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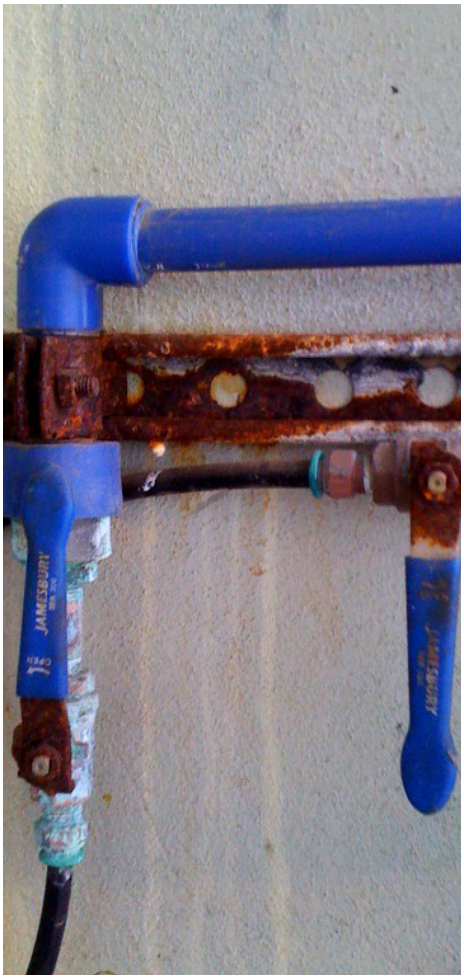
Air-Pro® Product Guide & Installation Manual

10 YEAR WARRANTY
ASAHI/AMERICA
10 YEAR
Air-Pro® Compressed Air Piping

AIR-PRO®
Thermoplastic Compressed Air Piping System
by ASAHI/AMERICA

ASAHI-AMERICA.COM | 800-343-3618 | ASAHI@ASAHI-AMERICA.COM

VERSATILITY OF AIR-PRO® PIPING SYSTEM



Air-Pro® at a bleach plant.

Air-Pro® in a buried application.

Air-Pro® at a fertilizer manufacturing facility covered in chemical dust.

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AIR-PRO®

Thermoplastic Compressed Air Piping System

by ASAHI/AMERICA

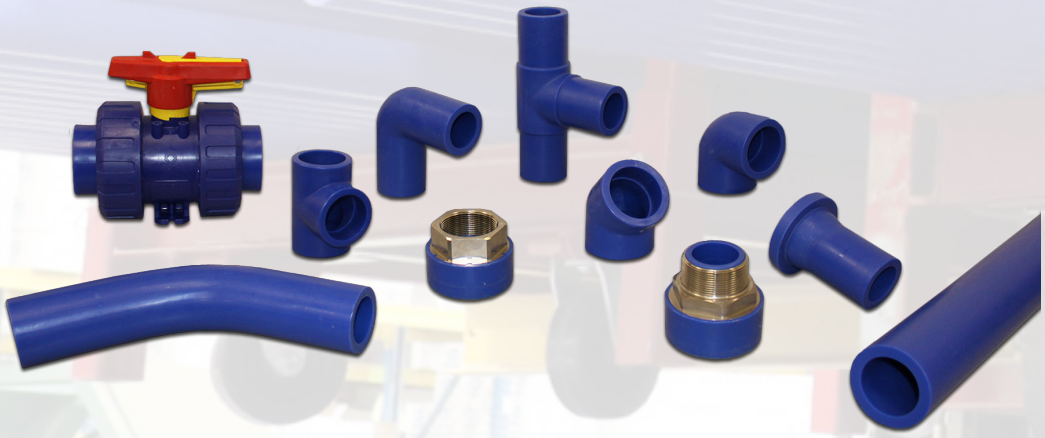
Air-Pro® is a thermoplastic compressed air piping system made from a specially formulated polyethylene (PE) material. Since its introduction to the US market in 1992, there have been over 5,000 successful installations of the product currently still in operation. Applications range from aboveground and below ground, indoors and outdoors, harsh, corrosive chemicals, marine salt-air environments, and a variety of manufacturing plants and workshops.

This guide provides the user, designer, and installer important and necessary information to assist in the proper selection and implementation of the Air-Pro® piping system. The information and data contained herein are in accordance with best practices of the compressed air industry.

Safety is of primary concern with compressed air and gas applications. Stored energy inherent in these types of systems can be harmful or fatal to personnel or damaging to equipment if the piping system is not manufactured, designed, installed, tested, operated, and maintained properly. Air-Pro® is specifically formulated to provide safe transport of compressed air with a minimum expected useful life of 50 years.

Following the guidelines and recommendations contained in this publication are essential to providing the user a low-maintenance, exceptionally performing compressed air piping system. However, this publication is to be used as a general guide only and should not be relied upon as a recommendation for any specific application. Since every application is unique, all variables may not be covered by using this guide as the only source of information. Asahi/America's pipe engineering staff should always be consulted regarding suitability of the Air-Pro® piping system for specific applications and conditions of service.

Air-Pro® compressed air piping system is currently backed by a 10 year warranty. For full details on warranty information, please visit our website at https://www.asahi-america.com/support/warranty-policy.



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SECTION A

PRODUCT GUIDE

Safety and Regulatory Compliance

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THERMOPLASTIC PIPE FOR COMPRESSED AIR

Compressed air and gas systems can store high amounts of energy. This can present dangerous conditions if the energy is released suddenly. For this reason, the United States Department of Labor – Occupational Safety and Health Administration (OSHA) has issued numerous rules and regulations regarding the use of thermoplastic piping materials for these applications. In essence, if thermoplastic piping materials are used for compressed air or gas applications, "the pipes must either be constructed of or be encased in shatter resistant materials" (OSHA Standard Interpretation dated February 28, 1991). Thermoplastic materials such as polypropylene (PP), polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) have relatively high brittleness, which could cause the pipe to fail in a catastrophic manner if left bare and unprotected - especially in colder conditions. Air-Pro® is constructed of shatter-resistant material and is designed for safe transport of compressed air. If Air-Pro® were to fail, it would simply open an orifice keeping the pipe material intact. No hazardous projectiles would come off the piping.

Air-Pro® over-pressurized ductile failure during burst test (pressure > 800psi)

CALIFORNIA OSHA

California OSHA has reviewed failure mode testing data for the Air-Pro® piping system and has acknowledged that it meets the requirements for "Unfired Pressure Vessel Safety Order" appendix C, which means it is safe to use for compressed air/gas applications. (Letter – State of California – Division of Occupational Safety and Health – Pressure Vessel Unit – Revised March 25, 2021). The markings on Air-Pro® pipe (for compressed air) and the joining methods meet the requirements of safety order 462 (m) (3). The blue color is the OSHA schematic color for compressed air pipelines.

RAILROAD APPROVAL

Approval to use Air-Pro® for brake lines on rail cars was received from the Association of American Railroads in 1998.

EXPLOSIVE ENVIRONMENTS

Air-Pro® is not intrinsically safe; a static charge could build up in the pipe. The user is responsible for ensuring that equipment located in explosive atmospheres is safe.

COLD ENVIRONMENTS

Air-Pro® is safe to use in cold environments. The recommended lowest applicable temperature limit for pressurized service is 14° F (-10° C).

HOT ENVIRONMENTS

The upper temperature limit of Air-Pro® is 140° F. Air compressors may generate air temperatures higher than this limit, therefore, Air-Pro® should be installed downstream of the aftercooler where air temperatures are typically below 100° F. Industry best practices of shielding pipework from direct heat sources should also be adopted. Air-Pro® has been installed successfully in applications where the external air temperature is less than 140° F.

HISTORICAL BACKGROUND

The Air-Pro® thermoplastic compressed air piping system was introduced to the US market in 1992. It is manufactured in Austria by Asahi/America's long-term partner, AGRU Kunststofftechnik – a worldwide leader in thermoplastic piping systems. As a European pipe system, Air-Pro® is designed based on DVS and DIN standards. The German Welding Society (DVS) and German Institute for Standardization (DIN) develop standards that apply to plastic piping systems. AGRU's manufacturing processes and procedures strictly adhere to all applicable International Organization for Standardization (ISO) standards. These standards detail the manufacturing, design and testing requirements plastic piping systems must follow based on specific applications. As such, Air-Pro® is specifically formulated, tested and designed for compressed air, gas and liquid applications.

