



ACO Product catalogue

ACO PIPE® stainless steel pipework systems



Content

General introduction	page
<i>Introduction</i>	<i>3</i>
<i>Applications</i>	<i>3</i>
<i>Industrial segment</i>	<i>4</i>
<i>Key features & benefits</i>	<i>5</i>
<i>ACO PIPE® material information</i>	<i>6</i>
<i>Push-fit connection</i>	<i>6</i>
<i>Sound</i>	<i>6</i>
<i>Fire resistance</i>	<i>7</i>
<i>Certification</i>	<i>7</i>
<i>Transport and handling</i>	<i>7</i>
System overview	
<i>Characteristics</i>	<i>8</i>
<i>ACO system of building drainage</i>	<i>8</i>
<i>ACO PIPE® component overview</i>	<i>9</i>
Part numbers – family range	
<i>Part numbers – family range</i>	<i>12</i>
Flow rates and operating pressure	
<i>Flow rates</i>	<i>51</i>
<i>Operating pressure</i>	<i>54</i>
Installation guide	
<i>Installation guide</i>	<i>54</i>
ACO PIPE® material information	
<i>Pipe material information</i>	<i>56</i>
<i>Sealing material information</i>	<i>57</i>
Care and maintenance	
<i>Care and maintenance</i>	<i>58</i>
References	
<i>References</i>	<i>60</i>

General introduction

Introduction

ACO PIPE® is reliable, lightweight and durable push-fit pipe work system, designed, produced and tested for soil, waste, rainwater and industrial wastewater drainage applications. Together with the other products of ACO Group it creates a perfect system and offers a sustainable drainage solution with unique advantages to the customers. Especially with the ACO gully and ACO's stainless steel channel systems provide a unique system for building drainage. The push-fit system ensures quick and easy assembly for a reliable installation for gravity and vacuum drainage.

All ACO PIPE® interconnecting seals and fittings incorporate a unique double sealing system providing a trouble-free, reliable sealing system – every time.

The wide range of fittings available utilizes advanced cold forming techniques, thereby reducing the manufacturing cost and minimizing the amount of welded components, to provide the ultimate in system reliability.

Stainless steel pipe systems are particularly suited to applications subject to thermal shock. Many types of clay and vitreous pipe systems are liable to crack when exposed to sudden temperature changes.



Applications

Typical applications for ACO PIPE® systems include:

Land applications in industrial segment and residential segment

Industrial segment applications

- Food industry
- Beverage industry
- Pharmaceutical industry
- Other industries

Residential segment applications

- Rain down
- Sanitary
- Below ground

Marine applications in new ships building and repairs focused on

- Cruise ships
- Ferries
- Super yachts
- Offshores

Segment of ACO PIPE® marine applications is covered by company ACO Marine and their materials (www.acomarine.com).

General introduction

Land applications – industrial segment

Industrial segment covers applications in food industry, beverage industry, pharmaceutical industry and sewage & water processing. Typical for all these applications are high requirements to resistance (water, chemicals, steam, heat), reliability and durability of products.

All elements of ACO PIPE® systems are precisely produced focusing on high resistance to aggressive environments. R&D centre and ACO company background, material processing on modern machinery and unique push-fit system ensure long service life and reliability. ACO as the expert in building drainage offers complex system of stainless steel drainage.



Industrial applications

Food industry

Food (meat)
Diary
Abattoirs
Sweets

Beverage industry

Beverage
Brewery
Spirits
Winery

Pharmaceutical

Pills/Pellets
Vaccine
Cosmetics
Hospitals

Other industries

Chemical
Petrochemical
Heavy industries
Paper mills
Desalination plants

Key features & benefits

ACO PIPE® stainless steel pipe work systems offer all the key features found in traditional metal rainwater, soil and waste systems but with the additional benefits unique to stainless steel material and the push-fit system.



Easy Installation

For connection of pipes within the ACO PIPE® systems our unique push-fit system is used. It allows very easy pipe connection on site without the use of special tools, or machines or equipment. Installation is therefore very quick and cost effective.



System solution

More than 1,500 different types are available (straight pipes, bends, branches, diameter increasers and reducer's) together with a wide range of accessories this creates a complex and complete system for pipe works construction – the ACO PIPE® systems.



Certification

ACO PIPE® stainless steel pipe work systems are designed, manufactured, tested and checked under all required standards. Pipe systems are tested for pressure, vacuum, noise, fire and tightness. ACO has for ACO PIPE® systems all important certificates to declare production quality, product resistance and conformity upon request.



Durability

The use of modern technologies, high quality materials and outstanding surface treatment processes ensure that our products are highly resistant to external environmental influences. The expected service life cycle exceeds 50 years.



Hygiene

Smooth welding, surface quality and full pickle-passivation of all stainless steel products within the ACO PIPE® systems ensure the prevention of corrosion and allows easy cleaning.



ACO PIPE® material information

ACO PIPE® stainless steel pipe work systems are manufactured from austenitic stainless steel in grades 304 and 316. All products are chemically pickled and passivated for optimum durability and corrosion resistance.

Surface treatment by means of electropolishing or warrishing is available. Recognized for long service and its easily cleaned characteristics, stainless steel's hard, smooth surface provides efficient flow for water and waste products.

ACO PIPE® sockets are fitted with EPDM seals as standard for regular drainage applications above and below ground. For particularly aggressive chemical applications, 316 grade stainless steel with Viton® seals can be specific for the ultimate in system security.

Push-fit connection

Very reliable for vacuum and gravity piping system.

ACO PIPE® double lip seal secure for the ultimate system reliability. Unique and sophisticated design of the lips and cavities gives ACO PIPE® full tight construction.

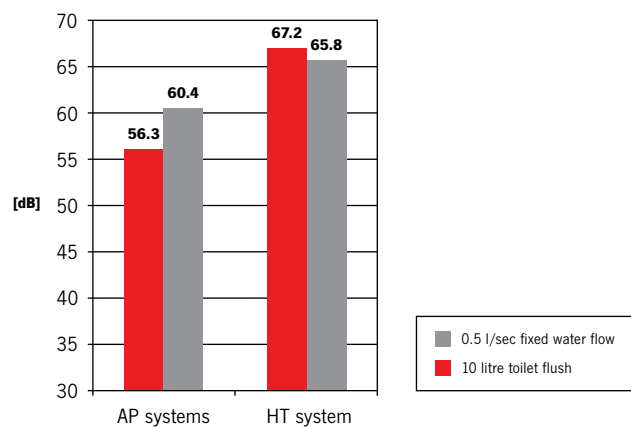
Push-fit advantages

- Easy to assemble
- Time saving
- Cost saving
- Tight connection



Sound

- Comparison of two pipe work systems
 - ACO PIPE® – DN 110
 - HT system – DN 110
 - Simulation of water fall from 1st floor through ground floor to basement of house
- SS has better results in comparison with cast iron comparable to all other materials



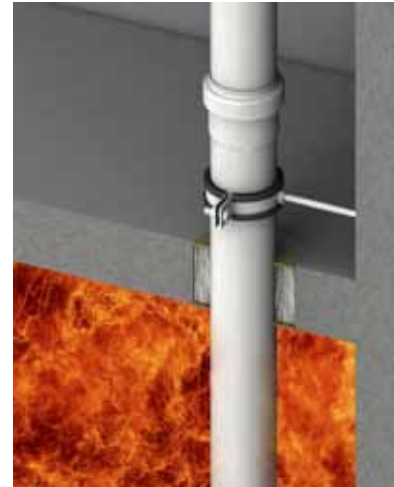
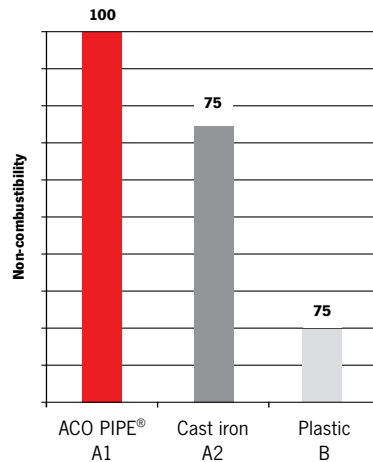
Fire resistance

ACO PIPE® push-fit system is classified and certified as non-combustible product (as it is manufactured in compliance to EN 1124, part 1 & part 2). That standard classifies the ACO PIPE® systems as class A1 fire resistant (highest rating).

ACO PIPE® systems are certified also by SITAC authority as fire resistant (cert. no. 0410-01).

Special certificate of fire resistance for coated pipes (no. CSI PK-08-027) is available

Fire certificates from marine authorities (DNV, ABS) available



- Non combustible
- No additional fire collars needed at installation
- No toxic fumes emitted in case of fire
- EN 1124, SITAC, CSI, DNV and ABS fire certification available

Standards & certificates

Reference standards

ACO PIPE® stainless steel pipe work systems are designed, manufactured, tested and checked under the standards EN 1124-1 and EN 1124-2 Pipes and fittings of longitudinally welded stainless steel pipes with spigot and socket for waste water systems.

The following standards will assist the designer to select the correct size of pipe system for the particular application.

EN 12056 gravity drainage systems Inside buildings.
EN 752 drain and sewer systems outside buildings.

Testing

ACO PIPE® stainless steel pipe systems are tested for the following points:

- Pressure & vacuum
- Noise
- Fire
- Tightness

Certificates quality & approval:

- ISO 9001
- ABS
- DNV
- Lloyd's Register
- SZÚ
- Bureau Veritas
- ETA
- Watermark

Resistance:

- Sitac
- CSI



Transport & handling

ACO PIPE® straight pipes are packed on pallets with wood frame and inserts, protected by cardboard and stretch foil. Fittings are packed in cardboard boxes and stacked on pallets. It is strongly recommended to transport and store the pipes and fittings in their original

packaging to avoid their damage. Pipes should be stored and supported on a flat surface to avoid deformation.

Handle the pipes and fittings with care. Any care less handling (like dragging along

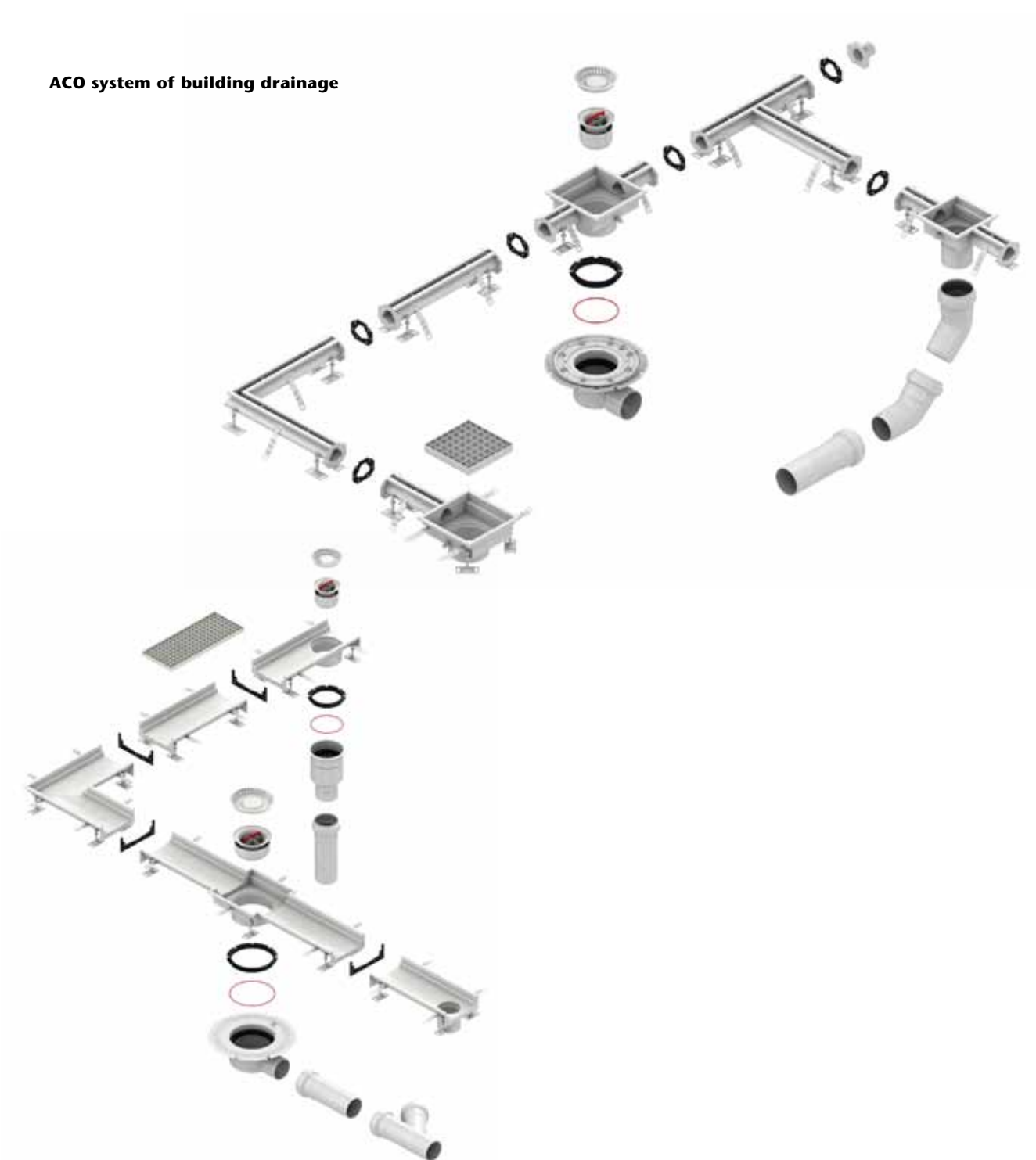
the ground, dumping off the truck...) can cause deformation or damage to pipes. Contact with carbon steel can cause corrosion on the stainless steel.

Characteristics

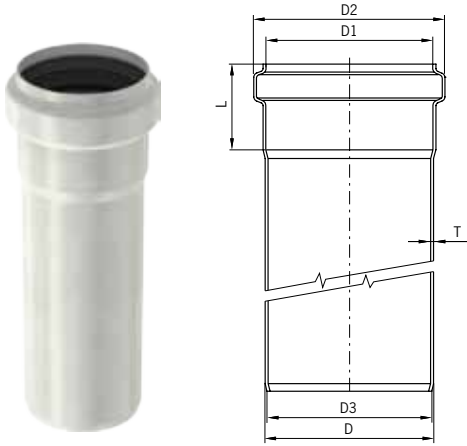
ACO PIPE® is ideal system for gray and black water, rainwater and industrial waste water drainage applications. Especially with the ACO gully and ACO stainless steel channel systems provide unique complex system for building drainage solution.

