde topuğu tutucu oluğa oturacak şekilde düzgün bir biçimde yerleşir.

Before the insertion of the gasket all foreign materials inside the socket (mud, sand, gravel and like) should be removed. The gasket seat should be clean. Foreign materials in the gasket seat may lead to leaks.

The gasket must be wiped with a clean cloth, flexed and then set in the socket. By this way the gasket is seated evenly around the inside of the socket with the heel of the gasket fitting snugly in the retaining groove.

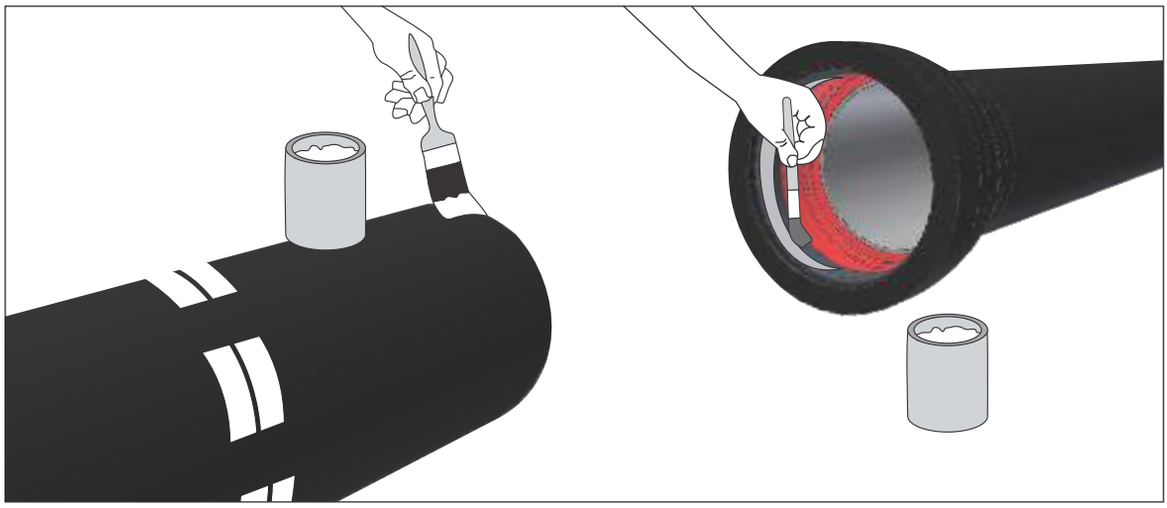


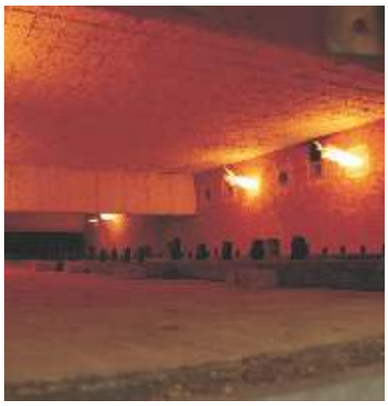



Kayganlaştırıcı Sıvının Uygulanması / Application of Lubricant

Mufun ön 150 mm'si tam olarak temizlenmelidir. Kayganlaştırıcı sıvı mufla temasta olacak conta yüzeyinin içine, muf kanalına ve borunun mufa giren kısmının 50 mm'sine bir fırça ile ince bir film tabakası halinde uygulanmalıdır. Kullanılacak sıvı sadece boru imalatçısının temin ettiği olmalıdır. Boru mufunun yağlandıktan sonra toprağa veya kanal kenarına değmesine izin verilmemelidir.

The front 150 mm of the socket must be cleaned thoroughly. The lubricant must be applied with a brush to the exposed surface of the gasket, which would contact with the entering pipe spigot, to the socket channel and spigot end of the pipe for about 50 mm as a thin film layer. The lubricant to be used must be the one supplied by the pipe manufacturer. The pipe spigot should not be allowed to touch the ground or the trench after it is lubricated.