MATERIAL OF CONSTRUCTION AND JOINING SYSTEM

Air-Pro® is made of a specially formulated polyethylene material, PE100 (see appendix for 'Material Properties' and 'Short Specification' in Section C). The material has insulative properties and is non-conductive. Air-Pro® is joined using thermofusion (fusion) welding. This joining method brings two joining surfaces together in a molten state under pressure. The end result of fusion welding is a complete homogeneous bonding of the two surfaces. This makes Air-Pro® unique among the different types of compressed air piping systems in that Air-Pro's® primary joining method is completely non-mechanical. There are no foreign materials used that could affect the weld. A fusion welded Air-Pro® system becomes virtually all one piece. This is why users rarely, if ever, have leaks. Mechanical transition fittings are available for the Air-Pro® system such as threaded adapters and flanged connections, if needed.

APPLICATIONS

Air-Pro® is suitable for most compressed air piping applications. It may be installed indoors or outdoors, aboveground or below ground, and in corrosive environments (e.g. chemical plants, plating shops, marine salt air locations, manufacturing facilities and workshops). The product line is silicone-free.

SAFETY FACTOR

Safety factor (SF) is built into the design of Air-Pro® to address environmental conditions and stresses a typical installation may encounter. European standards specify a minimum SF for various applications. Listed pressure ratings are based on a two-to-one safety factor for a minimum theoretical life expectancy of 50 years at 68° F with up to 230psi continuous service as shown below for SDR 7.4.

EXPECTED USEFUL LIFE

Based on long-term tests of aging stability in temperature-controlled, oxygenated fresh water, and creep rupture testing of the material as per DIN 8075, it is possible to calculate the service life of the system at permissible working pressures and various temperatures:

Operating Temperature ° F (° C)	Service Time (Years)	Permissible Working Pressure (psi)	
		SDR 7.4	SDR 11
14 (-10)	50	224	144
50 (10)	50	269	172
68 (20)	50	226	145
86 (30)	50	192	123
104 (40)	50	165	106
122 (50)	10	110	70
140 (60)	5	133	85

NOTE: Temperatures below 50° F and above 68° F decrease pressure rating.

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PIPE AND FITTINGS

Air-Pro® pipe comes in five-meter lengths (16.4 feet).

Fittings come in three styles: socket, butt and electrofusion, and are designed to match the dimensions of the pipe.

Air-Pro® SDR 7.4 has a maximum pressure rating of 230psi at 70° F and 150psi at 140° F, shown on the pipe marking illustration below:

AGRUAIR PE-100 ASTM3035 20X2.8 1/2" SDR 7.4 230psi/70°F 150psi/140°F 2018 "For Compressed Air" Made in Austria

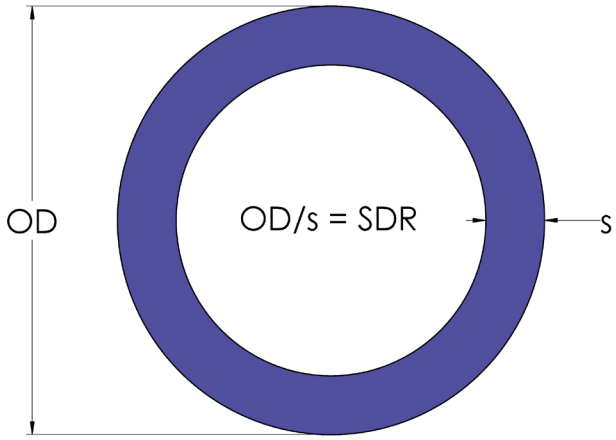
Air-Pro® socket fusion fittings 1/2” - 4” are molded with the manufacturer’s name (AGRU), the size in millimeters, and the inch equivalent. Quadrant hash marks are also molded on the fittings to assist the pipe fitter. They are stamped with the date of manufacture (year, lot run) and material. Air-Pro® butt fusion fittings are also available 2” - 4”. Fitting markings are pictured at right:

Air-Pro® SDR 11 pipe and fittings have a maximum pressure rating of 150psi at 68° F. A pipe marking illustration is below:

AIR-PRO - PE-100-RC - 160x14.6 - 6" SDR 11/ ISO S5 - MOP 10 bar/C=2.0 - 150 PSI/68° F "For Compressed Air"

In the illustration above, the outside diameter of the pipe is 160mm, and the wall thickness is 14.6mm SDR 11. Black fittings have the same marking information as blue fittings.

Air-Pro® as a pressure piping system is designed based on standard dimension ratio (SDR). SDR is a design platform that ensures every pipe dimension, using the same resin and same SDR, has the same pressure rating. The SDR number is derived by dividing the outside diameter (OD) of the pipe by the wall thickness (s), OD ÷ s = SDR.



SDR design characteristics maintain a constant pressure rating throughout the size range. The wall dimension gets thicker as you increase in pipe size. Designers need to only specify the SDR class to have the same pressure rating for every pipe size in that class. The lower the SDR number, the higher the pressure rating.

Example 1:

Question: What is the calculated wall thickness (s) of 110mm OD Air-Pro® SDR 7.4 pipe?
Answer: 110 ÷ 7.4 = 14.8648 mm (.585")

Example 2:

Question: What is the calculated wall thickness of 160mm Air-Pro® SDR 11 pipe?
Answer: 160 ÷ 11 = 14.55 mm (.573")

NOTE: The calculated wall thickness is the minimum wall thickness allowed per the manufacturing standard. Actual wall thicknesses are found in the two tables on page 12 of this manual.

Air-Pro® Pipe Sizes

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Air-Pro® is offered in the following pipe sizes and SDR classes:

Air-Pro® SDR 7.4								
Nominal Size (inch)	1/2	3/4	1	1-1/4	1-1/2	2	3	4
OD (mm)	20	25	32	40	50	63	90	110
SDR	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
Wall "S" Actual (inch)	0.11	0.14	0.17	0.22	0.27	0.34	0.48	0.59
ID Actual (inch)	0.57	0.71	0.91	1.14	1.43	1.80	2.59	3.14
Pressure Rating (psi) at 68° F	230	230	230	230	230	230	230	230

Air-Pro® SDR 11							
Nominal Size (inch)	6	8	10	12	14	16	18
OD (mm)	160	200	250	315	355	400	450
SDR	11	11	11	11	11	11	11
Wall "S" Actual (inch)	0.58	0.72	0.89	1.13	1.27	1.43	1.61
ID Actual (inch)	5.15	6.44	8.06	10.15	11.44	12.89	14.50
Pressure Rating (psi) at 68° F	150	150	150	150	150	150	150

Air-Pro® performs well in some of the most difficult conditions because its material of construction possesses superior physical and mechanical properties, and because it is designed with a high margin of safety. Pipe and fittings are made very robust to withstand rigors that may be encountered in real world applications. Air-Pro® material has very high ductility and strength, as well as very high corrosion, impact, and stress-crack resistance. It can handle a pH range of 1 to 14, and cold conditions without becoming brittle.

APPLICATION SUITABILITY

Air-Pro® may not be suitable for certain applications. For example: applications with temperature conditions above 104° F limit the expected useful life of the system. If you have an application you are not sure about, contact Asahi/America's engineering staff for assistance (see appendix document 'Application Documentation' in Section C).

ABOVEGROUND APPLICATIONS

Exposure to Ultraviolet (UV) Light

Air-Pro® material is UV stabilized and can be installed aboveground either indoors or outdoors. In outdoor applications, Air-Pro® exposed to direct sunlight is subject to inconsequential oxidation on the surface of the pipe. This can be avoided by providing a covering for the pipe and fittings (either a wrap or paint), or it can be ignored. If left alone, the oxidized surface provides a built-in UV blocker, which does not affect long-term performance of the system - including weldability.