ACO PIPE® stainless steel pipes and fittings are available in 50 mm, 75 mm, 110 mm, 125 mm, 160 mm and 200 mm external diameters with the standard lengths from 0.15 meter up to 6 meter for optimum practicality and ease of assembly.

ACO system of building drainage



ACO PIPE® component overview



Dimensions of socket and spigot

D [mm]	D ₁ [mm]	D ₂ [mm]	D ₃ [mm]	Socket length L [mm]	Wall thickness T [mm]
50	51	62.0	47	42	1
75	76	87.5	72	50	1
110	111	125.5	107	57	1
125	126	141.0	122	63	1
160	161	178.0	156	70	1.25
200	201	219.0	195	80	1.5

Table 1

ACO PIPE® component overview

Socketed pipes	Page 12	Bends	Page 24	Single branches	Page 27
					
Double branches		Page 29		Double branch reductions	
					
Swept single branches		Page 34		"P" traps	
					

Couplings	Page 35	Connectors	Page 38	Access units	Page 42
					
Rat-stop pipes	Page 43	Socket plugs	Page 44	Socket clamps	Page 45
					
		Vent cowl	Page 45	Seals	Page 46
					

Features

- Pipes and fittings are available in 50 mm, 75 mm, 110 mm, 125 mm, 160 mm and 200 mm external diameters
- Lengths from 0.15 meter up to 6 meter
- Available in 304 (1.4301) and 316 (1.4404) grades to stainless steel
- Push-fit system for quick assembly
- Fully comply to EN 1124-1 and EN 1124-2
- EPDM and Viton® seals available
- Fully pickle passivated
- Certifications: ISO 9001, ABS, DNV, Lloyd's Register, SZÚ, Bureau Veritas, ETA, Sitac, CSI



AP socketed pipe 50 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	150	0.2	98500	98550
	50	250	0.4	98502	98552
	50	500	0.7	98504	98554
	50	750	1.0	98506	98556
	50	1000	1.3	98508	98558
	50	1500	1.9	98510	98560
	50	2000	2.6	98512	98562
	50	2500	3.2	419274	419282
	50	3000	3.8	98514	98564
	50	4000	5.0	419458	419482
	50	5000	6.3	419466	419490
Viton	50	6000	7.5	419474	419498
	50	150	0.2	98501	98551
	50	250	0.4	98503	98553
	50	500	0.7	98505	98555
	50	750	1.0	98507	98557
	50	1000	1.3	98509	98559
	50	1500	1.9	98511	98561
	50	2000	2.6	98513	98563
	50	2500	3.2	419275	419283
	50	3000	3.8	98515	98565
	50	4000	5.0	419459	419483
	50	5000	6.3	419467	419491
	50	6000	7.5	419475	419499

Table 2



AP socketed pipe 75 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	75	150	0.4	98516	98566
	75	250	0.6	98518	98568
	75	500	1.0	98520	98570
	75	750	1.5	98522	98572
	75	1000	2.0	98524	98574
	75	1500	2.9	98526	98576
	75	2000	3.6	98528	98578
	75	2500	4.8	419276	419284
	75	3000	5.7	98530	98580
	75	4000	7.6	419460	419484
	75	5000	9.4	419468	419492
Viton	75	6000	11.3	419476	419500
	75	150	0.4	98517	98567
	75	250	0.6	98519	98569
	75	500	1.0	98521	98571
	75	750	1.5	98523	98573
	75	1000	2.0	98525	98575
	75	1500	2.9	98527	98577
	75	2000	3.6	98529	98579
	75	2500	4.8	419277	419285
	75	3000	5.7	98531	98581
	75	4000	7.6	419461	419485
	75	5000	9.4	419469	419493
	75	6000	11.3	419477	419501

Table 3



AP socketed pipe 110 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	110	150	0.6	98532	98582
	110	250	0.9	98534	98584
	110	500	1.5	98536	98586
	110	750	2.2	98538	98588
	110	1000	2.9	98540	98590
	110	1500	4.3	98542	98592
	110	2000	5.7	98544	98594
	110	2500	7.1	419278	419286
	110	3000	8.4	98546	98596
	110	4000	11.1	419462	419486
	110	5000	13.9	419470	419494
Viton	110	6000	16.7	419478	419502
	110	150	0.6	98533	98583
	110	250	0.9	98535	98585
	110	500	1.5	98537	98587
	110	750	2.2	98539	98589
	110	1000	2.9	98541	98591
	110	1500	4.3	98543	98593
	110	2000	5.7	98545	98595
	110	2500	7.1	419279	419287
	110	3000	8.4	98547	98597
	110	4000	11.1	419463	419487
	110	5000	13.9	419471	419495
	110	6000	16.7	419479	419503

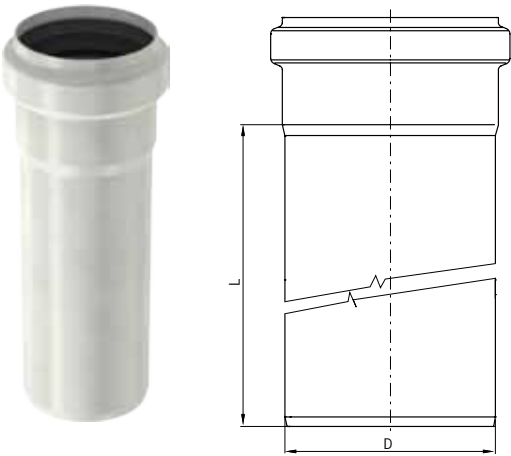
Table 4



AP socketed pipe 125 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	125	150	0.7	419692	419712
	125	250	1.0	419694	419714
	125	500	1.7	419696	419716
	125	750	2.5	419698	419718
	125	1000	3.3	419700	419720
	125	1500	4.9	419702	419722
	125	2000	6.5	419704	419724
	125	2500	8.1	419708	419728
	125	3000	9.6	419706	419726
Viton	125	6000	19.0	419710	419730
	125	150	0.7	419693	419713
	125	250	1.0	419695	419715
	125	500	1.7	419697	419717
	125	750	2.5	419699	419719
	125	1000	3.3	419701	419721
	125	1500	4.9	419703	419723
	125	2000	6.5	419705	419725
	125	2500	8.1	419709	419729
	125	3000	9.6	419707	419727
	125	6000	19.0	419711	419731

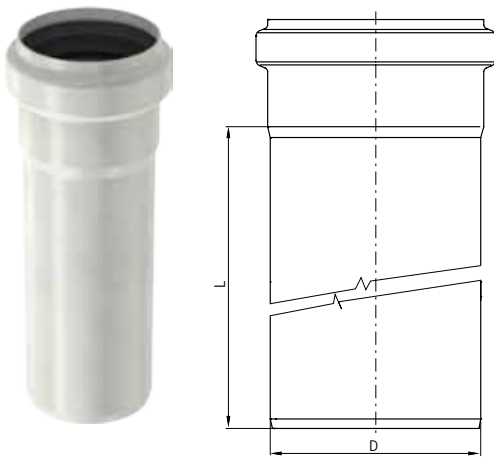
Table 5



AP socketed pipe 160 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	160	150	1.1	98548	98598
	160	250	1.6	98600	98650
	160	500	2.9	98602	98652
	160	750	4.1	98604	98654
	160	1000	5.4	98606	98656
	160	1500	7.9	98608	98658
	160	2000	10.4	98610	98660
	160	2500	12.9	419280	419288
	160	3000	15.4	98612	98662
	160	4000	20.4	419464	419488
	160	5000	25.4	419472	419496
Viton	160	6000	30.4	419480	419504
	160	150	1.1	98549	98599
	160	250	1.6	98601	98651
	160	500	2.9	98603	98653
	160	750	4.1	98605	98655
	160	1000	5.4	98607	98657
	160	1500	7.9	98609	98659
	160	2000	10.4	98611	98661
	160	2500	12.9	419281	419289
	160	3000	15.4	98613	98663
	160	4000	20.4	419465	419489
	160	5000	25.4	419473	419497
	160	6000	30.4	419481	419505

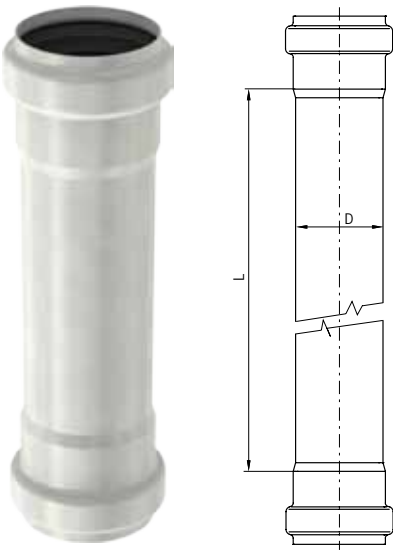
Table 6



AP socketed pipe 200 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	200	500	4.5	419383	419384
	200	1000	8.3	419387	419388
	200	2000	15.8	419391	419392
	200	3000	23.2	419395	419396
Viton	200	500	4.5	419385	419386
	200	1000	8.3	419389	419390
	200	2000	15.8	419393	419394
	200	3000	23.2	419397	419398

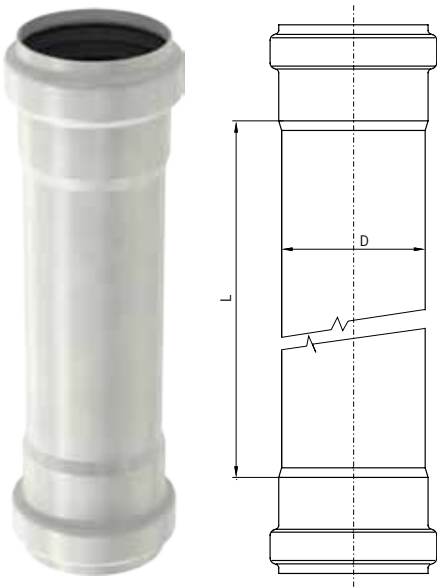
Table 7



AP double socketed pipe 50 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	250	0.4	419554	419594
	50	500	0.7	419556	419596
	50	750	1.1	419558	419598
	50	1000	1.4	419560	419600
	50	1500	2.0	419562	419602
	50	2000	2.6	419564	419604
	50	3000	3.9	419566	419606
Viton	50	250	0.4	419555	419595
	50	500	0.7	419557	419597
	50	750	1.1	419559	419599
	50	1000	1.4	419561	419601
	50	1500	2.0	419563	419603
	50	2000	2.6	419565	419605
	50	3000	3.9	419567	419607

Table 8



AP double socketed pipe 75 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	75	250	0.7	419568	419608
	75	500	1.2	419570	419610
	75	750	1.6	419572	419612
	75	1000	2.1	419574	419614
	75	1500	3.0	419576	419616
	75	2000	4.0	419578	419618
	75	3000	5.8	419580	419620
Viton	75	250	0.7	419569	419609
	75	500	1.2	419571	419611
	75	750	1.6	419573	419613
	75	1000	2.1	419575	419615
	75	1500	3.0	419577	419617
	75	2000	4.0	419579	419619
	75	3000	5.8	419581	419621

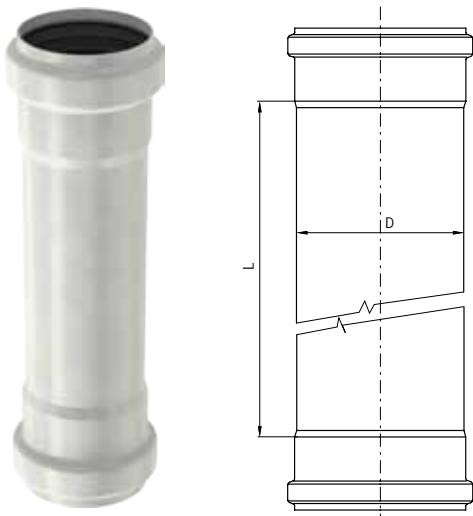
Table 9



AP double socketed pipe 110 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	110	500	1.7	419582	419622
	110	750	2.4	419584	419624
	110	1000	3.0	419586	419626
	110	1500	4.4	419588	419628
	110	2000	5.7	419590	419630
	110	3000	8.4	419592	419632
Viton	110	500	1.7	419583	419623
	110	750	2.4	419585	419625
	110	1000	3.0	419587	419627
	110	1500	4.4	419589	419629
	110	2000	5.7	419591	419631
	110	3000	8.4	419593	419633

Table 10



AP double socketed pipe 125 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	125	500	1.7	419787	419799
	125	750	2.5	419789	419801
	125	1000	3.3	419791	419803
	125	1500	4.9	419793	419805
	125	2000	6.5	419795	419807
	125	3000	9.6	419797	419809
Viton	125	500	1.7	419788	419800
	125	750	2.5	419790	419802
	125	1000	3.3	419792	419804
	125	1500	4.9	419794	419806
	125	2000	6.5	419796	419808
	125	3000	9.6	419798	419810

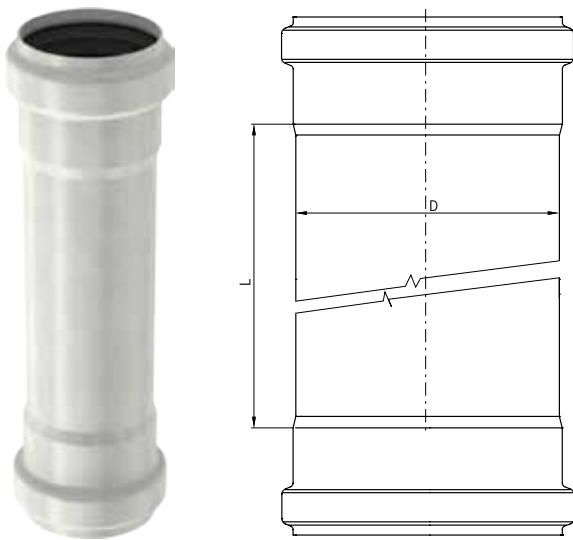
Table 11



AP double socketed pipe 160 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	160	500	3.3	419634	419646
	160	750	4.5	419636	419648
	160	1000	5.8	419638	419650
	160	1500	8.2	419640	419652
	160	2000	10.7	419642	419654
	160	3000	15.7	419644	419656
Viton	160	500	3.3	419635	419647
	160	750	4.5	419637	419649
	160	1000	5.8	419639	419651
	160	1500	8.2	419641	419653
	160	2000	10.7	419643	419655
	160	3000	15.7	419645	419657

