

AIRCOM PIPING

TECHNICAL CATALOGUE

JANUARY 2006



OMEGA

CERTIFICATE



Certificato Nr 50 100 4121

Si attesta che / This is to certify that

IL SISTEMA QUALITÀ DI THE QUALITY SYSTEM OF

> AIRCOM SRL **VIA GARIBALDI 65** I-16040 NE' (GE)

É CONFORME AI REQUISITI DELLA NORMA HAS BEEN FOUND TO CONFORM TO THE REQUIREMENTS OF

UNI EN ISO 9001:2000

Questo certificato é valido per il seguente campo di applicazione This certificate is valid for the following product or service range

Progettazione e produzione di tubi, raccordi valvole ed accessori in materiale termoplastico per la distribuzione di aria compressa e fluidi; commercializzazione di tubi in alluminio, raccordi, valvole ed accessori per la distribuzione di aria compressa e fluidi (EA 14, 29a)

Design and manufacture of thermoplastic pipes, fittings, valves and components for compressed air and fluid distribution; trade of aluminium pipes, fittings, valves and components for compressed air and fluid distribution (EA 14, 29a)

Data/date 2004-03-16

Lead Auditor: Fabricio Sertori

Data di scadenza/Expiry date 2006-12-03

Per l'Organismo di Certificazione For the Certification Body TÜV Italia S.r.I. Cinisello Balsamo (MI)









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CONTENTS

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PRODUCT DESCRIPTION	PAG.	4
Fields of application		7
PRODUCT INSTALLATION		8
Expansion and contraction		9
Anchoring		12
ASSEMBLY INSTRUCTIONS		13
DESIGN AND TESTING		16
PRODUCT CHART		22
CONVERSION CHART (millimetres to inches)		23
NOTES		23



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PRODUCT DESCRIPTION





The OMEGA AIRCOM PIPING system has been designed and built for installation on compressed air distribution systems.

The materials and types of joint used offer a flexible system that can be integrated with all systems and solve all the problems and meet all the requirements of even the most complex systems.

In spite of rapid installation times, the system offers perfect air tightness, considerable mechanical resistance and long-term efficiency.

CORROSION

The aluminium alloy and hot electro-painting system used for the tubes and the engineering plastics used for the unions protect the piping from internal and external decay and corrosion. This allows product life to be guaranteed for at least 50 years in normal operating conditions.

SHOCK RESISTANCE

The materials use to product the elements offer excellent mechanical, internal pressure and external shock resistance. The piping can easily withstand violent knocks and shocks.

UV RADIATION

Aluminium is totally unaffected by UV radiation and the system can therefore be installed both indoors and outdoors.

FIRE RESISTANCE

Aluminium offers excellent fire resistance as it neither feeds nor generates flames.

FLOW RATE

The OMEGA AIRCOM PIPING system offers excellent flow rates given its low coefficient of friction, the large internal section of the piping and the absence of obstacles or bottlenecks.

INSTALLATION

The OMEGA AIRCOM PIPING system is extremely flexible and can be used together with any kind of piping.

The speed and simplicity of installation totally eliminate system start-up times.

DIMENSIONS AND CONFORMITY

All the components of the OMEGA AIRCOM PIPING system comply with national and international legislation governing pressurised fluid piping.

COMPATIBILITY WITH COMPRESSOR OILS

The aluminium and engineering polymers used to produce the OMEGA PIPING system are compatible with compressor lubrication oil.

Please ask OMEGA COMPRESSORS for a compatibility table.



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PRESSURE/TEMPERATURE CURVE

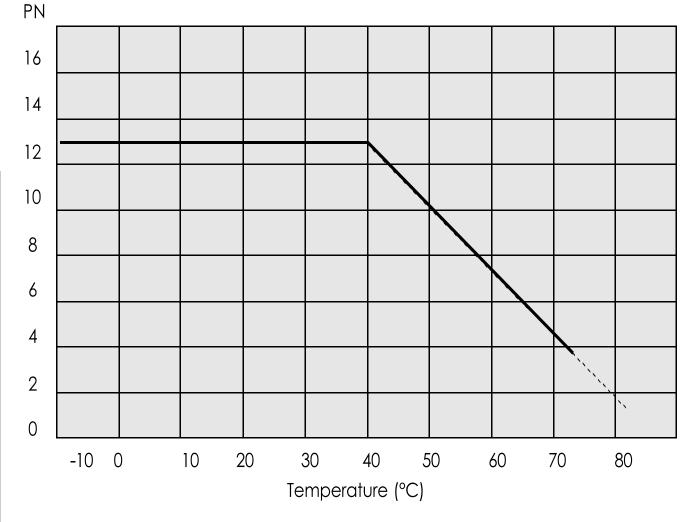
Pn 12 means that the components of the OMEGA AIRCOM PIPING can be used at a constant pressure of 12 bar.