Hot & Cold Temperatures

Air-Pro® can be installed in applications where there is extreme ambient temperature fluctuations. For example, in certain outdoor locations, seasonal weather conditions can range from greater than 110° F down to -20° F. Likewise, temperatures can vary greatly between summer and winter months, especially in rafters inside buildings that are not climate-controlled. This requires designers to employ sufficient restraints, offsets and/or loops to reduce the amount of movement in horizontal runs of pipe to an acceptable level. On smaller sizes, a continuous channel support system with hangers further apart may be better than placing pipe clips close together. Asahi/America's pipe engineering staff can assist in making the proper calculations for stress evaluation, placement of restraints and use of offsets and loops. Air-Pro® is a unitary homogeneous fusion welded non-mechanical piping system requiring no elastomeric seals for pipe to fitting connections, which permits the system to be installed in areas where high temperature fluctuations between night and day or winter and summer occur.

BELOW GROUND APPLICATIONS

As a non-mechanically joined system, Air-Pro® is ideal for buried applications. The pipe material is extremely ductile. There are Air-Pro® buried applications at power plants and railroad yards that have been in service over 20 years without issues. Plowing and horizontal directional drilling (HDD) are all suitable methods of installing Air-Pro® underground.

When burying Air-Pro® in trenches or in traffic areas, the type of soil, compaction, depth, and width of the trench as it relates to static and live loads, and the related stress on the pipe should be considered. As a general rule, Air-Pro® can handle H-20 wheel loads with a minimal burial depth > three feet in soil compacted with 95% of its maximum dry density. The pipe is considered to be restrained in buried conditions due to thermal stability and soil compaction around the pipe.

MAXIMUM AND MINIMUM DEPTH OF COVER REQUIRING NO CALCULATIONS

Air-Pro® SDR	Minimum Depth of Cover - With H-20 Load (Feet)	Minimum Depth of Cover - Without H-2O Load (Feet)	Maximum Depth of Cover (Feet)
7.4	3	2	25
11	3	2	25

AWWA M-55 Design Window - PPI PE Handbook "Design of PE Piping Systems" Chapter 6, page 193, table 3.1

MINIMUM BEND RADIUS

Air-Pro® may be installed to effect a change of direction without use of fittings:

Air-Pro® Minimum Bend Radius	
SDR 7.4 (1/2" – 4" pipe)	20 times the pipe OD
SDR 11 (6" – 18" pipe)	25 times the pipe OD

GAS APPLICATIONS

Air-Pro® is suitable for many types of pressurized air and some gas applications. It is suitable for inert or non-reactive gases including nitrogen (N_2) and carbon dioxide (CO_2), and reactive gases such as hydrogen (H_2) and oxygen (O_2).

Gas	Resistant (Yes or No)
Inert gases including nitrogen and carbon dioxide	Yes
Hydrogen	Yes
Oxygen	Yes
Fluorine, chlorine & bromine	**NO**
Natural gas	Yes*
Propane	Yes*
Breathing air	Yes*

**Air-Pro® does not have US certification required for medical or domestic utility gas applications. There is a pressure derate factor that needs to be considered for Air-Pro® piping for natural gas and propane applications. Please contact Asahi/America's engineering department for a detailed review.*

CORROSIVE ENVIRONMENT APPLICATIONS

Due to its inherent corrosion resistant qualities, Air-Pro® is ideal for applications that are located in areas with corrosive atmospheres. It is resistant to liquids or fumes with a pH ranging from 1 to 14. It's also well suited for the transport of corrosive fumes in positive pressure or vacuum service. Please contact Asahi/America's pipe engineering staff for help with specific corrosive applications. Non-metallic Air-Pro® pipes and fittings are used in marine salt-air, chemical, plating, scrubber and many other types of corrosive applications, providing over 25 years of corrosion resistance and maintenance-free service.

LOW DEW POINT APPLICATIONS

Lowering the water content in compressed air systems with refrigerated or desiccant dryers is sometimes a critical requirement in a company's overall corrosion control strategy. Air-Pro's® material of construction is naturally hydrophobic or water repelling. It does not react with water, nor does it require the presence of water molecules to provide long-term service in compressed air applications. Air-Pro® can handle low dew point applications less than -80° F.

VACUUM APPLICATIONS

Theoretical full internal vacuum at sea level is 29.92" Hg or -14.7psi, but this is rarely seen in practice due to limitations of vacuum pumps and related equipment. In practice, most vacuum systems can achieve up to about 98% of full vacuum. In general, Air-Pro's® external or negative pressure rating is much higher than theoretical full vacuum. This is important because there may be other variables besides internal vacuum that could contribute to negative pressure on the hoop stress of the pipes. As with all unreinforced thermoplastic pipe systems, both positive and negative pressure ratings decrease as temperatures rise. When designing vacuum systems with Air-Pro®, the highest possible temperature the pipes will be exposed to along with desired useful service life should be considered.

Temperature ° F (° C)	Expected Useful Life (Years)	Air-Pro® Permissible External (Negative) Pressure (-psi)	
		SDR 7.4	SDR 11
68 (20)	1	180	34
	10	133	23
	25	120	19
86 (30)	1	153	28
	10	113	18
	25	106	16
104 (40)	1	120	19
	10	100	14
	25	93	13
122 (50)	1	100	14
	10	86	11

SDR 11 values truncated from published chart in Asahi/America Engineering Design Guide

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COMPRESSOR LUBRICANT, WATER & OXYGEN COMPATIBILITY

Air compressor manufacturers recommend a wide variety of lubricants for proper operation of their equipment. Some compressors are designed to be oil-free, while others require either synthetic or mineral based lubricants. There is always the chance, in the presence of lubricants, that some trace amounts may be entrained in the compressed air and transferred onto the air piping. Air-Pro® material is formulated to be resistant to compressed air with trace amounts of compressor lubricants including: mineral oils, synthetic blends, polyalpha-olefin (POA), polyol-ester (POE), and diesters.

Water vapor is also often present in compressed air systems. The presence of moisture can be corrosive to metal pipes and lower the efficiency and cleanliness of the system as a result. Particles can dislodge and travel into processes where air is used. For most manufacturing processes, this is unacceptable because it affects the quality of the products and increases quality control rejection rates. Air-Pro® is inherently immune to these issues relating to moisture because it cannot rust, scale, pit, or corrode.

Air-Pro® is made of a carefully selected PE pipe- and fitting-grade resin, which is designed specifically for conveyance of both liquids, and compressed gases, including compressed air. As a crucial part of the resin manufacturing process, additives and stabilizers are used to aid in pellet and finished product processing, material stability and addressing oxidative effects. Air-Pro® resins include proprietary stabilizers to specifically address oxidative effect of oxygen rich applications such as oxygen gas and compressed air. Therefore, Air-Pro® is fully pressure rated, 230psi @ 68° F for a minimum expected useful life of 50 years. Some PE pipe and fitting grade resins that are not formulated for compressed air, must be severely derated and will have a limited life expectancy.

Cubic feet per minute (CFM) is a term used in the compressed air industry to measure the amount of air volume flow at a given compression (psi) delivered by the compressor. Processing equipment and tools that use the energy of compressed air require a minimum CFM flow at a specified pressure to operate properly. When air flows through pipes, there will be a drop in pressure from friction and changes of direction. As long as the pressure drop is kept below a maximum allowable limit, the system will deliver the required energy needs for tools or processing equipment. Primary factors that affect pressure drop through the pipe system are:

- Pipe size - inside diameter (ID)
- Pipe inner surface smoothness - Hazen & Williams Factor "C"
- Number and kinds of fittings used

Air-Pro® pipes and fittings have thicker walls than most metal pipe systems. This means the inside diameter (ID) for a given pipe size of an Air-Pro® system will generally be less than that of most metal pipes. The following pipe ID charts compare Air-Pro® with Schedule 40 A-53 black steel:

ID Comparison Chart - Air-Pro® SDR 7.4 vs. Schedule 40 Black Steel A-53								
Size	1/2”	3/4”	1”	1-1/4"	1-1/2”	2”	3”	4”
Air-Pro® ID (inch)	0.57	0.71	0.91	1.14	1.43	1.80	2.59	3.14
Black Steel ID (inch)	0.62	0.82	1.05	1.38	1.61	2.07	3.07	4.03

ID Comparison Chart - Air-Pro® SDR 11 vs. Schedule 40 Black Steel A-53							
Size	6”	8”	10”	12”	14”	16”	18”
Air-Pro® ID (inch)	5.15	6.44	8.06	10.15	11.44	12.89	14.47
Black Steel ID (inch)	6.07	7.98	10.02	11.94	13.13	15	16.88

CFM Piping System Design

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This is where the smoothness factor C of a pipe's inner wall plays a critical role. Air-Pro® has an extremely smooth ID, which remains intact for the life of the system. While the ID comparisons are favorable to steel pipe, designers of metal pipe systems must consider that corrosion will increase the roughness of the pipe adversely over time. To compensate for this, the next larger pipe size is often chosen as part of the design strategy for metal pipes.