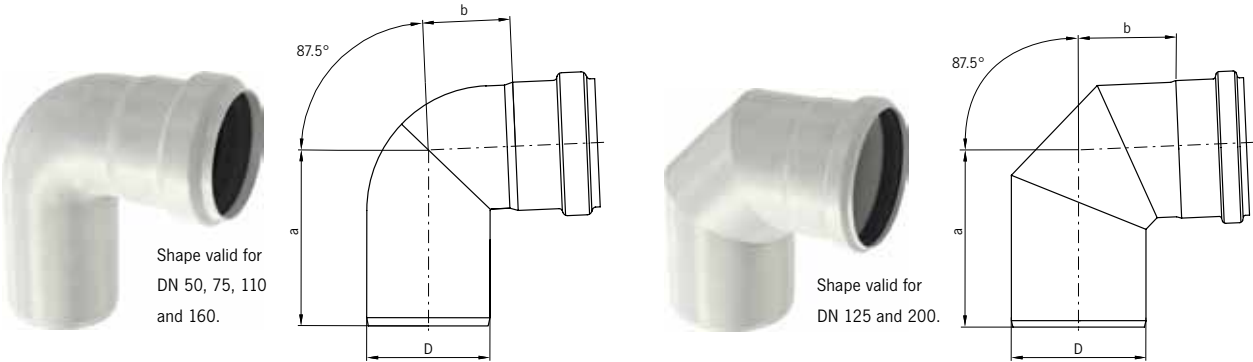
Table 12



AP double socketed pipe 200 mm

Seal material	D [mm]	Active length L [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	200	500	5.0	419658	419659
	200	1000	8.6	419662	419663
	200	2000	15.9	419666	419667
	200	3000	23.1	419670	419671
Viton	200	500	5.0	419660	419661
	200	1000	8.6	419664	419665
	200	2000	15.9	419668	419669
	200	3000	23.1	419672	419673

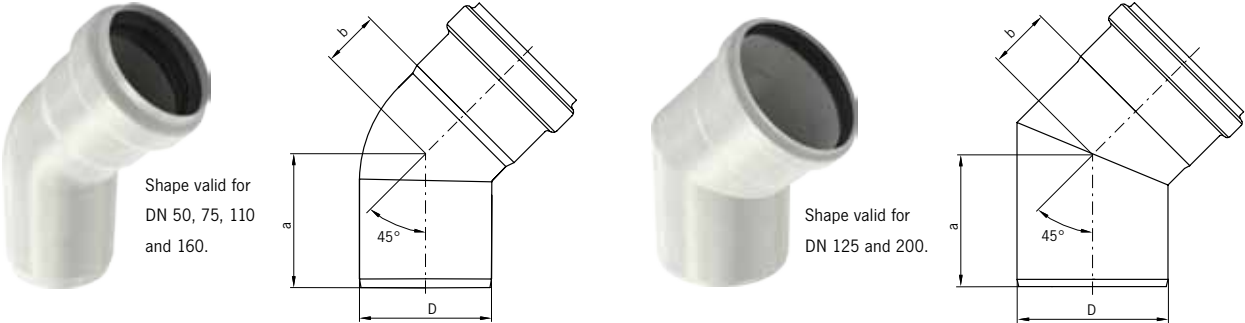
Table 13



AP bend 87.5°

Seal material	D [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	86	40	0.2	98700	98750
	75	107	53	0.4	98702	98752
	110	134	67	0.7	98704	98754
	125	161	93	0.8	419732	419734
	160	181	105	1.7	98706	98756
	200	215	129	3.9	419411	419413
Viton	50	86	40	0.2	98701	98751
	75	107	53	0.4	98703	98753
	110	134	67	0.7	98705	98755
	125	161	93	0.8	419733	419735
	160	181	105	1.7	98707	98757
	200	215	129	3.9	419412	419414

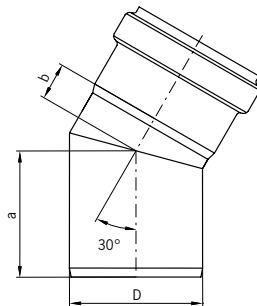
Table 14



AP bend 45°

Seal material	D [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	62	24	0.2	98708	98758
	75	76	32	0.3	98710	98760
	110	93	42	0.5	98712	98762
	125	110	50	0.6	419736	419738
	160	131	55	1.3	98714	98764
	200	152	60	2.7	419407	419409
Viton	50	62	24	0.2	98709	98759
	75	76	32	0.3	98711	98761
	110	93	42	0.5	98713	98763
	125	110	50	0.6	419737	419739
	160	131	55	1.3	98715	98765
	200	152	60	2.7	419408	419410

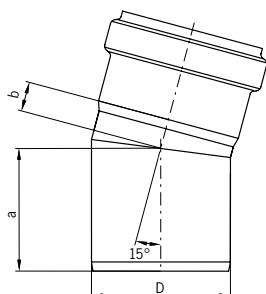
Table 15



AP bend 30°

Seal material	D [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	57	16	0.2	98716	98766
	75	71	21	0.3	98718	98768
	110	85	27	0.5	98720	98770
	125	98	28	0.6	419740	419742
	160	110	40	1.2	98722	98772
Viton	200	137	45	2.3	419403	419405
	50	57	16	0.2	98717	98767
	75	71	21	0.3	98719	98769
	110	85	27	0.5	98721	98771
	125	98	28	0.6	419741	419743
	160	110	40	1.2	98723	98773
	200	137	45	2.3	419404	419406

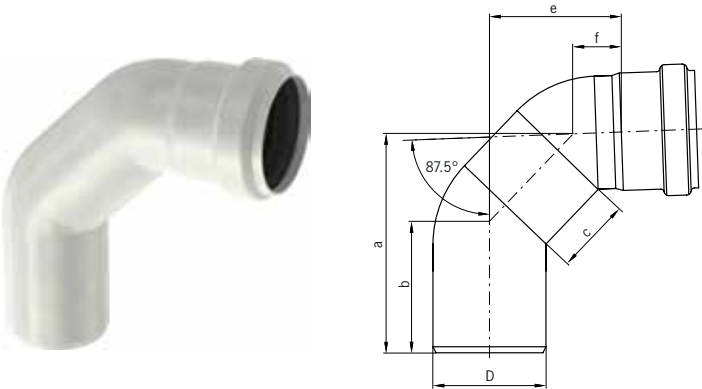
Table 16



AP bend 15°

Seal material	D [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	54	12	0.1	98724	98774
	75	66	16	0.3	98726	98776
	110	78	15	0.4	98728	98778
	125	84	19	0.5	419744	419746
	160	99	29	1.0	98730	98780
	200	123	31	1.9	419399	419401
Viton	50	54	12	0.1	98725	98775
	75	66	16	0.3	98727	98777
	110	78	15	0.4	98729	98779
	125	84	19	0.5	419745	419747
	160	99	29	1.0	98731	98781
	200	123	31	1.9	419400	419402

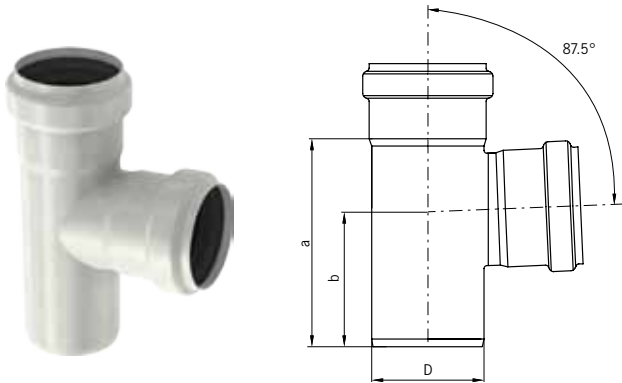
Table 17



AP long bend 87.5°

Seal material	D [mm]	a [mm]	b [mm]	c [mm]	e [mm]	f [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	123	71	50	75	25	0.3	419146	419000
	75	146	87	50	88	32	0.5	419148	419002
	110	175	103	250	103	39	1.4	419150	419004
	160	222	126	250	183	92	2.2	419152	419144
Viton	50	123	71	50	75	25	0.3	419147	419001
	75	146	87	50	88	32	0.5	419149	419003
	110	175	103	250	103	39	1.4	419151	419005
	160	222	126	250	183	92	2.2	419153	419145

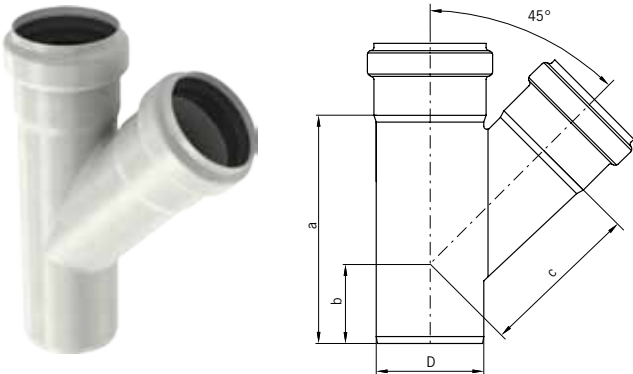
Table 18



AP single branch 87.5°

Seal material	D [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	106	71	0.3	98732	98782
	75	139	90	0.5	98734	98784
	110	183	117	0.8	98736	98786
	125	220	135	0.9	419748	419750
	160	288	184	2.3	98738	98788
	200	333	206	4.5	419419	419421
Viton	50	106	71	0.3	98733	98783
	75	139	90	0.5	98735	98785
	110	183	117	0.8	98737	98787
	125	220	135	0.9	419749	419751
	160	288	184	2.3	98739	98789
	200	333	206	4.5	419420	419422

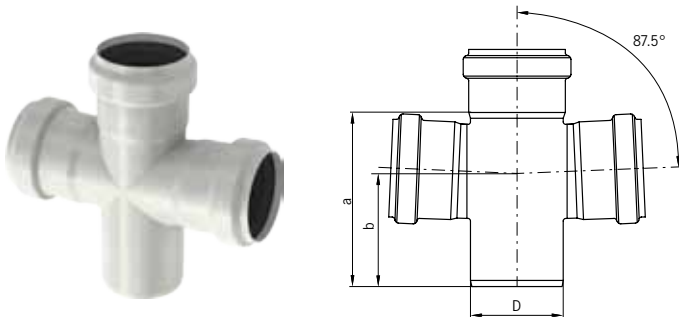
Table 19



AP single branch 45°

Seal material	D [mm]	a [mm]	b [mm]	c [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	128	57	76	0.3	98748	98798
	75	179	74	110	0.5	98800	98850
	110	233	88	149	1.0	98802	98852
	125	273	103	170	1.1	419760	419762
	160	332	119	222	2.6	98804	98854
	200	415	151	274	5.7	419427	419429
Viton	50	128	57	76	0.3	98749	98799
	75	179	74	110	0.5	98801	98851
	110	233	88	149	1.0	98803	98853
	125	273	103	170	1.1	419761	419763
	160	332	119	222	2.6	98805	98855
	200	415	151	274	5.7	419428	419430

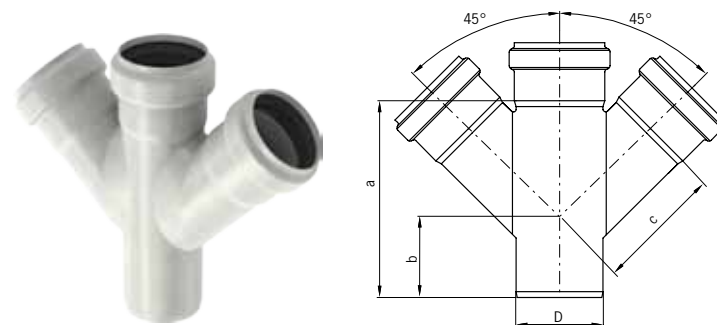
Table 20



AP double branch 87.5°

Seal material	D [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	106	71	0.3	98740	98790
	75	139	90	0.6	98742	98792
	110	183	117	0.9	98744	98794
	160	288	184	2.7	98746	98796
Viton	50	106	71	0.3	98741	98791
	75	139	90	0.6	98743	98793
	110	183	117	0.9	98745	98795
	160	288	184	2.7	98747	98797

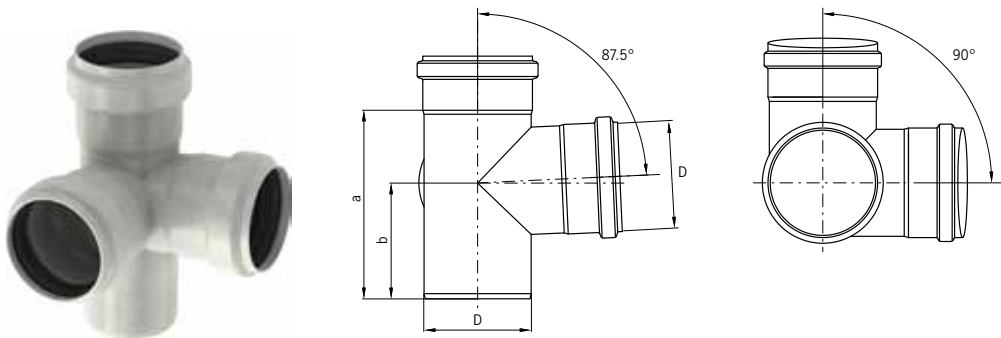
Table 21



AP double branch 45°

Seal material	D [mm]	a [mm]	b [mm]	c [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	128	57	76	0.4	98806	98856
	75	179	74	110	0.7	98808	98858
	110	233	88	149	1.2	98810	98860
	160	332	184	222	3.5	98812	98862
Viton	50	128	57	76	0.4	98807	98857
	75	179	74	110	0.7	98809	98859
	110	233	88	149	1.2	98811	98861
	160	332	184	222	3.5	98813	98863