Increases in temperature generate decreases in rated pressure as shown by the curves in the following graphs.

PRESSURE/TEMPERATURE CURVE WITH THE ALUMINIUM PURESTREAM









PHYSICAL CHARACTERISTICS

Characteristics Unit		Temperature	Values
Density	Kg/dm³		2,7
Modulus of elasticity	KN/mm³		69
Thermal expansion	µ°C-¹	20°-100°	23
Thermal conductivity	W/(m . K)	20°	200
Specific heat	J/(Kg . K)	0°-100°	880-900
Specific resistance	n W m		33
Melting point t range	°C		600-655

TABLE OF COMPARISON FOR ALLOYS

AIRCOM	DIN Werkstoff nr	ASTM B 241	UNI	
6060	AIMg5i 0,5 3.3206	A96063 T5	3569 - 9006/1	

MECHANICAL CHARACTERISTICS

6060 T6	
Rm N/mm ²	205
R p (02) N/mm2	165
A %	10
MB	60-80

CHEMICAL COMPOSITION

Alloy	Al	Mg	Si	Fe	Mn	Zn	Cv	Impur
6060	Resto	0,35-0,60	0,30-0,60	0,3	0,10	0,10	0,10	0,05-0,15

FIELDS OF APPLICATION

1. COMPRESSED AIR

The OMEGA AIRCOM PIPING system was mainly designed to convey COMPRESSED AIR up to a pressure of 12 bar. The product range can be used to build systems featuring a production unit, treatment lassembly loop distribution system and all external connectors.

A set of special elements rapidly and effectively solves all specific installation problems connected with compressed air.

2. OTHER USES

Inert gases

Negative pressure systems

Compatibility of liquid foodstuffs (please contact the OMEGA technical dept.)

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PRODUCT INSTAURATION



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EXPANSION AND CONTRACTION

All materials change size as a result of temperature variations; plastics generally change much more than metals.

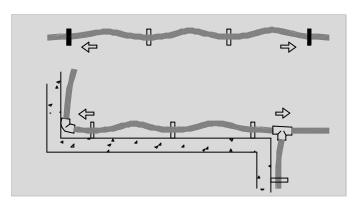
Compared with a reference temperature (at installation):

they expand when the temperature rises,

they contract when the temperature falls.

The main consequences of contraction and expansion are:

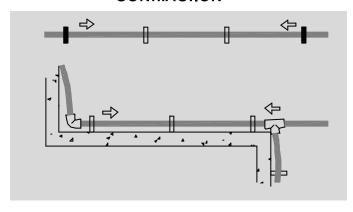
EXPANSION



deformation of the piping between two fixed points

compression of fixed fittings, connections or equipment with the risk of deformation, detachment of glue and/or breakage

CONTRACTION



Pulling of the piping between two fixed points

Compression of the fixed fittings, connections or equipment with the risk of deformation, detachment of glue and/or breakage.

To prevent the effects of expansion/contraction from causing serious damage to the system and making it look unattractive, do the following to allow the piping to move freely and compensate expansion/contraction:

Support and clamp the system so that the piping can move freely between two fixed points.

If the distance between the two fixed points is such as to involve considerable contraction/expansion, fit an expansion joint between them.

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These variations can be measured using the linear expansion coefficient d

For the OMEGA AIRCOM PIPING with aluminium tube, the coefficient d is 0.024 mm/m/°C

that is, 0.024 millimetres per metre per degree centigrade

A comparison of the linear expansion coefficients of some frequently used materials is shown below:

Steel	12,8 x 10 ⁻⁶ m/m °C
Copper	16,5 x 10 ⁻⁶ m/m °C
Aluminum	24 x 10 ⁻ 6 m/m °C
OMEGA AIRCOM	75 x 10 ⁻⁶ m/m °C
ABS	101 x 10% m/m °C
PVDF	120 x 10⁴ m/m °C
PP	150 x 10⁴ m/m °C
PE	200 x 10 ⁻⁶ m/m °C

The design and construction of any system must consider this phenomenon which can be calculated using the following formula:

$$?L = d \times L \times ?T$$

where: **d** = linear expansion coefficient

L = length of piping

?T = temperature difference in degrees centigrade

? L = difference in length (expansion or contraction)

e.g.: installation temperature +10°C; length of piping 20 m; operating temperature 35°C

$$?T = 35 - 10 = 25$$
°C

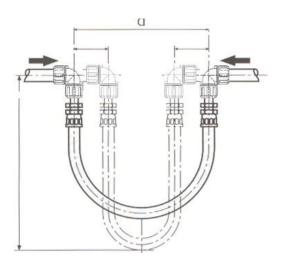
? L= 0,024 x20 x 25 = <u>12 mm</u>

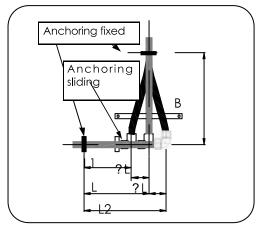
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Two of the most effective expansion joint systems are the "LIRA" (or OMEGA) and the "CHANGE OF DIRECTION".