The main determining factors for proper Air-Pro® pipe sizing are:

- Total required flow for the system (CFM)
- Operating supply pressures at points-of-use
- Length of pipe runs
- Number and types of fittings
- Future expansion

The following CFM chart may be used for quick reference to determine the proper size of Air-Pro® pipe for given applications:

CFM Chart - Air-Pro®												
Pressure (psi)	1/2" - 4" SDR 7.4 Pipe								6" - 12" SDR 11 Pipe			
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	3"	4"	6"	8"	10"	12"
40	5	9	19	34	62	117	306	525	1998	3649	6685	12492
50	7	12	24	43	79	149	389	669	2543	4644	8508	15901
60	8	14	29	52	96	181	474	814	3096	5656	10362	19365
70	10	17	34	62	114	214	560	962	3658	6682	12241	22876
80	11	20	39	71	131	247	647	1112	4226	7719	14142	26429
90	13	22	45	81	149	281	735	1263	4800	8768	16063	30018
100	14	25	50	90	167	315	824	1415	5379	9825	18001	33669
110	16	28	56	100	185	349	913	1568	5963	10892	19954	37290
120	17	30	61	110	204	383	1003	1723	6551	11966	21923	40969
130	19	33	67	120	222	418	1094	1879	7143	13048	23904	44672
140	20	36	72	130	241	453	1185	2036	7739	14136	25898	48398
150	22	38	78	140	259	488	1277	2193	8338	15231	27904	52146
160	23	41	84	150	278	523	1369	2352	-	-	-	-
170	25	44	89	161	297	559	1462	2511	-	-	-	-
180	26	47	95	171	316	594	1555	2671	-	-	-	-
190	28	50	101	181	335	630	1649	2832	-	-	-	-
200	30	53	106	191	354	666	1743	2993	-	-	-	-

*Calculations are based on a **1.5% pressure drop for 100 feet** of Air-Pro® pipe*

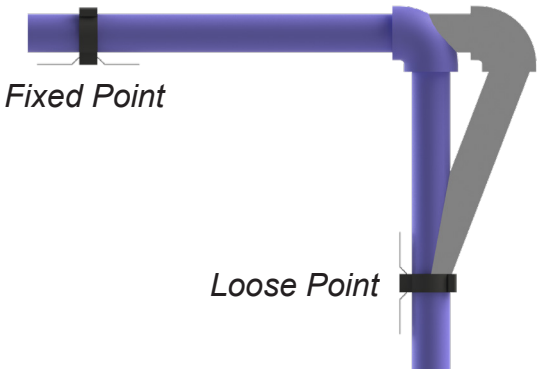
All thermoplastic materials expand and contract due to temperature changes. As a general rule, Air-Pro® pipe will expand or contract 1.2” / 10° F Δ T / 100 feet of pipe. This is roughly 12 times more than steel pipe. Although this may seem high, end load pressures of plastic pipes are very low compared with steel pipes. Even so, the anticipated changes of temperature of pipe material should be considered, and an acceptable design strategy should be adopted and implemented. There are three basic ways of dealing with expansion and contraction:

1. Allow the pipe to move within acceptable limits by employing natural offsets and/or loops
2. Restrain and guide the system without offsets or loops and let the pipe handle stresses
3. A hybrid strategy using elements of both 1 and 2

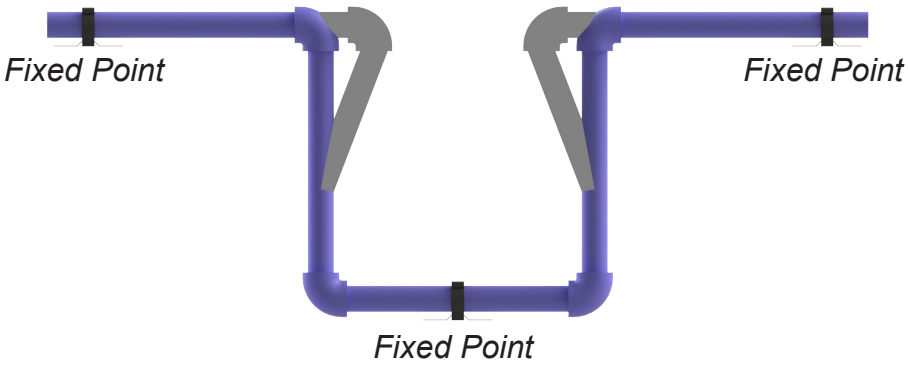
For some plastic pipe systems like PVC or CPVC, restraining and guiding without offsets or loops is not practicable because the material is not strong or ductile enough to handle higher stresses, especially at lower temperatures. However, for Air-Pro®, either option is possible because the material has a very high allowable stress. When installing expansion bends, stress should be calculated to ensure it does not exceed the maximum allowable stress.

To assist in calculation and design for expansion and contraction, Asahi/America has an expansion calculator tool available on its website (www.asahi-america.com). The tool allows you to input all necessary information and automatically calculates the expansion/contraction, and illustrates configuration of an offset and loop with dimensions. Proper placement and use of supports (loose points) and restraints (fixed points) are also shown.

OPTION 1



OPTION 2



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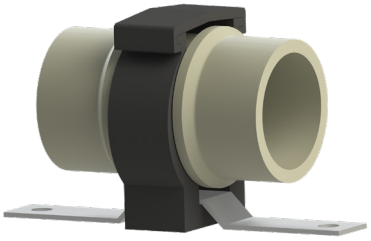
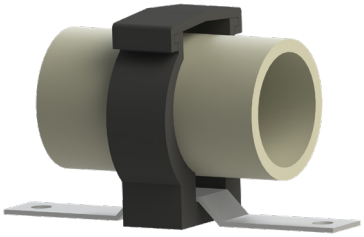
Air-Pro® offers a pipe clip system. Asahi pipe clips are made of reinforced plastic and are designed to hold pipe circumferentially, but still allow it to move without damaging surface. Metal hardware should not be attached directly to Air-Pro® pipe or fittings.

The exterior surface of pipe should never be clamped so tight that the pipe cannot slide through the support. Hard clamping puts undo stress on the pipe wall and, in time, could lead to failures. Restraint fittings are designed to prevent movement of pipe without needing to clamp down hard on the fitting. Restraint fittings have two shoulders extending off the OD of the pipe 360 degrees. A pipe clip is attached between the two shoulders. When pipe expands or contracts, the shoulders contact the side of the pipe clip so that movement is stopped at that point. Properly anchored pipe clips are designed to handle horizontal stresses when used with restraint fittings.



FP = Fixed Point
Restraint fittings secure pipe to structure creating a rigid point



LP = Loose Point
Allows expansion and contraction while guiding and supporting

SUPPORT SPACING

When choosing support spacing for Air-Pro®, the temperatures the pipe system will be subjected to should be considered. The chart below lists support spacing at various temperatures that the pipe will experience. The highest temperature that pipes will be exposed to should always be considered. The chart represents deflection less than or equal to 0.20”, which is most often adopted because there appears to be no visible sag between supports at or below this deflection.