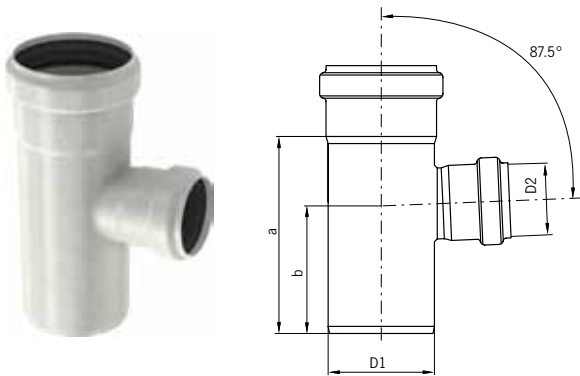
Table 22



AP corner branch 87.5°

Seal material	D [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	106	71	0.4	419162	419210
	75	139	90	0.7	419164	419212
	110	183	117	1.1	419166	419214
	125	220	135	1.6	417020	417021
	160	288	184	2.9	419168	419216
Viton	50	106	71	0.4	419163	419211
	75	139	90	0.7	419165	419213
	110	183	117	1.1	419167	419215
	125	220	135	1.6	417054	417055
	160	288	184	2.9	419169	419217

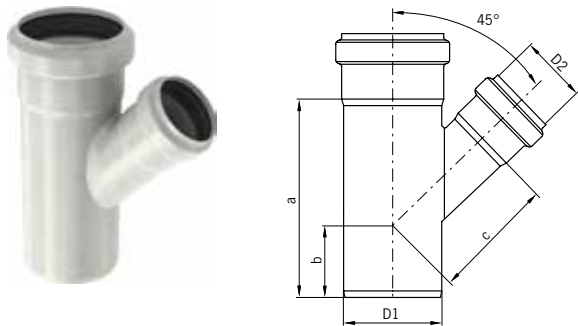
Table 23



AP single branch reduction 87.5°

Seal material	D1 [mm]	D2 [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	75	50	139	90	0.3	98928	98930
	110	50	183	117	0.5	98932	98934
	110	75	183	117	0.8	98936	98938
	125	75	187	110	0.9	419752	419754
	125	110	205	127	0.9	419756	419758
	160	110	288	184	2.3	400691	400693
	200	160	293	186	3.7	419415	419417
Viton	75	50	139	90	0.3	98929	98931
	110	50	183	117	0.5	98933	98935
	110	75	183	117	0.8	98937	98939
	125	75	187	110	0.9	419753	419755
	125	110	205	127	0.9	419757	419759
	160	110	288	184	2.3	400692	400694
	200	160	293	186	3.7	419416	419418

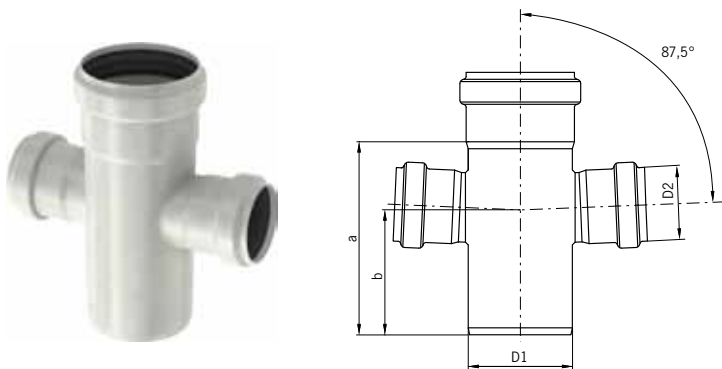
Table 24



AP single branch reduction 45°

Seal material	D1 [mm]	D2 [mm]	a [mm]	b [mm]	c [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	75	50	144	56	94	0.3	400661	400663
	110	50	147	42	119	0.5	400665	400667
	110	75	182	60	135	1.0	400669	400671
	125	75	200	65	141	1.1	419764	419766
	125	110	250	90	160	1.1	419768	419770
	160	110	332	119	191	2.6	400699	400701
Viton	200	160	359	123	250	4.7	419423	419425
	75	50	144	56	94	0.3	400662	400664
	110	50	147	42	119	0.5	400666	400668
	110	75	182	60	135	1.0	400670	400672
	125	75	200	65	141	1.1	419765	419767
	125	110	250	90	160	1.1	419769	419771
	160	110	332	119	191	2.6	400700	400702
	200	160	359	123	250	4.7	419424	419426

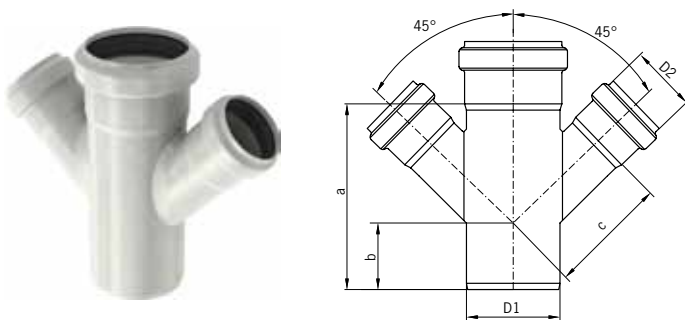
Table 25



AP double branch reduction 87.5°

Seal material	D1 [mm]	D2 [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	75	50	139	90	0.3	98940	98942
	110	50	183	117	0.6	98944	98946
	110	75	183	117	0.9	98900	98902
	160	110	288	184	2.7	400695	400697
Viton	75	50	139	90	0.3	98941	98943
	110	50	183	117	0.6	98945	98947
	110	75	183	117	0.9	98901	98903
	160	110	288	184	2.7	400696	400698

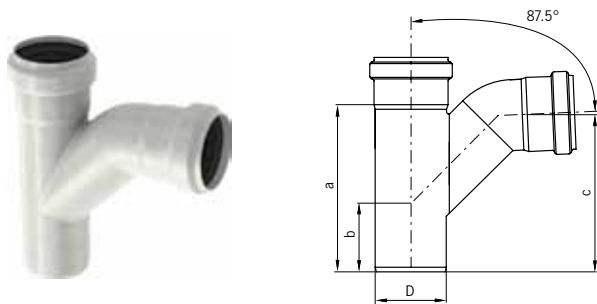
Table 26



AP double branch reduction 45°

Seal material	D1 [mm]	D2 [mm]	a [mm]	b [mm]	c [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	75	50	144	56	94	0.4	400673	400675
	110	50	147	42	119	0.7	400677	400679
	110	75	182	60	135	1.2	400681	400683
	160	110	332	119	190	3.5	400703	400705
Viton	75	50	144	56	94	0.4	400674	400676
	110	50	147	42	119	0.7	400678	400680
	110	75	182	60	135	1.2	400682	400684
	160	110	332	119	190	3.5	400704	400706

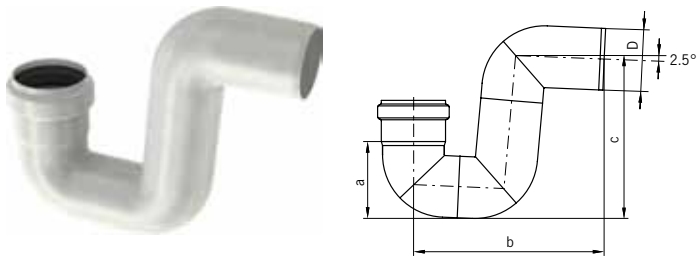
Table 27



AP swept single branch 87.5°

Seal material	D [mm]	a [mm]	b [mm]	c [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	128	57	117	0.3	98814	98864
	75	179	74	157	0.6	98816	98866
	110	233	88	209	1.1	98818	98868
	160	332	184	302	2.8	98820	98870
Viton	50	128	57	117	0.3	98815	98865
	75	179	74	157	0.6	98817	98867
	110	233	88	209	1.1	98819	98869
	160	332	184	302	2.8	98821	98871

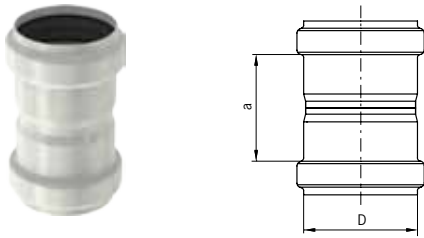
Table 28



AP “P” trap

Seal material	D [mm]	a [mm]	b [mm]	c [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	68	187	149	0.5	98822	98872
	75	94	232	193	0.7	98824	98874
	110	132	300	254	1.3	98826	98876
	160	190	403	347	3.3	98828	98878
Viton	50	68	187	149	0.5	98823	98873
	75	94	232	193	0.7	98825	98875
	110	132	300	254	1.3	98827	98877
	160	190	403	347	3.3	98829	98879

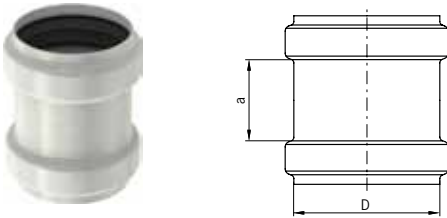
Table 29



AP straight coupling

Seal material	D [mm]	a [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	54	0.1	98920	98970
	75	75	0.2	98922	98972
	110	84	0.4	98924	98974
	125	140	0.4	419813	419815
	160	110	0.8	98926	98976
	200	136	1.8	419431	419433
Viton	50	54	0.1	98921	98971
	75	75	0.2	98923	98973
	110	84	0.4	98925	98975
	125	140	0.4	419814	419816
	160	110	0.8	98927	98977
	200	136	1.8	419432	419434

Table 30



AP repair coupling

Seal material	D [mm]	a [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	44	0.1	98830	98880
	75	46	0.2	98832	98882
	110	52	0.3	98834	98884
	125	70	0.3	419772	419774
	160	76	0.7	98836	98886
	200	100	1.5	419435	419437
Viton	50	44	0.1	98831	98881
	75	46	0.2	98833	98883
	110	52	0.3	98835	98885
	125	70	0.3	419773	419775
	160	76	0.7	98837	98887
	200	100	1.5	419436	419438

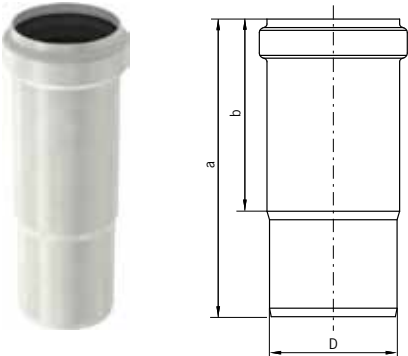
Table 31

Note:

Repair couplings are used to aid a convenient repair to a damaged in-situ pipe. Unlike the standard straight coupling, there is no central registration to limit the insertion depth of the pipe. The repair coupling slides completely over a pipe joint and simply re-positioned to bridge the required pipe joint.

Installation tip:

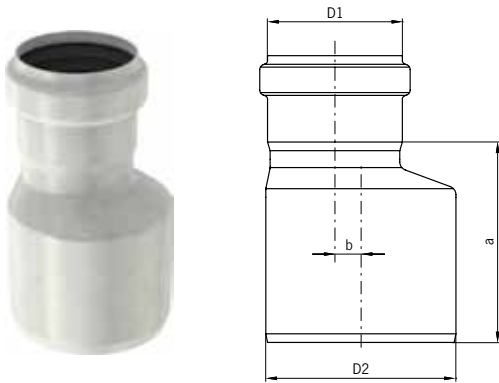
Mark the final position of the repair coupling on the installed pipe system to ensure the coupling seals are positioned symmetrically about the pipe joint.



AP expansion socket

Seal material	D [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	50	159	102	0.2	98664	98666
	75	175	113	0.3	98668	98670
	110	200	121	0.5	98672	98674
	125	250	165	0.6	419776	419778
	160	292	170	1.4	98676	98678
Viton	50	159	102	0.2	98665	98667
	75	175	113	0.3	98669	98671
	110	200	121	0.5	98673	98675
	125	250	165	0.6	419777	419779
	160	292	170	1.4	98677	98679

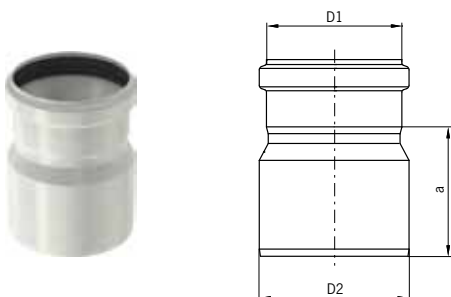
Table 32



AP eccentric increaser coupling

Seal material	D1 [mm]	D2 [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 316
EPDM	50	75	88	7	0.3	98892
	50	110	103	25	0.4	98978
	75	110	116	15	0.5	98894
	110	160	136	22	1.1	98896
Viton	50	75	88	7	0.3	98893
	50	110	103	25	0.4	98979
	75	110	116	15	0.5	98895
	110	160	136	22	1.1	98897

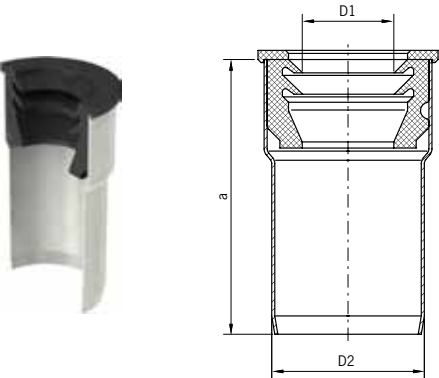
Table 33



AP concentric increaser coupling

Seal material	D1 [mm]	D2 [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 316
EPDM	110	125	107	0	0.6	419780
	125	160	113	0	1.2	419811
	160	200	170	0	1.8	419441
Viton	110	125	107	0	0.6	419781
	125	160	113	0	1.2	419812
	160	200	170	0	1.8	419442

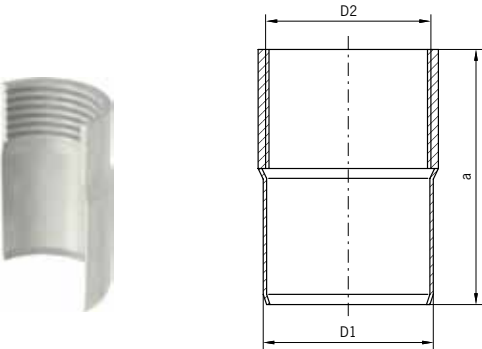
Table 34



AP increaser connector

Seal material	D1 [mm]	D2 [mm]	a [mm]	Weight [kg]	Order No. AISI 316
NBR	32	50	90	0.2	419373
NBR	40	50	90	0.2	419374