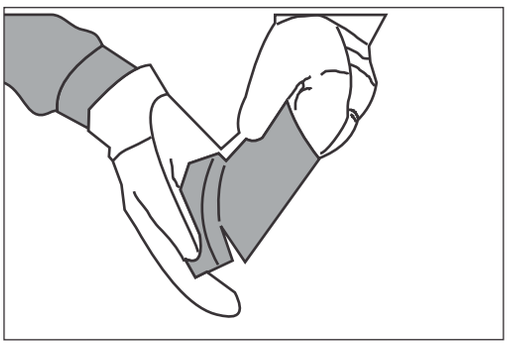


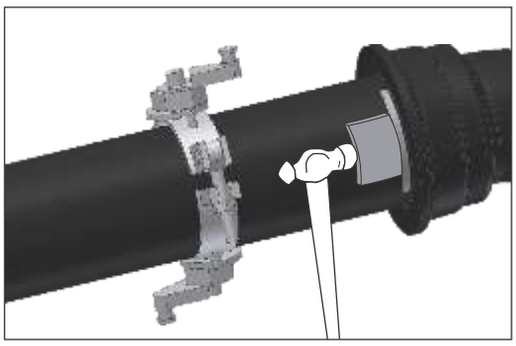


DN80 - 600 T-Lok Plus Tip Conta Demontajı / Dismantling of DN80 - 600 T-Lock Plus Type Gasket

1. Elleri korumak için eldiven giyerken taşıyıcı örse (yivli ve eğik çelik blok) bir dış şim geçirin ve şimin ön tarafını yağlayın. Bağlantının altından başlayarak ve örse vurarak şimi contanın altına sürün. Örsü şimden sökün ve yeni bir şim sokun.

While wearing protective gloves, insert an extractor shim into the carrying anvil-slotted and curved steel block-and apply lubricant over the leading edge of the shim. Starting from the bottom of the joint, drive the shim under the gasket by striking the anvil. Remove the anvil from the shim and insert a new shim.



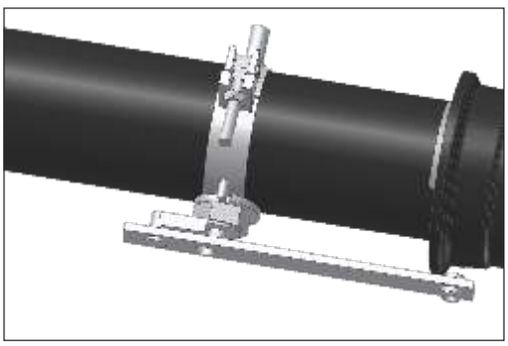


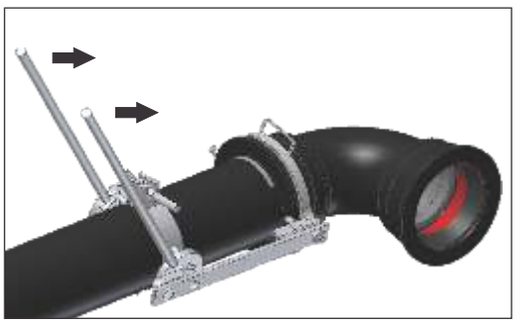
2. Bağlantının tüm çevresinde conta altında şimleri sürmeye devam edin. Şimler arasındaki boşluğun minimum olmasına dikkat edin. Nihai şimi her iki taraftaki şimlerin üstüne çıkacak şekilde sokun.

Continue driving shims under the gasket around the whole circumference of the joint. Keep the gap in between the shims to be minimum. Insert the final shim so that it is overlapped by the shims on either side.

3. Resimde belirtildiği gibi halka ve boru kelepçelerini, somun kolları soket yüzünden uzak olacak şekilde pozisyonlandırın.

As given in the figure, attach the yoke and the pipe clamp, positioning the crank nut arms pointing away from the socket face.





4. Döndürme tutamaklarını çevirerek mufu borudan çıkartın. Bağlantı demonte olana kadar tutamakları hafifçe itin. Contanın tekrar kullanılması tavsiye olunmaz.

Push the spigot out of the socket by turning the crank nuts with the crank handles. Push the handles lightly till the joint is dismantled. Re-use of the gasket is not recommended.

SAMSUN MAKİNA SANAYİ A.Ş.

Merkez / Head Office:
100. Yıl Mahallesi Fethiye Sokak No:1, 06700
Gaziosmanpaşa - Çankaya / Ankara
Tel: +90 312 446 33 50 • Fax: +90 312 447 42 91

Samsun Fabrika / Samsun Factory:
Kerimbey OSB Mahallesi Yaşar Doğu Caddesi
No:41/1, 55300 Tekkeköy / Samsun
Tel: +90 362 266 51 60 • Fax: +90 362 266 51 62

Adana Fabrika / Adana Factory:
Acıdere OSB Mahallesi Abdullah Gül Bulvarı
123. Sokak No:15, Sarıçam / Adana
Tel: +90 322 503 04 60

info@samsunmakina.com.tr • www.samsunmakina.com.tr
export@samsunmakina.com.tr

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