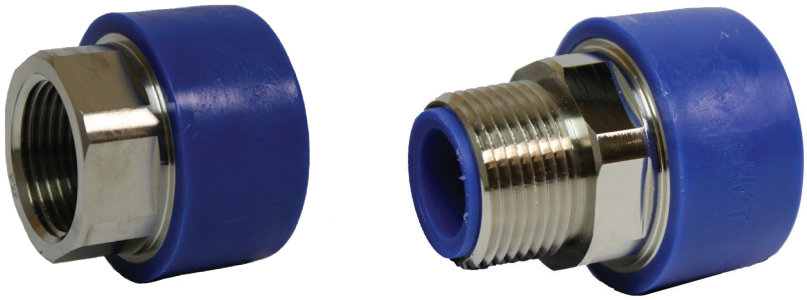
AIR-PRO® SUPPORT SPACING (INCH)

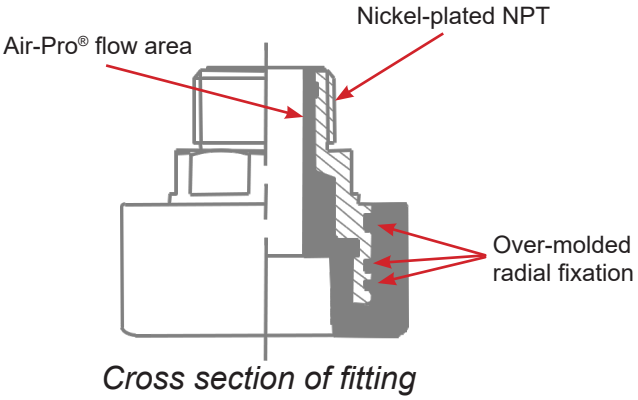
Size		68° F (20° C)	86° F (30° C)	104° F (40° C)	122° F (50° C)	140° F (60° C)
OD (inch)	OD (mm)					
1/2	20	31	31	28	23	20
3/4	25	36	33	31	31	28
1	32	41	41	36	36	31
1-1/4	40	48	46	41	41	36
1-1/2	50	56	56	48	46	41
2	63	66	64	59	56	48
2-1/2	75	74	71	66	61	56
3	90	84	79	74	69	64
4	110	92	89	84	79	71
6	160	115	107	102	97	90
8	200	128	123	118	113	105
10	250	146	141	133	128	118
12	315	161	156	151	143	131

The Air-Pro® system comes with full port ball valves available in 1/2” to 2” sizes that are fusion welded directly onto the pipe. These valves are manual with a lock-out, tag-out feature. They can also be furnished automated with electric or pneumatic actuation.

If metal valves are used, they can be adapted onto the Air-Pro® system with either a threaded transition fitting or a flange connection.

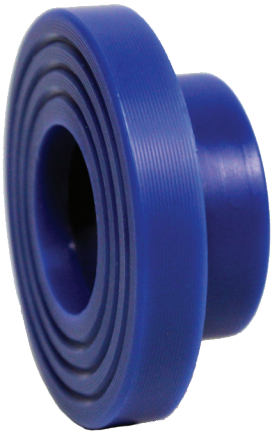
Air-Pro® threaded adapters are nickel-cadmium plated brass. The threaded component is over molded with Air-Pro®, which mechanically locks the two together.





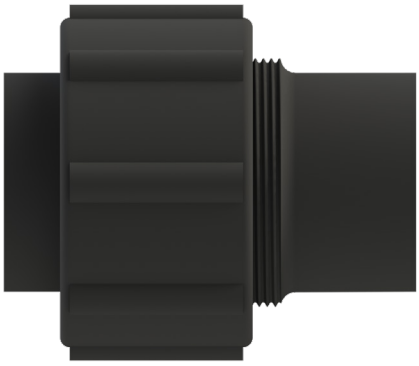
Cross section of fitting

Air-Pro® flanges are two parts: a stub end with a backing ring. The stub end is fusion welded directly onto the pipe. The backing ring is made with a reinforced plastic material surrounding the steel core for corrosion resistance, and an ANSI 150psi bolt pattern.

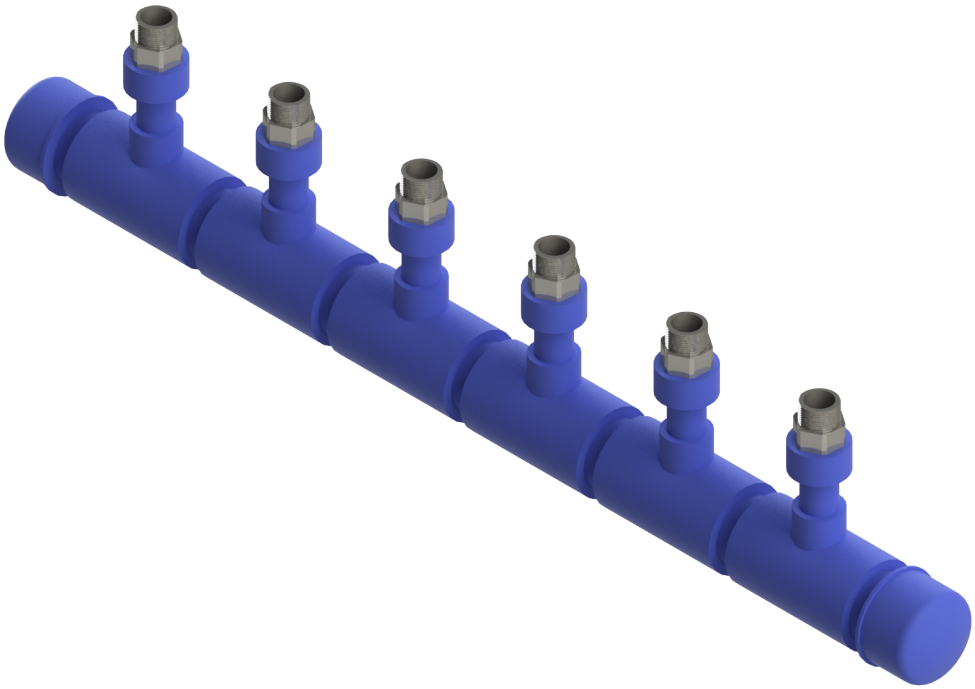


A

Air-Pro® also offers acrylonitrile butadiene styrene (ABS) to Air-Pro® transition fittings, which are available for solvent cement ABS x Air-Pro® fusion connections.



Custom fabrications are available from the factory, such as the one shown here:



SECTION B

INSTALLATION

General Working Conditions

B

Air-Pro® must be joined with proper tools and equipment, and by properly trained installers. Pipe and fittings are metric sized components, so joining tools must be fitted with metric dimension heater bushings and clamps. Work areas should be sufficiently clear of dirt, debris and dust so as not to compromise the fusion joining process. Welding may be done outdoors, but not in windy or rainy conditions, nor in weather below 40° F. A shaded work area is preferred.

SAFETY

Safety is always a primary concern on any job site. The installers must take measures and precautions to ensure safety of workers. The following are important safety guidelines related to the type of work associated with an Air-Pro® installation:

- Safety training on the proper use of fusion and cutting tools is required.
- Fusion tools' hot heating elements are a potential burn hazard. Clean, insulating, heat resistant gloves should be worn while operating fusion tools.
- Fusion tools are electrically powered. To avoid electric shock, they should not be operated with standing water present.
- Rotating, cutting, shaving and peeling tools have exposed sharp blades; they must be handled with care.

PLANNING THE WORK

Proper planning is essential for well-organized, successful Air-Pro® installations. This includes timing the various aspects of the project carefully. The following items should be considered before work can begin:

1. **Material:** Create a thorough take-off of required material. Order material in time for training and start-up. Store material in a safe, dry, covered, and protected area when it arrives on job. Make sure you have extra material in case you need it for job and training purposes.
2. **Tools:** Choose the proper tools needed for the project and order them to arrive before training and start-up. Having multiple tools on a job can allow multiple crews to operate at the same time and save labor. A crew can be as few as two installers. Make sure you have extra blades for shaving and cutting tools if needed. Some tools may be rented while others are for purchase only. Make sure you have sufficient electrical power for tools.
3. **Training:** Schedule a factory representative to come and do qualification training of installers. Training should be conducted just prior to beginning work. Each tool operator will need to be trained and certified on all tools they will operate.
4. **Shop vs. Field Welding:** Set up a shop area, preferably close to the installation site, where you expect to do most of the welding. Since Air-Pro® pipe and fittings are relatively flexible and lightweight, a good portion of the work can be done in the shop area where you will minimize welding time versus field welding. Longer pre-assemblies can easily be moved from the shop area because Air-Pro® pipe and fittings weigh less than one-third the weight of steel pipe and fittings. In 1" and larger sizes, long straight runs of pipe may be butt fused together, eliminating the need for couplings and saving an extra weld per joint. If you have sufficient lay-down area, hundreds of feet of pipe may be fused in the shop and then carried into the field for installation. Fewer field welds are better. Most close pipe work can also be done in shop. When field position welds must be made, be sure weld location offers sufficient room for prep-work and tool access. Flanges may also be used in lieu of making a field weld.