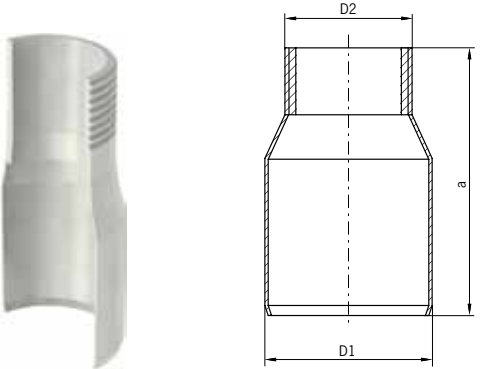
Table 35



AP connector with internal screw thread and spigot

D1 [mm]	D2	a [mm]	Weight [kg]	Order No. AISI 316
50	Rp 1¼"	72	0.2	98956
50	Rp 1½"	75	0.3	98957
50	Rp 2"	80	0.3	98958

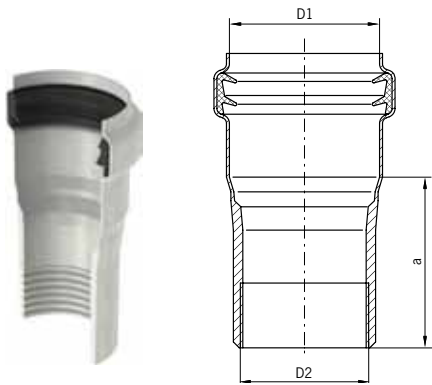
Table 36



AP connector with external screw thread and spigot

D1 [mm]	D2	a [mm]	Weight [kg]	Order No. AISI 316
50	Rp 1¼"	100	0.2	419330
50	Rp 1½"	100	0.3	419331
50	Rp 2"	100	0.3	419332

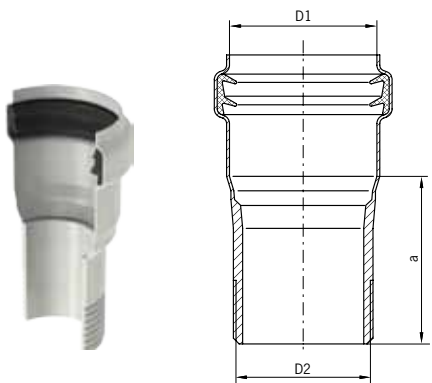
Table 37



AP connector with socket and external screw thread

Seal material	D1 [mm]	D2	a [mm]	Weight [kg]	Order No. AISI 316
EPDM	50	R 1¼"	58	0.2	419333
	50	R 1½"	58	0.3	419335
	50	R 2"	58	0.3	419337
Viton	50	R 1¼"	58	0.2	419334
	50	R 1½"	58	0.3	419336
	50	R 2"	58	0.3	419338

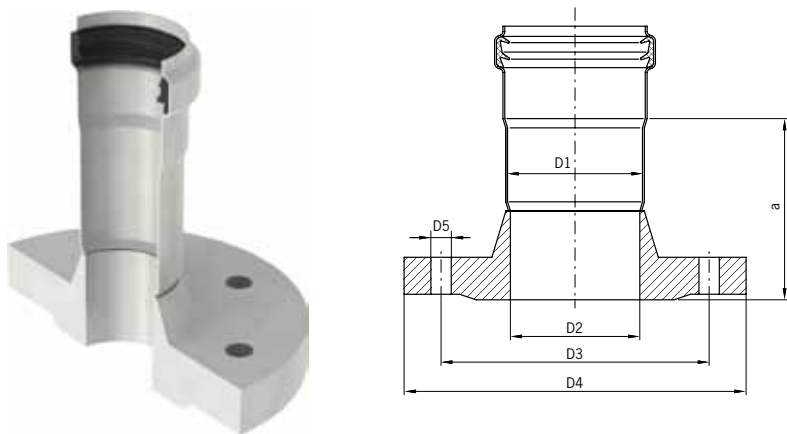
Table 38



AP connector with socket and external screw thread

Seal material	D1 [mm]	D2	a [mm]	Weight [kg]	Order No. AISI 316
EPDM	50	R 1¼"	58	0.2	419250
	50	R 1½"	58	0.3	419252
	50	R 2"	58	0.3	419254
Viton	50	R 1¼"	58	0.2	419251
	50	R 1½"	58	0.3	419253
	50	R 2"	58	0.3	419255

Table 39



AP connector with socket and flange

Seal material	D1 [mm]	D2	D3 [mm]	D4 [mm]	n × D5 [mm]	a [mm]	Weight [kg]	Order No. AISI 316
EPDM	50	DN 40	110	150	4 × 18	100	2.3	419256
	50	DN 50	125	165	4 × 18	100	2.7	419258
	75	DN 65	145	185	4 × 18	100	3.4	419260
	110	DN 100	180	220	8 × 18	100	4.9	419262
	200	DN 200	295	340	12 × 22	102	12.0	419514
Viton	50	DN 40	110	150	4 × 18	100	2.3	419257
	50	DN 50	125	165	4 × 18	100	2.7	419259
	75	DN 65	145	185	4 × 18	100	3.4	419261
	110	DN 100	180	220	8 × 18	100	4.9	419263
	200	DN 200	295	340	12 × 22	102	12.0	419515

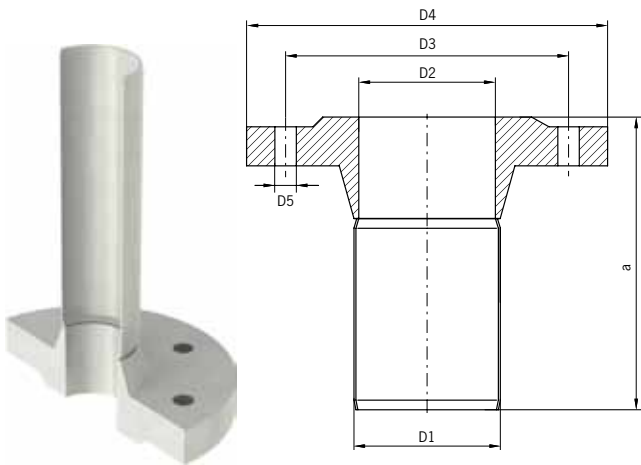
Table 40

Note:

n – number of holes for screws in the flange.

Flange PN 16 DIN 2633.

Flange PN 6 and PN 10 available on request.



AP connector with flange and spigot

D1 [mm]	D2	D3 [mm]	D4 [mm]	n × D5 [mm]	a [mm]	Weight [kg]	Order No. AISI 316
50	DN 40	110	150	4 × 18	192	2.3	419264
50	DN 50	125	165	4 × 18	192	2.7	419265
75	DN 65	145	185	4 × 18	245	3.4	419266
110	DN 100	180	220	8 × 18	259	4.9	419267
160	DN 150	240	285	8 × 22	200	8.5	419540
200	DN 200	295	240	12 × 22	240	12.3	419541

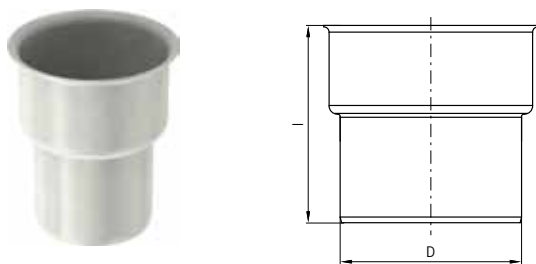
Table 41

Note:

n – number of holes for screws in the flange.

Flange PN 16 DIN 2633.

Flange PN 6 and PN 10 available on request.



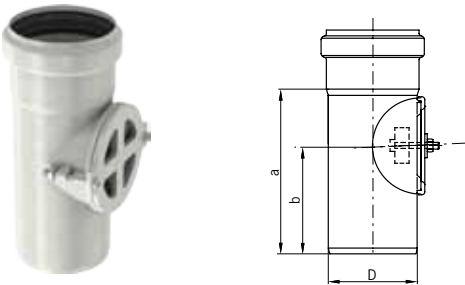
AP connector cast iron spigot → ACO PIPE® socket

D [mm]	l [mm]	Weight [kg]	Order No. AISI 316
75	121	0.4	98904
110	137	0.6	98906
160	174	1.0	98905

Table 42

Note:

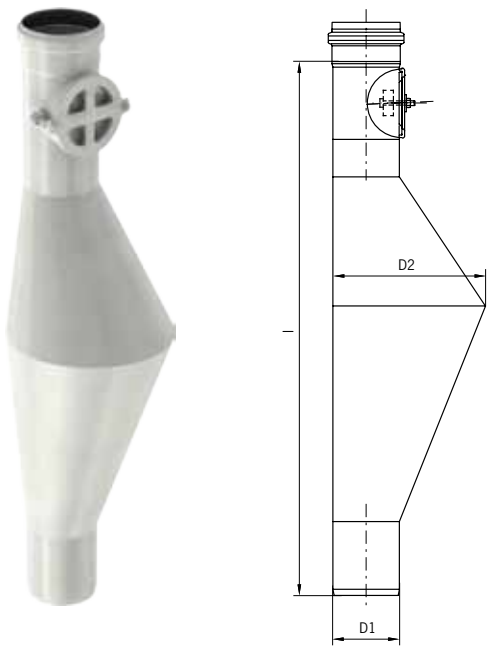
Set of reduction sealings cast Iron spigot → ACO PIPE® socket and ACO PIPE® spigot → cast iron socket.



AP access unit

Seal material	D [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	75	139	90	0.5	98913	98963
	110	183	117	0.8	98915	98965
	125	210	135	0.9	419783	419785
	160	288	184	2.3	98917	98967
	200	293	186	3.7	419676	419678
Viton	75	139	90	0.5	98914	98964
	110	183	117	0.8	98916	98966
	125	210	135	0.9	419784	419786
	160	288	184	2.3	98918	98968
	200	293	186	3.7	419677	419679

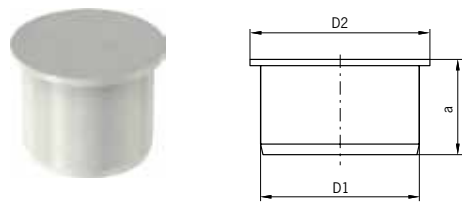
Table 43



AP rat-stop pipe

Seal material	D1 [mm]	D2 [mm]	I [mm]	Weight [kg]	Order No. AISI 304	Order No. AISI 316
EPDM	110	250	864	3.8	419268	419270
Viton	110	250	864	3.8	419269	419271

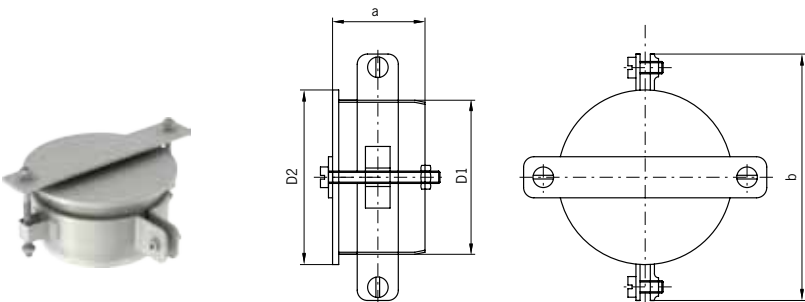
Table 44



AP socket plug

D1 [mm]	a [mm]	D2 [mm]	Weight [kg]	Order No. AISI 316
50	45	58	0.1	98888
75	45	85	0.3	98889
110	45	120	0.5	98890
125	50	135	0.6	419782
160	50	170	0.5	98891
200	50	210	1.0	98994

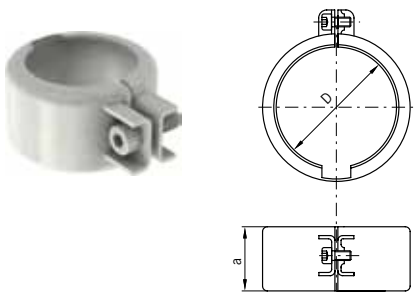
Table 45



AP socket plug with clamp

D1 [mm]	D2 [mm]	a [mm]	b [mm]	Weight [kg]	Order No. AISI 316
50	58	45	88	0.4	419138
75	85	45	120	0.6	419139
110	120	45	167	0.8	419140
160	170	50	214	1.1	419141

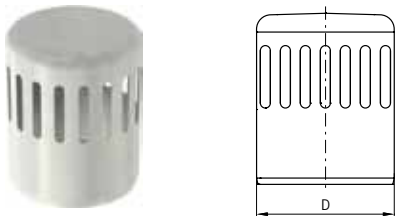
Table 46



AP socket clamp

D [mm]	a [mm]	Weight [kg]	Order No. AISI 316
50	40	0.1	419134
75	40	0.2	419135
110	43	0.3	419136
160	43	0.4	419137

Table 47



AP vent cowl

D [mm]	Weight [kg]	Order No. AISI 316
110	0.4	98962

Table 48



AP reduction sealing cast Iron spigot → ACO PIPE® socket

D	Weight [kg]	Order No. EPDM
DN 70/75	0.06	400580
DN 100/110	0.10	400581
DN 150/160	0.14	400582

Table 49

Note:

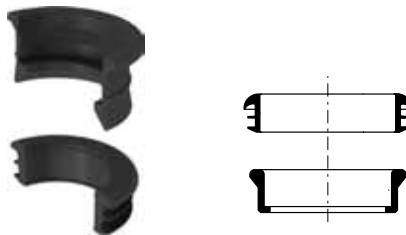
While purchasing AP reduction sealing cast iron spigot → ACO PIPE® it is necessary order AP cast iron connector.



AP reduction sealing ACO PIPE® spigot → cast iron socket

D	Weight [kg]	Order No. EPDM
DN 70/75	0.05	400586
DN 100/110	0.08	400587
DN 150/160	0.12	400588

Table 50



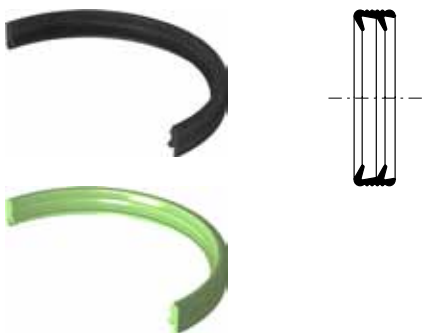
AP reduction sealing set for cast iron

D	Weight [kg]	Order No. EPDM
DN 70/75	0.11	419370
DN 100/110	0.18	419371
DN 150/160	0.26	419372

Table 51

Note:

Set of reduction sealings cast iron spigot → ACO PIPE® socket and ACO PIPE® spigot → cast iron socket.



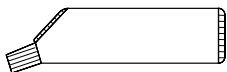
AP pipe seal

D [mm]	Weight [kg]	Order No. EDPM	Order No. Viton
50	0.01	98400	98404
75	0.02	98401	98405
110	0.05	98402	98406
125	0.06	419453	419454
160	0.08	98403	98407
200	0.10	98433	98437

Table 52

Note:

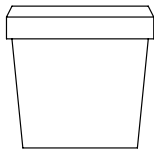
Spare ACO PIPE® seals in EPDM and Viton® grades are available for all pipe sizes. All seals incorporate the unique ACO PIPE® double lip seal arrangement for increased reliability and security. Both seal materials are mechanically interchangeable thereby facilitating easy on-site upgrade from EPDM to Viton®, for example. For seal installation instructions, refer to the Appendices. To aid identification, the seals are colour coded as follows: EPDM seals are BLACK. Viton® seals are GREEN.



ACO Universal Lubricant

Weight [kg]	Order No.
0.15	E80350000

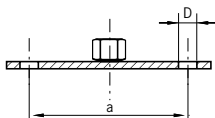
Table 53



ACO Universal Lubricant in bucket 1kg

Weight [kg]	Order No.
1.00	E80350001

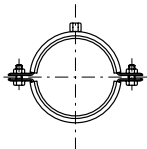
Table 54



AP socket plug

D [mm]	a [mm]	Weight [kg]	Order No. Galvanised steel	Order No. AISI 316
8.4	70	0.05	400525	400521

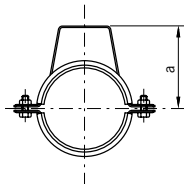
Table 55



AP support bracket with rubber infill

D [mm]	Weight [kg]	Order No. Galvanised steel	Order No. AISI 316
50	0.14	400533	400529
75	0.23	400534	400530
110	0.33	400535	400531
125	0.36	419854	419855
160	0.39	400536	400532
200	0.44	419451	419675

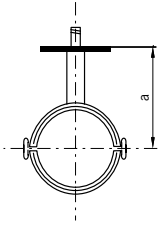
Table 56



AP support bracket with rubber infill and stirrup

D [mm]	a [mm]	Weight [kg]	Order No. Galvanised steel	Order No. AISI 316
50	56	0.18	400541	400537
75	80	0.28	400542	400538
110	116	0.41	400543	400539
160	166	0.48	400544	400540

Table 57



AP support bracket with rubber infill and key

D [mm]	a [mm]	Weight [kg]	Order No. Galvanised steel	Order No. AISI 316
50	120	0.16	400549	400545
75	133	0.26	400550	400546
110	150	0.38	400551	400547
160	175	0.44	400552	400548

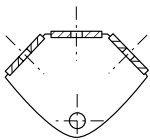
Table 58



AP threaded support pole M8

D	Lenght l [mm]	Weight [kg]	Order No. Galvanised steel	Order No. AISI 316
M8	1000	0.39	400557	400553
M8	90	0.03	400558	400554
M8	40	0.016	400559	400555

Table 59



AP set for axial fixing

Weight [kg]	Order No. Galvanised steel	Order No. AISI 316
0.11	400565	400561

Table 60

Note:

Six M8 nuts included.

**AP ACO PIPE® cutter manual 50–110 mm**

Note	Weight [kg]	Order No.
in plastic case	3.50	419363

Table 61

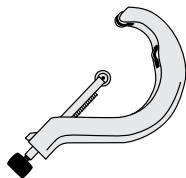
AP replacement discs for ACO PIPE® cutters manual

Note	Weight [kg]	Order No.
for cutter 419363	0.005	419365

Table 62

Note:

Minimum order quantity – 10 pcs..

**AP pipe manual cutter**

D [mm]	Weight [kg]	Order No.
50–110	1.0	419364
110–160	2.0	400738

Table 63

Note:

While purchasing AP manual cutter it is necessary order AP holder for manual cutting.

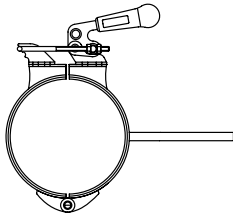
AP replacement discs for manual cutter disc

Note	Weight [kg]	Order No.
for cutter 400738 and 419364	0.005	400578

Table 64

Note:

Minimum order quantity – 10 pcs.



AP holder for manual cutting

D [mm]	Weight [kg]	Order No.
125	3.5	419857
160	4.0	400742

Table 65

Note:

While order AP holder for manual cutting it is necessary order AP manual cutter.

Full bore flow rate tables for varying gradients

For rainwater/storm drainage applications

Flow rates based on colebrook-white formula.

Roughness coefficient $k_s = 0.6$ mm (spreadsheet calculation only uses "pipe diameters", which are inside diameters)

Gradient [%]	Pipe Ø 50 mm		Pipe Ø 75 mm		Pipe Ø 110 mm		Pipe Ø 125 mm		Pipe Ø 160 mm		Pipe Ø 200 mm	
	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]
10.0	2.74	1.52	8.40	2.01	23.81	2.60	33.61	2.83	64.15	3.31	116.89	3.83
7.5	2.38	1.31	7.28	1.74	20.62	2.25	29.11	2.45	55.56	2.87	101.22	3.32
5.0	1.94	1.07	5.94	1.42	16.83	1.84	23.77	2.00	45.36	2.34	82.65	2.71
4.5	1.84	1.02	5.64	1.35	15.97	1.74	22.55	1.90	43.03	2.22	78.40	2.57
4.0	1.73	0.96	5.31	1.27	15.06	1.64	21.26	1.79	40.57	2.10	73.92	2.43
3.5	1.62	0.90	4.97	1.19	14.08	1.54	19.88	1.67	37.95	1.96	69.14	2.27
3.0	1.50	0.83	4.60	1.10	13.04	1.42	18.41	1.55	35.13	1.81	64.01	2.10
2.5	1.37	0.76	4.20	1.00	11.90	1.30	16.80	1.41	32.07	1.66	58.43	1.92
2.0	1.23	0.68	3.76	0.90	10.64	1.16	15.03	1.26	28.68	1.48	52.26	1.71
1.5	1.06	0.59	3.25	0.78	9.22	1.01	13.01	1.10	24.84	1.28	45.26	1.48
1.0	0.87	0.48	2.66	0.63	7.53	0.82	10.63	0.89	20.28	1.05	36.95	1.21

Table 66

The flow rates shown in the table 66 assume a free outlet from the pipe. For installations without a free outlet, the flow rate will be affected by the downstream throttle.

For shallow gradients, the colebrook-white formula underestimates flow rates (because when gradient tends towards zero %, velocity also tends to zero). For level or nearly level installations (slope < 1 %), spatially varied flow tables should be used; refer to the table 68.

Full bore flow rate tables for varying gradients

For soil/foul water drainage applications

Flow rates based on colebrook-white formula.

Roughness coefficient $k_s = 0.6$ mm (spreadsheet calculation only uses "pipe diameters", which are inside diameters).

	Pipe Ø 50 mm		Pipe Ø 75 mm		Pipe Ø 110 mm		Pipe Ø 125 mm		Pipe Ø 160 mm		Pipe Ø 200 mm	
Gradient [%]	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]	Flow rate Q [l/s]	Velocity v [m/s]
10.0	2.30	1.27	7.14	1.71	20.45	2.23	28.97	2.44	55.61	2.87	101.81	3.34
7.5	1.99	1.10	6.19	1.48	17.71	1.93	25.09	2.11	48.16	2.49	88.17	2.89
5.0	1.63	0.90	5.05	1.21	14.46	1.58	20.49	1.72	39.32	2.03	71.99	2.36
4.5	1.54	0.85	4.79	1.14	13.72	1.50	19.43	1.64	37.30	1.93	68.30	2.24
4.0	1.46	0.80	4.52	1.08	12.94	1.41	18.32	1.54	35.17	1.82	64.39	2.11
3.5	1.36	0.75	4.23	1.01	12.10	1.32	17.14	1.44	32.90	1.70	60.23	1.98
3.0	1.26	0.70	3.91	0.93	11.20	1.22	15.87	1.34	30.46	1.57	55.76	1.83
2.5	1.15	0.64	3.57	0.85	10.23	1.12	14.49	1.22	27.80	1.44	50.90	1.67
2.0	1.03	0.57	3.19	0.76	9.15	1.00	12.96	1.09	24.87	1.28	45.53	1.49
1.5	0.89	0.49	2.77	0.66	7.92	0.86	11.22	0.94	21.53	1.11	39.43	1.29
1.0	0.73	0.40	2.26	0.54	6.47	0.71	9.16	0.77	17.58	0.91	32.19	1.06

Table 67

The flow rates shown in the table 67 assume a free outlet from the pipe. For installations without a free outlet, the flow rate will be affected by the downstream throttle.

For shallow gradients, the colebrook-white formula underestimates flow rates (because when gradient tends towards zero %, velocity also tends to zero).

For level or nearly level installations (slope < 1 %), spatially varied flow tables should be used; refer to the table 68.

Full bore flow rate tables for level or nearly level gradients

Flow rates based on spatially-varied flow formula for steady non-uniform flow

Strickler coefficient = 90

Pipe diameter [mm]	Length [m]	Gradient			
		0.0% Flow rate Q [l/s]	0.25% Flow rate Q [l/s]	0.5% Flow rate Q [l/s]	0.75% Flow rate Q [l/s]
50	5	0.40	0.57	0.75	0.92
50	10	0.30	0.54	0.75	0.92
50	15	0.26	0.53	0.75	0.92
50	20	0.23	0.53	0.75	0.92
75	5	1.45	1.75	2.40	2.90
75	10	1.10	1.72	2.35	2.90
75	15	0.95	1.70	2.35	2.90
75	20	0.85	1.70	2.35	2.90
110	5	4.50	5.55	6.75	8.15
110	10	3.60	5.05	6.60	8.15
110	15	3.20	4.90	6.50	8.15
110	20	2.80	4.80	6.50	8.15
125	5	6.45	7.90	9.60	11.45
125	10	5.20	7.25	9.50	11.45
125	15	4.55	7.00	9.50	11.45
125	20	4.10	6.85	9.50	11.45
160	5	13.00	15.40	18.60	21.20
160	10	10.90	14.30	18.50	21.20
160	15	9.50	13.80	18.40	21.20
160	20	8.50	13.50	18.30	21.20
200	5	24.80	29.00	34.20	38.70
200	10	20.80	26.70	33.80	38.40
200	15	18.60	25.70	33.70	38.40
200	20	17.00	25.00	33.60	38.40

Table 68

Using spatially varied flow equations, and with level or nearly level pipes, the length to an outlet will determine the maximum flow rate through the pipe.

The flow rates shown in the table 68 assume a free outlet from the pipe. For installations without a free outlet, the flow rate will be affected by the downstream throttle.

Operating pressure

The ACO PIPE® socketed stainless steel pipe systems are fitted with a unique, double lip seal manufactured from either EPDM or Viton®. The double lip seal arrangement provides added security for the ultimate in long term reliability.

The ACO PIPE® socketed stainless steel pipe systems are tested and approved for operating

pressures in all gravity, syphonic and vacuum systems.

ACO PIPE® stainless steel pipe systems are designed for maximum working pressure 0.5 bar. In case where higher pressure may apply is necessary to combine system with socket clamps.

Pipe diameter [mm]	Max. operating pressure [bar]	
	Without socket clamp	With socket clamp
50	0.5	2.0
75	0.5	2.0
110	0.5	2.0
160	0.5	1.0

Table 69

Installation guide

Generally

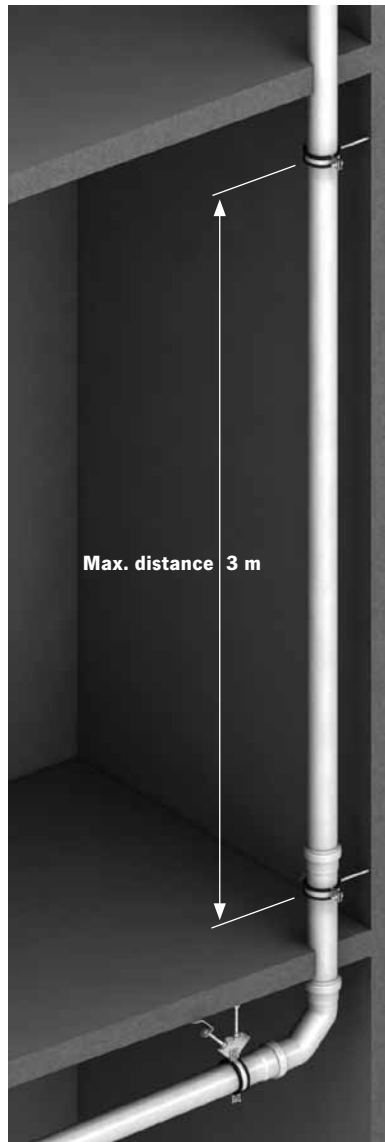
The following standards will assist designers select the correct size of pipe system for a particular application: EN 12056: gravity drainage systems inside buildings. EN 752: drain and sewer systems outside buildings. Installation should be in accordance with the manufacturer's recommendations but also EN 12056-2, EN 12056-3 and EN 752.

Pipe cutting

If it is necessary to adapt or shorten pipe lengths then whatever tools are used, the cut must be square, clean and ready chamfered. Suitable cutters and whole cutter sets are available from ACO (see page 51).

Pipe jointing

The assembly of pipe joints is quick and straightforward requiring only a light application of lubricant available from ACO to the chamfered pipe end. Ensure that the mating ends of the pipes and fittings are clean and free from contamination. Push-fit the pipe end into the socket but do not push fully home into the socket recess so as to allow for thermal expansion within the system.



Vertical pipe stacks

When designing a rainwater or soil and waste system, pipe work must be supported at not more than 2 meter centres and vertical pipes should be fixed to the wall not less than 30 mm to facilitate maintenance and painting. Allow at least one bracket per fitting preferably at the downstream end of the fitting with additional brackets at changes of direction or junction points.