5. **Electrofusion Couplings:** Electrofusion fittings can be ideal when making difficult field position welds because the tool stays on the ground and only the leads need to be hooked up to the fitting in place.
6. **Hanging & Support:** Before Air-Pro® welding begins, decide on a hanging/support strategy and prepare hardware needed for pipe clips. It might be helpful to mount a minimum number of pipe clips in aboveground installations. This will enable you to hang runs of pipe that are welded in the shop as they are produced and will aid in taking measurements as needed. Air-Pro® pipe clips are designed to easily snap on to an existing pipe run (shown below).

WELDING METHODS

All welding methods follow DVS Standard 2207-1 for PE-HD.

Air-Pro® is joined with either socket, butt or electrofusion fittings in the following sizes:

Size	1/2”	3/4”	1”	1-1/4”	1-1/2	2”	3”	4”	6”	8”	10”	12”
Socket	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Butt	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electro	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Air-Pro® has flanges and male (M) and female (F) threaded transition adapters in the following sizes:

Size	1/2”	3/4”	1”	1-1/4”	1-1/2”	2”	3”	4”	6”	8”	10”	12”
Flanges	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
M/F Adapters	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No

FUSION WELDING

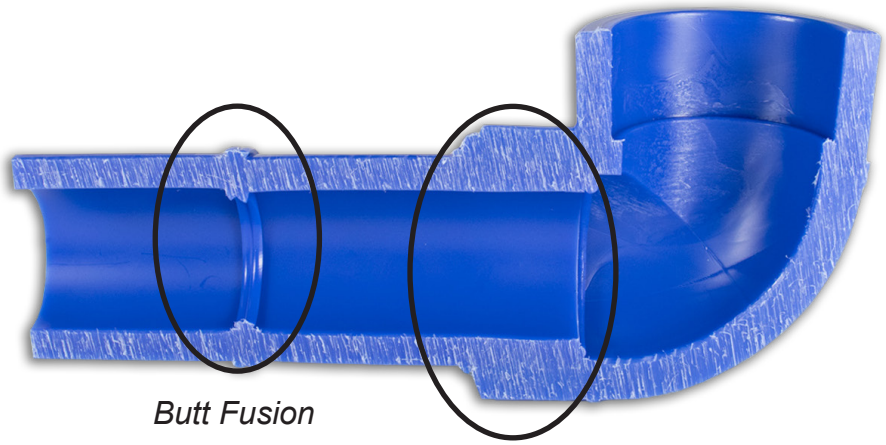
Socket and butt thermoplastic fusion joining results in a completely homogeneous weld. Heat fusion is the only method of joining thermoplastic pipes and fittings that requires no foreign material to affect the weld. The pipe and the fitting are brought to a molten state using a heating element. The heating element is removed and the two melted surfaces are joined and allowed to cool under pressure. The resulting weld becomes one homogeneous piece. The weld area has the same physical and mechanical strength as the pipe itself.

ASAHI/AMERICA WELDING APP

Asahi/America maintains an online welding parameter web application on its website (www.asahi-america.com/welding). The web app is located under the 'Resources' section in 'Online Tools' as 'Welding Parameter App'. This is where you can find current welding data for all tools used with Air-Pro® system.

SOCKET FUSION

Socket fusion melts the OD of the pipe and the ID of the fitting and brings them together in a molten state under pressure. Air-Pro® comes in sizes 1/2” to 4” with a full range of socket fittings available in all sizes. Sizes larger than 4” are joined with butt fusion or electrofusion only. Socket and spigot heater bushings are required (socket for pipe and spigot for fittings). Air-Pro® uses only DVS Type B heater bushings. The dimensions of the pipe and fittings are designed so that the pressure builds as the pipe is inserted into the fitting to make the weld. The result is a fusion bond the entire length of the socket depth with a double melt bead all the way around the outside where the pipe and fitting meet. If the weld is cut in half cross-sectionally, you would see only one seamless mass of material joining the pipe to the fitting.



Butt Fusion

Socket Fusion

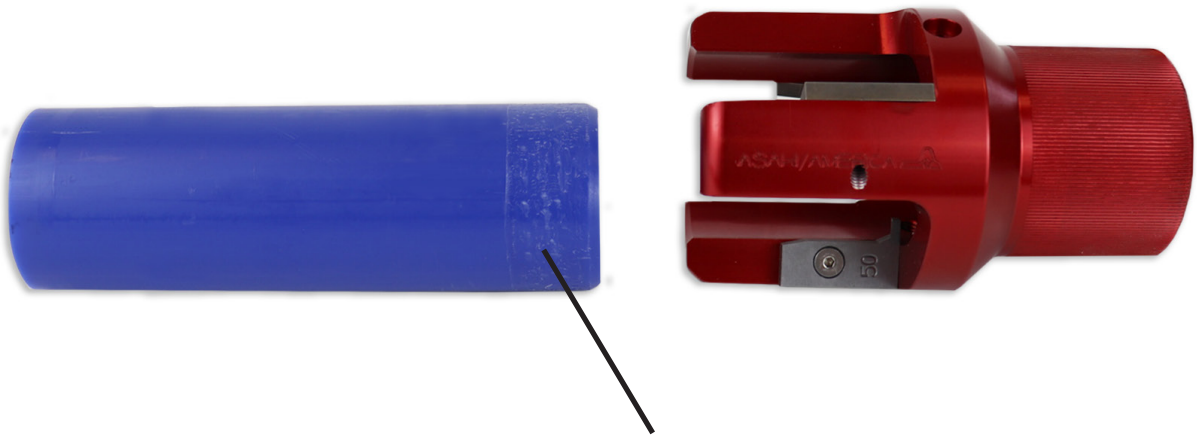
PREP TOOL

Socket fusion requires the pipe to be peeled with a PREP tool before welding. The tool is placed over the pipe end and inserted while turning it clockwise (either by hand or by drill) until the pipe bottoms out at the base of the cutting blades. PREP stands for Peel, Remove, Edge, Plane. This performs four functions:

1. Exposes a clean surface for welding
2. Bevels the end of the pipe slightly
3. Provides a mark for the insertion depth into the socket heater bushing
4. Prepare pipe end for welding per DVS Standards 2207 part 1

PREP tools are available in sizes 1/2" - 2" individually or as a set.

NOTE: Components should be cleaned before starting the welding process. If peeled pipe end or fitting gets dirty, it must be cleaned with 90% or higher IPA and a lint-free cloth. Cleaned pipe ends and fittings must be wiped with a clean dry cloth before welding. If pipe is dirty, clean before you prep.



Insertion Depth

Socket Fusion Welding Tools

B

There are two types of tools for socket fusion:

HAND SOCKET

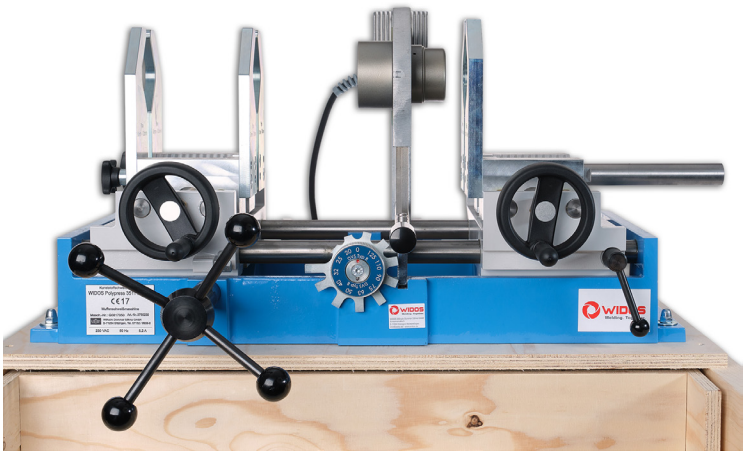
Hand socket tools are designed for manual socket fusion of sizes 1/2” to 2” and 1/2” to 4” respectively. They are meant for portable welding. A skilled pair of operators in the field can make hand socket welds in difficult locations. This tool requires manual force to insert and weld the components. The amount of force increases as pipe size increases. The tool is not meant to be the primary tool for shop work and it may not be practical to make multiple welds in sizes 1-1/4” and larger. Multiple welds in sizes 1”, 3/4” and 1/2” are certainly possible. The hand socket tool is most useful for making field position welds.

Hand Socket 2 Tool

Hand Socket 4 Tool

BENCH SOCKET TOOL

Bench socket tools are designed for shop use in sizes 1/2” to 4”. The pipe is clamped down in the tool to ensure aligned and repeatable welded joints. Pipe stands must be used to ensure the pipe is coming level and straight into the tool and to allow the pipe to move while making a weld.



Air-Pro® socket fusion weld charts are supplied on the Asahi/America weld web app and in the specific tool’s instruction manual.

Socket Fusion Welding Procedure Summary:

(Reference welding tool installation manual and detailed Asahi/America weld training courses for details.)

1. After making a measurement of the piece, cut pipe squarely and de-burr.
2. Clean and dry the pipe and fitting, if needed.
3. PREP pipe, making sure to note the insertion depth and make a back-up mark, if desired.
4. Check that the temperature of the heater bushings is 500° F.
5. Insert the pipe and the fitting onto the heater bushings to full depth.
6. After insertion, hold for the heat soak time.
7. Quickly remove the pipe and fitting and immediately insert the melted pieces together until the two melt beads meet, without twisting, and within the adjusting time.
8. Continue to hold fused piece with pressure until minimum cooling time has expired.

At this point, the finished piece can be carefully handled and moved.

BUTT FUSION

Butt fusion melts the ends of pipes and fittings and brings them together in a molten state under pressure. Technically, all sizes of Air-Pro® can be butt fused (pipe to pipe) without needing couplings. However, butt fusion is mostly done in sizes 1" and larger, because the internal weld bead is too restrictive in 3/4" and 1/2" sizes. Additionally, butt fittings are only available in sizes 2" and larger. Butt fusion fittings are the same ID and OD as the pipe for end-to-end welding. The heater plate is flat with a non-stick surface. Pipe and/or fitting preparation is done with a facing tool designed to plane and square the ends so no gap is present before welding. Pipe stands should be used to ensure the pipe is level coming into the clamps on the tool.

MINIPLAST® SHOP 4 TOOL

The Miniplast® Shop 4 tool is a compact butt fusion tool for shop or field welding. The size range is 1/2" to 4". The tool can be removed from the bottom frame to do field position welding. Clamps on the left side are fixed while the other side moves. It comes complete with all metric clamp sizes and accessories in a sturdy wooden box, which can be used as a bench to fasten the tool to for shop welding. Larger butt fusion tools come in shop and field versions.

Butt Fusion Welding Procedure Summary:

(Reference welding tool installation manual and detailed Asahi/America weld training courses for details.)

1. Cut measured pipe squarely (square cutting saves time in shaving).
2. Set pipe and/or fitting into clamps and tighten (leave approximately 1" past the clamps on both sides).
3. **Shaving:** Set shaving tool on bar and lock it down; close weld pieces on shaving tool with pressure and begin shaving until continuous ribbons come off (ribbons should be the length of the circumference of the pipe). Remove shaving tool and bring pieces together for final visual inspection before welding. Pieces should contact all the way around with no gap.
4. **Initial Melt:** Open the pieces and set the heater plate on the bar; bring pieces onto heater plate and come to initial melt pressure; visually inspect pieces while waiting for melt bead to form all the way around.
5. **Heat Soak:** Once melt is visible, take pressure down to almost zero and begin counting heat soak time. Almost zero pressure keeps the bead from getting larger during heat soak. Pieces must be touching the heater plate during heat soak.
6. **Welding:** Once heat soak time has elapsed, quickly open the bed and remove the heater plate, then immediately bring the melted pieces together and apply weld pressure within the change-over and force ramp times.
7. **Cooling:** Allow joint to cool undisturbed for the minimum allotted cooling time, then carefully take the welded piece out of the tool and set it aside for the remainder of the total cooling time, if any.

ELECTROFUSION (EF)

Electrofusion fittings are available in most sizes and are rated at 150psi for compressed air/gas applications. Air-Pro®, electrofusion fittings are important for difficult field welds that can't be socket or butt fused; however, electrofusion is typically not used as the primary joining method for Air-Pro®. Once pipes are peeled to expose virgin material and prepped, and fittings are in position ready to be welded, the tool welds the joint automatically with the push of a button. Electrofusion welding can be done in temperatures from 14° F to 122° F. The maximum allowable ovality of the pipe is 1.5% for SDR 7.4 and 11.

POLYMATIC ELECTROFUSION WELDER

The Polymatic is a portable tool, designed for making position welds in the field or the shop. For field welding, the tool base is placed in close proximity to the welding location. Two leads on long electrical cords are hooked to two electrical connections on the fitting and the joint is automatically fused in place.

Electrofusion Welding Procedure Summary:

1. Cut pipes squarely.
2. Mark pipes half the length of the EF coupling or socket depth of the fitting.
3. Peel pipes up to the mark – peeling depth minimum 0.2mm (peeling may be done by scraping in axial direction or by rotational peeler).
4. Do not touch the peeled surfaces or inside surface of the fittings. If there is contamination of the weld areas, clean with isopropyl alcohol and dry the surfaces before welding.
5. Insert fitting onto pipes up to the mark (if fitting is too tight to push onto the pipe, a secondary peeling is necessary).
6. If pipes are out of round, install re-rounding clamps.
7. Install pipe clamping device on both sides of the fitting to hold weld areas still while fusing joint. It is possible to EF weld without the clamping device as long as the joint is completely stress-free and weld preparation adheres to DVS 2207 part 1.
8. Connect the two leads from the tool to the two posts on the fitting. The tool will acknowledge continuity and prompt through the remaining steps.
9. Tool steps:
   - Press the green start key. The display will show time, temperature, and voltage
   - Scan in welding parameters via a reading pencil; audio signal will sound
   - Acknowledge information and that joint preparation has been done properly
   - Weld the joint. The tool will automatically conduct the weld and audio signal when done
   - Visually inspect that fitting melt indicator posts are exposed, showing there was fusion

ABOVEGROUND INSTALLATIONS

Air-Pro® may be installed aboveground either indoors or outdoors. Work should be carefully planned based on the following important factors:

- Maximum and minimum external temperatures the pipes will be exposed to should be determined
- An acceptable strategy must be adopted for handling expansion and contraction, including support spacing, pipe clips, pipe supports, restraints, offsets and loops should all be determined and located
- Shop welding (pre-fabricating) should be maximized as much as possible
- Field welding should be minimized and field position welds should be determined
- Training and certification is required for all personnel doing socket and/or butt fusion welds in the field
- All fusion tool operators need to be trained and certified and take all necessary safety precautions

BELOW GROUND INSTALLATIONS

Air-Pro® may be installed below ground. Work should be carefully planned based on the following important factors:

- Traffic loads above the buried Air-Pro® pipes should be considered and proper burial depths and soil compaction should be determined
- Mechanical joints should not be buried
- Most fusion joining should be done outside trenches

HORIZONTAL DIRECTIONAL DRILLING (HDD) APPLICATIONS

Air-Pro® can be installed by horizontal directional drilling (HDD). Contact Asahi/America's engineering department for assistance with HDD applications.

SECTION C

APPENDIX

AIR-PRO® SPECIALLY FORMULATED PE SPECIFICATION

Blue Polyethylene (PE)
Compressed Air Piping System

MATERIAL

ASTM D3350 cell classification PE445574E or better. Resin shall comply with FDA Code of Federal Regulators (CFR), Title 21, Chapter 1: Section 177.1520 determining suitability for contact with foodstuff.