Pipe weights

Engineers should be aware of minimum and maximum weights when designing vertical stack and horizontal pipe run systems. Generally, when the pipe is completely full of water, then the vertical deflection of the pipe between brackets should not exceed 1.5 mm. The discretion of the installer should be applied in each instance to ensure that the pipe is adequately supported.

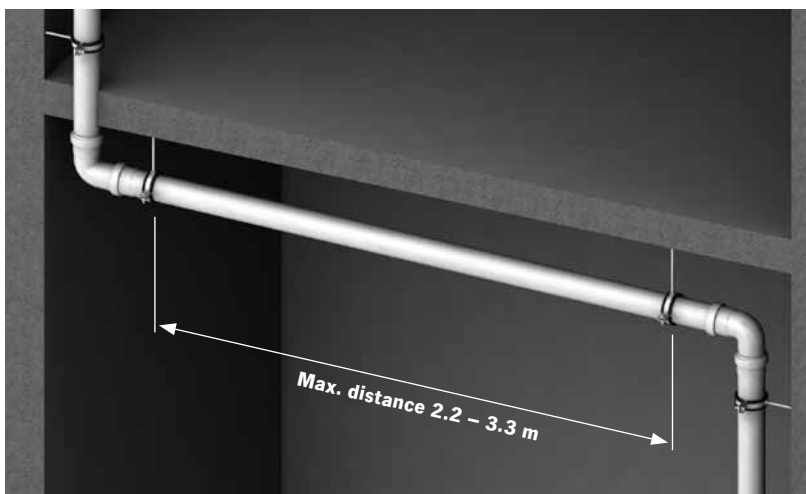
As a guide, use the table below for bracket spacing on horizontal pipes.

Pipe diameter bracket spacing*

Pipe Ø [mm]	Length [m]
50	2.0
75	2.3
110	2.5
125	3.0
200	3.0

Table 70

* recommended distances, for installation follow your local standards



Horizontal pipe runs

Horizontal pipe work should be supported with at least two brackets per 3 meter pipe length. One bracket should be within 300 mm of the pipe joint and the other approximately at the midpoint of the pipe length, but not more than 2 metres from the next bracket. Additional brackets should be used at changes of direction and at junction points immediately downstream of the fitting. Horizontal pipe runs may be installed at a fall of 1 in 50 and feeder connections should be achieved using 45° branches. Where long pipe runs occur i.e. greater than 15 meters, a fixing arm should be attached to the bracket to prevent pendulum movement within the system.

Bellow ground installation

Back filling

Backfilling around the pipe can only start when the position of the pipe has been checked and approved.

Compression

Care should be taken to avoid distortion of both the pipe run and the pipe itself during backfilling and compaction. Avoid tipping backfill material directly onto the Pipe system. If mechanical compaction is used, the weight and resultant compressive force must be taken into account to avoid distortion. Backfill materials should be compacted to a minimum of 93 %.

Filling in the excavation

Soil from the excavation can be used for filling, but larger stones and blocks may not be used. Compression of the filling material outside reinforced areas is not necessary if the settling will not cause problems or damage.

Local standards

It is recommended to install pipes according to local standards like is for example BSEN in UK.

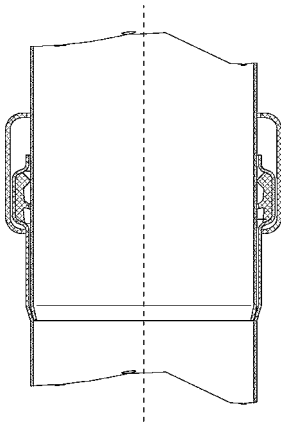


Socket clamps

Drainage systems for soil, waste water and rainwater in above-ground installations are gravity systems with free draining and should not be overloaded/blocked. The ACO PIPE® socketed systems have push-fit socket joints and consequently they will not be able to resist internal pressure unless precautions are made to ensure that the joints will not slide apart. Appropriate fixing to the building can prevent the joints from sliding apart in most cases, but if it is difficult or impossible to fix the pipes to the building, the socket clamps (Art. No. 419134-7) can prevent the push-fit sockets and spigot ends from sliding apart if the system is overloaded or internal pressure is generated.

Pipe Ø [mm]	Max. pressure [bar]
50 mm	2.0
75 mm	2.0
110 mm	2.0
160 mm	1.0

Table 71



The ACO PIPE® socketed joints with the socket clamps can withstand the pressures presented in the Table 71.

ACO PIPE® material information

Structural penetrations

Where it is necessary for pipe work to pass through the walls, structural decking or floors with DPM waterproofing, the ACO Apex Wall Seal system provides water and gas tight quality sealing for pipe feed-throughs.

ACO apex systems can accommodate any structural thicknesses up to 400 mm and provides the following benefits:

- Above and below ground damp and water proof penetration quality.
- Available in all ACO PIPE® stainless steel pipe sizes.
- Accommodate the effects of structural movement upon pipe work.
- Allows up to 8° of pipe deflection through fixed structures.

Refer to the product catalogue Wall seals and roof penetrations for further details.

Thermal movement

ACO PIPE® stainless steel pipe work systems have a low coefficient of thermal expansion, of approximately 1 in 1000 mm per 60 °C of temperature change.

The requirement for thermal tolerance on pipe systems is otherwise confined to hot water conditions. A comparison of approximate thermal movement between different pipe materials in mm per metre with a temperature change of 60 °C is given below.

■ Aluminium alloy	1.44 mm
■ Copper	0.98 mm
■ Grey cast iron	0.75 mm
■ HDPE	9.0 mm
■ PVCu	3.0 mm
■ Stainless steel	0.99 mm

Coefficients of linear expansion (α) for various materials are as follows:

Material	Coefficient of linear expansion [$10^{-6}K^{-1}$]
Aluminium	24.0
Copper	16.4
Grey cast iron	12.5
HDPE	150.0
PVCu	50.0
Stainless steel	16.5

Pipe weights

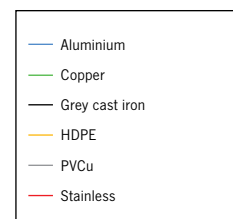
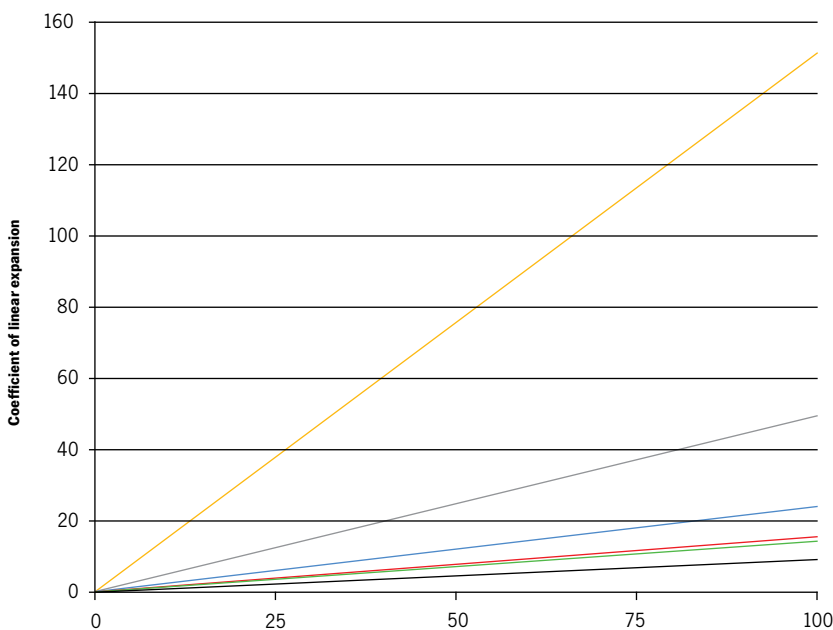
ACO PIPE® thin-wall stainless steel pipe systems are light in weight and high on performance with clear advantages in ease of handling and savings in labour costs over traditional metal pipe systems.

Engineers will need to know weights and loading when designing vertical stack and horizontal pipe run systems. The table below gives weights for all pipe sizes empty and full of water.

Pipe diameter [mm]	Pipe weight Empty [kg/m]	Pipe weight full (water) [kg/m]
50	1.2	3.0
75	1.8	6.9
110	2.7	11.9
125	3.3	15.8
160	5.0	24.6
200	7.5	38.0

Table 72

Thermal expansion



Sealing materials

Seal material information

The ACO PIPE® socketed stainless steel pipe systems are fitted with a unique, double lip seal manufactured from either EPDM, NBR or Viton®. The double lip seal arrangement provides added security for the ultimate in long term reliability.

EPDM (ethylene propylene diene monomer)

Black sealing rubber ring which is suitable for most applications where there are no oil or petrol residues in the waste water.

NBR (nitril butan rubber)

Black sealing rubber ring is suitable for waste water applications where there are petrol or oil residues. NBR is not resistant to solvents and high temperatures.

FPM (fluorelastomer) – Viton®

Green sealing rubber ring is suitable for special applications where oil, solvents and strong acids are present in waste water and for applications with higher temperatures. Viton® seal has limited resistance to chemicals like acetone, methyl alcohol.

To be sure of suitability for special applications please consult exact seal material features within ACO installation guide.



Rubber type	EPDM	NBR	FPM (Viton)
Colour	black	black	green
Temperature range	-50 / +130 / +150 °C	-30 / +80 / +100 °C	-20 / +200 / +300 °C
Resistance			
Water	excellent	good	good
Chemicals			
Acids	good	fair	excellent
Bases	good	fair	excellent
Benzene/Petrol	unsatisfied	excellent	excellent
Oils			
ASTM Oil No. 1	unsatisfied	excellent	excellent
ASTM Oil No. 3	unsatisfied	excellent	excellent
Ozone & weather stresses	good	limited	good

* Table 73 Viton® is a registered trademark for fluorelastomer by DuPont Performance Elastomers L.L.C.
Please contact ACO in case of any doubts regarding this topic.

Care and maintenance

Cleaning methods

Stainless steel is easy to clean. Washing with soap or a mild detergent and warm water followed by a clear water rinse is usually quite adequate for many industrial applications. An enhanced aesthetic appearance will be achieved if the cleaned surface is finally wiped dry.

Precautions

If all the suggestions and actions in the table below have been attempted, stainless steel has the facility to be mechanically cleaned by specialists on site. Please contact ACO Industries for further assistance.

Problem	Cleaning agent	Comment
Routine cleaning, all finishes.	Soap or mild detergent and water (such as washing up liquid).	Sponge, rinse with clean water, wipe dry if necessary.
Fingerprints, all finishes.	Soap or warm water or organic solvent (e.g. acetone, alcohol).	Rinse with clean water, wipe dry if necessary.
Stubborn stains and discolouration.	Mild cleaning solutions (e.g. Jif, Goddard stainless steel care).	Rinse well with clean water and wipe dry.
Oil and grease marks, all finishes.	Organic solvents (e.g. acetone, alcohol, trichlorethylene).	Clean after with soap and water, rinse with clean water and dry.
Rust and other corrosion products.	Oxalic acid. The cleaning solution should be applied with a swab and allowed to stand for 15–20 minutes before being washed away with water. May continue using Jif to give final clean.	Rinse well with clean water (precautions for acid cleaners should be observed).
Scratches on brush (satin) finish.	Household synthetic fibre scouring pads (e.g. Scotch Brite fibre pad). For deeper scratches; apply in direction of polishing. The clean with soap or detergent as per routine cleaning.	Do not use ordinary steel wool (iron particles can become embedded in stainless steel and cause further surface problems).

Table 74

Resistance of materials

1 = Very good service to operating limit of material 2 = Moderate service 3 = Limited or variable service 4 = Unsatisfactory	AISI 316 L Stainless	AISI 304 Stainless	Cast iron	Polyethylene	PVC	Polypropylene	EPDM	NBR	FPM
Acetone	1	1	1	4	4	2	1	4	4
Acetic acid (diluted) 30%	1	1	1	3	3	1	1	2	2
Acetic acid 100%	1	1	1	4	4	3	1	3	3
Acetic acid anhydride	1	1	1	2	4	3	2	3	4
Aluminium chloride	4	4	2	1	1	1	1	1	1
Aluminium sulfate	1	4	2	1	1	1	1	1	1
Ammonium carbonate	1	1	2	1	1	1	1	4	-
Ammonium chloride	2	3	2	1	1	1	1	1	-
Ammonium hydroxide	1	1	2	1	1	1	1	4	2
Amyl chloride	1	1	2	4	4	4	-	-	-
Anilin	1	1	2	4	4	2	2	4	3

1 = Very good service to operating limit of material 2 = Moderate service 3 = Limited or variable service 4 = Unsatisfactory	AISI 316 L Stainless	AISI 304 Stainless	Cast iron	Polyethylene	PVC	Polypropylene	EPDM	NBR	FPM
Anilin hydrochloride	4	4	2	2	4	4	2	2	2
Barium chloride	2	2	2	1	1	1	1	1	1
Barium hydroxide	1	1	2	1	1	1	1	1	1
Benzaldehyde	1	1	2	4	4	3	1	4	4
Benzene	1	1	1	4	4	4	4	4	1
Benzoic acid	1	1	2	1	1	2	-	-	1
Borax	1	1	2	1	1	1	1	2	1
Boric acid	1	1	2	1	1	1	1	1	1
Bromine	4	4	4	4	4	4	-	-	1
Bromine chloride acid	4	4	4	1	4	3	1	2	1
Bromine hydrogen acid	4	4	4	1	1	3	1	4	1