Meets Cal/OSHA requirements for transport of compressed air.

PIPE PRODUCTION

Dimensions and tolerances shall exceed ISO DIN 8074 requirements.

FITTING PRODUCTION

Dimensions and tolerances shall exceed ISO 15494 requirements.

PRESSURE RATING

Components shall be pressure rated in accordance with ASTM D2837 and DIN 8074 and 8077 for hydrostatic design basis. Components shall be manufactured to standard dimensional ratio (SDR) 7.4 and 11.

Based on continuous service life of 50 years at 68° F (20° C).

SDR 7.4: 230psi (PN16)
SDR 11: 150psi (PN10)
PN = Nominal pressure in bar.

JOINING

Preferred methods shall be according to the schedule below:
DVS 2208-1 Socket: 1/2” (20mm) - 4” (110mm)
DVS 2207-1 Contact Butt: 2” (63mm) - max product size

SPECIFIC MATERIAL PROPERTIES FOR PE

	Property	Standard	Unit	PE100
	Density at 23°C	ISO 1183	g/cm^3	0.95
	Melt flow index MFR 190/5 MFR 190/2, 16 MFR 230/5 MFI range	ISO 1133 ISO 1872/1873	g/10min	 0.3 <0.1 T003
Mechanical Properties	Tensile stress at yield	ISO 527	MPa	25
	Elongation at yield	ISO 527	%	9
	Elongation at break	ISO 527	%	>600
	Impact strength unnotched at +23°C Impact strength unnotched at -30°C	ISO 179	kJ/m^2	no break no break
	Impact strength notched at +23°C Impact strength notched at 0°C Impact strength notched at -30°C	ISO 179	kJ/m^2	16 6
	Ball indentation hardness acc. Rockwell	ISO 2039-1	MPa	46
	Flexural strength (3.5% flexural stress)	ISO 178	MPa	24
	Modulus of elasticity	ISO 527	MPa	1100
Thermal Properties	Vicat-Softening point VST/B/50	ISO 306	°C	77
	Heat deflection temperature HDT/B	ISO 75	°C	75
	Linear coefficient of thermal expansion	DIN 53752	$K^{-1} \times 10^{-4}$	1.8
	Thermal conductivity at 20°C	DIN 52612	W/(mxK)	0.4
	Flammability	UL94 DIN 4102	–	94-HB B2
Electrical Properties	Specific volume resistance	VDE 0303	OHM cm	$>10^{16}$
	Specific surface resistance	VDE 0303	OHM	$>10^{13}$
	Relative dielectric constant at 1 MHz	DIN 53483	–	2.3
	Dielectric strength	VDE 0303	kV/mm	70
	Physiologically non-toxic	EEC 90-128	–	Yes
	FDA	–	–	Yes
	UV stabilized	–	–	carbon black
	Color	–	–	black

STATEMENT OF USE

The following information is intended to provide a general overview of pressure testing requirements for Air-Pro® specially formulated PE compressed air/gas piping systems. The customer, contractor and design firm should agree upon pressure test criteria applicable to their system and follow all local codes or governing agencies. The testing recommendations are in accordance with ASME B31.3 PIPING & ASME NM1 Testing.

SAFETY

- Air-Pro® testing should be done hydrostatically as set forth in the following procedures. This is primarily recommended as a safety precaution.

- If a hydrostatic test is not practicable, as an alternate, a pneumatic test may be performed using air. Observe caution due to the hazard of a sudden release of air. Verify that all pipes are fastened down properly and all welds and mechanical connections were done correctly prior to performing the test.

- Before pressure testing, all welded joints must be completely cooled down (one hour after the last welding process)

NOTE

Asahi/America's Air-Pro® pipe:

- 20 - 110mm (1/2” - 4”) SDR 7.4 is rated for 230psi at test conditions of between 40° F and 90° F

- 160 - 315 mm (6” - 12”) SDR 11 is rated for 150psi at test conditions of between 40° F and 90° F

TEST PRESSURE

The minimum hydrostatic test pressure shall be per the following equation:
P_T = 1.5 x P_D where:
P_T = Minimum Test Pressure
P_D = Design Pressure

APPARATUS & EQUIPMENT

- Equipment used to isolate sections shall be rated equal or higher than test pressure to be applied
- Air release devices should be located at every high point
- Follow local jurisdictions for supply and disposal of water test media
- Pressure regulators and gauges must be utilized in order to ensure accuracy and safety

PRELIMINARY HYDROSTATIC TEST

Fill the system with water at a rate that does not exceed the capacity of the high point vents to release air.

Apply incremental pressure to achieve test requirement of 1.5 times the design pressure. Apply pressure at the rate of 5 - 10 lbs/min. Recommended to stop at 10psi and check system for leaks.

Do not exceed the lowest pressure rated component in the system or remove the low pressure rated items during system pressure test.

The pipe system will expand during initial pressurization, which will result in pressure loss. Check the pressure gauge after 30 minutes at full pressure. If there is a decrease of less than 10% of the total pressure and no indication of leakage, repressurize the system to required pressure.

PRIMARY STATIC TEST

Repressurize the system to the test pressure and monitor for another 30 minutes. All joints and connections shall be examined for leakage. Pressure loss of more than 5% of total pressure is considered a failure. Locate the leak and repair.

PRECAUTIONS:

Pneumatic testing involves a possible hazard due to possible sudden release of energy stored in compressed gas. Air-Pro® is designed for compressed air/gas applications and as such, the system is suitable for pneumatic testing. Prior to testing, all fusion joints and mechanical joints should be inspected to assure nothing is loose and that the connections were made properly. All pipes should be properly fastened to the support system.

TEST PRESSURE

The minimum test pressure shall be per the following equation:

$P_T = 1.1 \times P_D$ where:
P_T = Minimum test pressure
P_D = Design pressure

APPARATUS & EQUIPMENT

- Equipment used to isolate sections shall be rated equal or higher than test pressure to be applied
- Pressure regulators and gauges must be utilized in order to ensure accuracy and safety

PRELIMINARY PNEUMATIC TEST

Apply incremental air pressure to achieve test requirement of 1.1 times the design pressure. Do not exceed the lowest pressure rated component in the system or remove the low pressure rated items during system pressure test.

Apply pressure at the following rate: 10% per minute

Stop pressurizing at between 5 - 10psi and check system for leaks. The pipe system will expand during initial pressurization, which will result in pressure loss. Check the pressure gauge after 30 minutes at full pressure. If there is a decrease of less than 10% of the total pressure and no indication of leakage repressurize the system to required pressure.

PRIMARY STATIC TEST

Repressurize the system to the test pressure and monitor for 30 minutes. Pressure loss of more than 5% of total pressure is considered a failure. Locate the leak and repair.

Owner's Name: _____

Contractor's Name: _____

Project Name: _____

Contact Name: _____

Contact Email: _____

Contact Phone: _____

APPLICATION INFORMATION

Compressed Air or Gas? Specify_____

Concentration: _____

Instrument Air? Yes / No

Process Air? Yes / No

Dew Point of Air: _____ (°F)

Maximum Operating Pressure:

Positive _____ (psi)

Negative/Vacuum _____(-psi) or inch (Hg) or (H_2O)

Media Operating Temperature: Max. _____ Min. _____ (°F)

External Temperature Range: Max. _____ Min. _____ (°F)

Total System CFM Requirement: _____ (CFM)

Approx. Total Footage of Pipe: _____ (ft.)

Approx. Total Number of Fittings: _____ (90's) (45's) (Tees)

Indoors? Yes / No

Outdoors? Yes / No

Buried? Yes / No

Corrosive Environment? Yes / No Specify: _____

INSTALLATION INFORMATION

Owner/Contractor has own tools? Yes / No

Rental tools required? Yes / No

Owner/Contractor will need tool training and certification? Yes / No

Project requires some factory pre-fabrication? Yes / No

Please include any additional information, considerations, comments or questions below

AIR-PRO®

Thermoplastic Compressed Air Piping System

by ASAHI/AMERICA

ASAHI/AMERICA®
Your Experts in Plastics™

Another Corrosion Problem Solved.™

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