1 = Very good service to operating limit of material 2 = Moderate service 3 = Limited or variable service 4 = Unsatisfactory	AISI 316 L Stainless	AISI 304 Stainless	Cast iron	Polyethylene	PVC	Polypropylene	EPDM	NBR	FPM
Bromoethylene	1	1	2	4	4	4	-	-	-
Butanol	1	1	1	4	4	4	4	1	1
Butyl acetat	1	1	2	4	4	4	2	-	4
Butyric acid	1	1	1	4	4	1	-	-	-
Calcium bisulfate el sulfite	1	1	4	1	1	1	4	1	1
Calcium chloride	2	2	2	1	1	1	1	1	1
Calcium hydroxide	1	1	3	1	1	1	1	1	1
Calcium hypoklorite	2	3	2	1	3	2	1	3	1
Carbon disulfide	1	1	1	4	4	4	-	-	-
Carbon tetrachloride	1	1	1	4	4	4	4	3	1
Chloracetic acid (mono)	4	4	2	4	4	4	2	-	-
Chloride	4	4	2	3	1	4	-	-	-
Chloril acid	4	4	2	3	1	4	-	-	-
Chlorine (dry)	1	1	2	4	4	4	-	-	1
Chlorobenzene	1	1	2	4	4	4	4	4	1
Chloroform	2	2	2	4	4	4	4	4	1
Chlorosulfonic acid	2	3	1	4	4	4	4	4	3
Copper chloride	2	2	2	1	1	2	1	1	1
Copper nitrate	1	1	1	1	1	2	-	-	-
Copper sulfate	1	1	1	1	1	2	1	1	1
Ether	1	1	1	4	4	4	-	-	-
Ethyl chloride	1	1	1	4	4	4	1	1	1
Fatty acid	1	1	1	4	1	2	4	2	1
Flouiner (dry)	1	1	4	4	2	4	-	-	-
Flourine hydrogen acid	4	4	4	2	3	3	2	4	1
Formaldehyde	1	1	1	1	1	2	1	2	1
Formic acid	1	1	1	3	4	2	1	2	3
Furfural	1	1	2	4	4	4	2	4	4
Gallic acid	1	1	1	1	1	1	2	2	1
Hydrochloric acid	4	4	4	1	1	1	1	4	1
Hydrogen peroxide	1	1	2	3	4	3	3	4	2
Iodine (wet)	4	4	4	4	4	3	-	-	-
Lead acetate	1	1	2	1	1	1	1	2	-
Magnesium chloride	2	2	2	1	1	1	1	1	1
Magnesium sulfate	1	1	1	1	1	1	1	1	1
Mercury	1	1	1	1	1	1	1	1	1
Methanol	1	1	1	1	1	2	1	1	3
Methyl chloride	1	1	1	4	4	4	3	4	1
Methylene chloride	2	2	1	4	4	4	4	4	2
Natphalene	1	1	2	4	1	3	4	4	1
Nickel chloride	2	2	2	1	1	1	1	1	1
Nickel sulfate	1	1	2	1	1	1	1	1	1
Nitric acid	3	3	1	4	4	4	3	4	1
Oxalic acid	3	3	2	1	1	3	1	2	1
Perchloric acid	4	4	1	1	4	3	2	-	1
Phorsphor acid	1	1	2	1	1	2	2	4	1
Picric acid	1	1	2	3	4	4	2	2	1
Potassium bromide	1	1	2	1	1	1	-	-	-

1 = Very good service to operating limit of material 2 = Moderate service 3 = Limited or variable service 4 = Unsatisfactory	AISI 316 L Stainless	AISI 304 Stainless	Cast iron	Polyethylene	PVC	Polypropylene	EPDM	NBR	FPM
Potassium carbonate	1	1	2	1	1	1	-	-	-
Potassium chlorate	1	1	2	1	1	1	-	-	-
Potassium cyanide	1	1	2	1	1	1	1	1	1
Potassium hydroxide	1	1	4	1	1	1	1	2	2
Potassium nitrate	1	1	1	1	1	1	1	1	1
Potassium permanganate	1	1	2	2	2	3	-	-	-
Potassium sulfate	1	1	1	1	1	1	1	1	1
Potassium sulfide	1	1	1	1	1	1	-	-	-
Potassiumchloride	2	2	1	1	1	1	1	1	1
Prophylyene dichloride	1	1	1	4	4	4	-	-	-
Sal ammoniac	2	3	2	1	1	1	1	1	-
Silver nitrate	1	1	1	1	1	1	1	2	1
Soda (ash)	1	1	2	1	1	1	-	-	-
Sodium acetate	1	1	2	1	1	1	1	2	4
Sodium bicarbonate	1	1	1	1	1	1	1	1	1
Sodium bisulfate	1	3	1	1	1	1	-	-	-
Sodium bisulfite	1	1	4	1	1	1	1	1	1
Sodium bromide	2	2	2	1	1	1	-	-	-
Sodium chlorate	1	1	1	1	3	1	-	-	-
Sodium chloride	4	4	2	3	1	4	-	-	-
Sodium cyanide	1	1	1	1	1	1	1	1	1
Sodium fluoride	1	1	4	1	1	1	-	-	-
Sodium hydroxide	1	1	4	1	1	1	1	2	2
Sodium hypoklorite	4	4	2	3	1	2	2	2	1
Sodium nitrate	1	1	1	1	1	1	1	2	-
Sodium sulfate	1	1	1	1	1	1	1	1	1
Sodium sulfide	1	1	2	1	1	1	-	-	-
Sodium sulfite	1	1	4	1	1	1	-	-	-
Stannic chloride	2	3	2	1	1	1	2	1	1
Sulfur	1	1	1	3	1	2	1	4	1
Sulfur chloride	1	1	4	4	4	4	4	3	1
Sulfur dioxide	1	2	4	3	4	3	1	4	1
Sulfuric acid	4	4	1	4	4	3	2	4	1
Sulfurous acid	1	3	4	1	1	2	2	2	1
Tionyl chloride	1	1	2	4	4	3	4	-	1
Toluene (toluol)	1	1	1	4	4	4	4	4	1
Trichloroethylene	1	1	1	4	4	4	4	3	1
Turpentine	1	1	2	4	4	4	4	1	1
Xylene (xylol)	1	1	2	4	4	4	-	-	-
Zinc sulfate	1	1	1	1	1	1	-	-	-

Table 75

Note:

Concentration levels and length of exposure have a direct influence on the resistance of stainless steel to certain chemicals. Each application should therefore be carefully reviewed to determine the suitability of stainless steel.

Assumptions:

Data represented is to be used as a guide only, for detailed information please contact our technical department.

Main references



- 🕒 Danone dairy, Benesov, Czech Republic
- ⊕ Waste water from production
- 👍 Downtime reduction from 3–4 weeks to 3–4 days



- 🕒 Lion Nathan brewery, Australia
- ⊕ Waste water from production
- 👍 Complex solution, service



- 🕒 La Zaragozana brewery, Spain
- ⊕ Waste water from production
- 👍 Short installation time



- 🕒 Bodegas Domino de Cair winery, Spain
- ⊕ Waste water from production



- 🕒 Aceites Marinos fish oil factory, Spain
- ⊕ Waste water from production
- 👍 Resistance



- 🕒 Svendborgsund Bridge drainage, Denmark
- ⊕ Complete solution including special customized gullies



- 🕒 Bayer Schering pharmaceutical, Finland
- ⊕ Waste water from laboratory
- 👍 Easy to install, heat- and chemical resistance

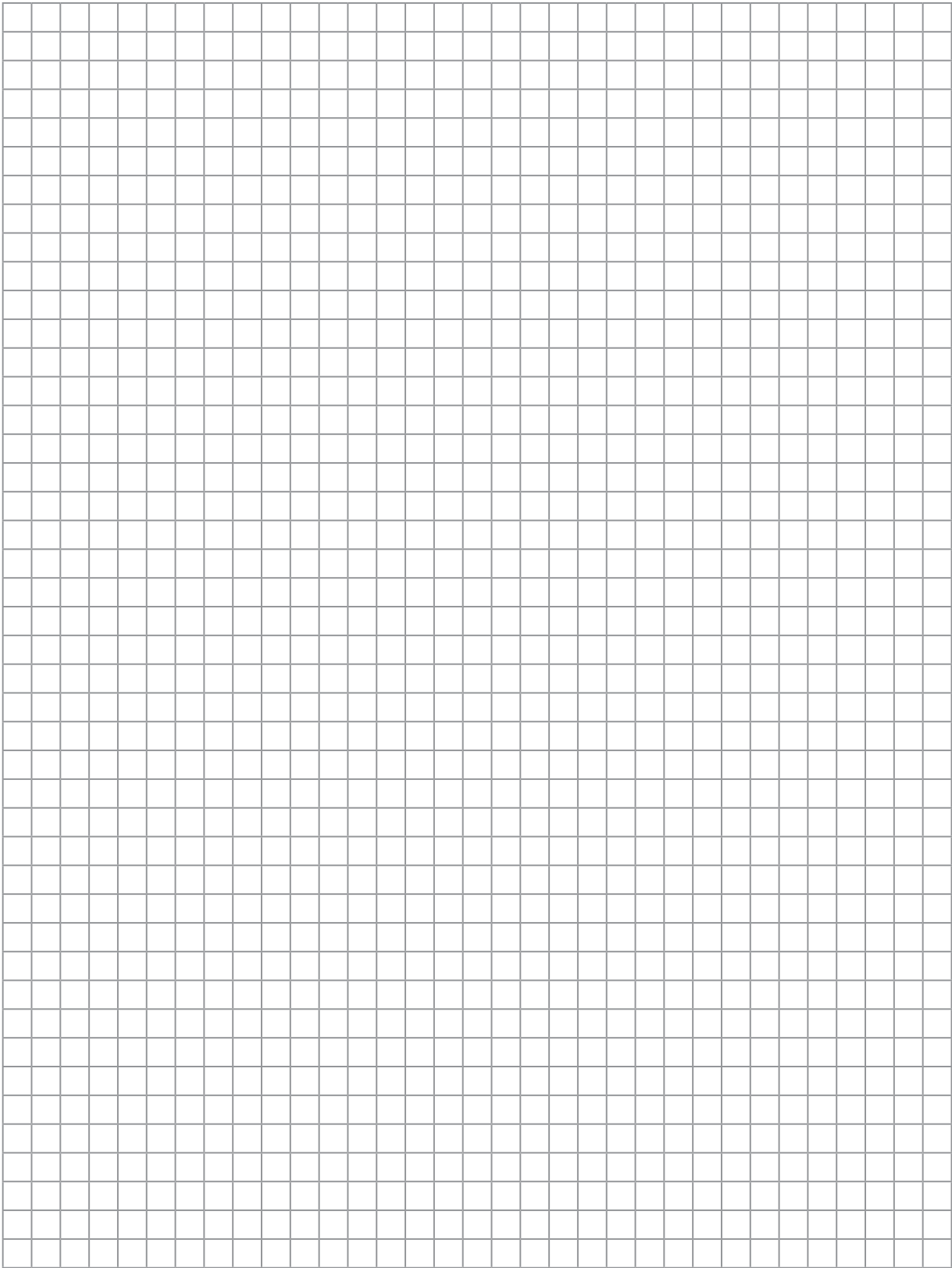


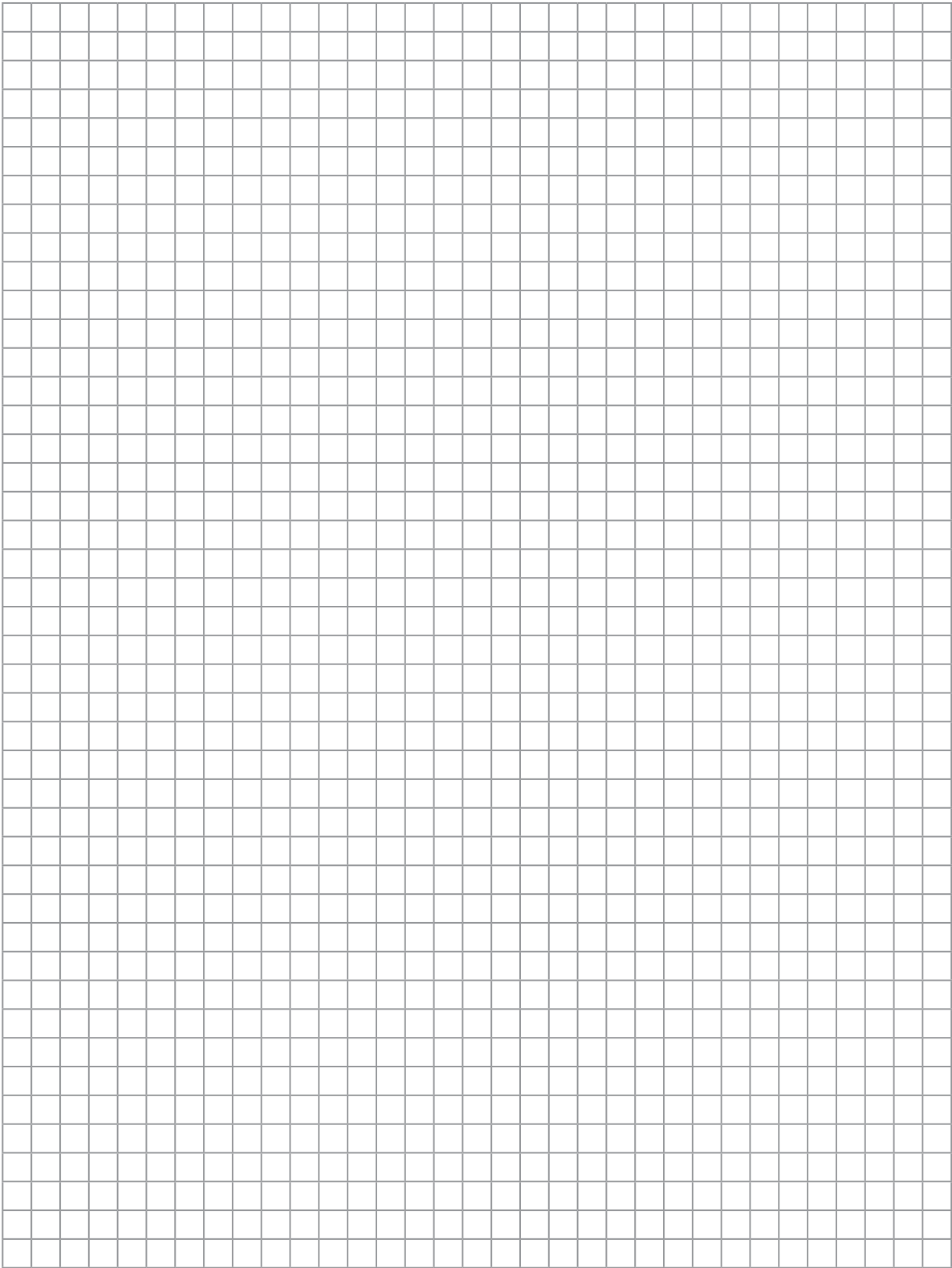
- 🕒 HK Ruokatalo meat production, Finland
- ⊕ Waste water from production
- 👍 Resistance, easy to install



- 🕒 Valio Herajoki dairy, Finland
- ⊕ Waste water from production
- 👍 Quick install, material resistance







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