The LIRA and CHANGE OF DIRECTION comprise elbows and tubes; as they are perfectly compatible with the system and cheap and easy to fit, we consider them to be the best solution to expansion/contraction, unless there is some special reason why they cannot be used.

LIRA





CHANGE OF DIRECTION

L: length of piping at installation

L1: length at minimum temperature

L2: length at maximum temperature

? L: difference in length between L1 and L2

B: arm length of "lira" or "change of direction"

To determine the arm length B of LIRA or CHANGE OF DIRECTION, use the following TABLE showing the tube diameters and the relative differences in length ? L.

Reference TABLE

Diameter (mm)	Hose length (m)
16	1.20
20	1.40
25	1.60
32	1.80
40	2.00
63	2.40



ANCHORING

Take great care when choosing the piping supports and clamps. These must have the following features:

- ? the supports must fix the piping to the structure of the building;
- ? they must not scratch or in any way damage the piping;
- ? they must leave enough room between the wall or other obstacles for maintenance work, etc.;
- ? they must keep the piping perfectly straight, support its weight together with that of all the sliding accessories, and fix it well to the anchors;
- ? take great care when clamping the accessories and valves. Given that these are subject to stress when they are used, they must be fixed separately from the piping and be able to be used and dismounted;
- ? take great care when clamping the pipe ends (covers, wall assemblies, drop lines).

DISTANCES BETWEEN SUPPORTS



The DISTANCES between the supports are determined according to the diameter of the piping and the temperature and weight of the conveyed fluid as shown below:

Diameter	Distance expressed in metres according to temperature							
mm	< 20°C	30°C	40°C					
16	3	2,5	2					
20	3,5	3	2,5					
25	4	3,5	3					
32	4,5	4	3,5					
40	5	4,5	4					
63	5	4,5	4					

Do not fix sliding supports near unions or other accessories as otherwise the tube may not slide freely.

For horizontal or vertical tubes installed from 0 to 250 cm from the ground, double the number of supports in order to ensure the piping is perfectly anchored to the structure.

ASSEMBLY INSTRUCTIONS

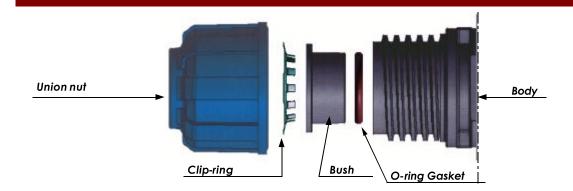


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The OMEGA AIRCOM PIPING series of unions can be connected to the aluminium tube.

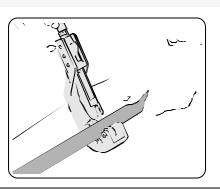
Assembly is extremely quick and easy and does not require expensive and complicated equipment. Just a few steps are required to fit a joint.

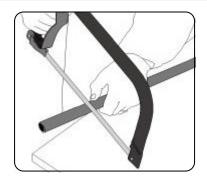
YOU MUST ALWAYS INSPECT THE PRESENCE OF ALL COMPONENTS AND THEIR CORRECT INSERTION



After checking the surface of the tube (there must be no relevant scoring, abrasions, dents that could cause leaks), make a **clean**, **straight cut** to the required size.

Cut the tube as near as possible to a right-angle (90° compared with the axis of the tube).

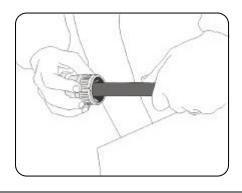


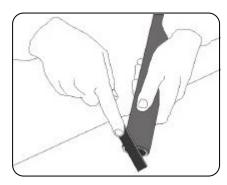


Chamfer carefully the external edge of the cut and remove any burrs and/or cutting residue along the inside edge as indicated in the pictures below or with instruments fitting to the purpose.

Remove any cutting residue, dust, and swarfs from the inside of the tube in order to prevent future problems with the compressed air equipment.

THE ABSCENCE OR NOT SUITABLE EXECUTION FOR THAT ACTION COMPROMISES THE INSERTION OF THE TUBE INTO THE SOCKET.





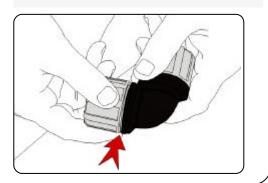


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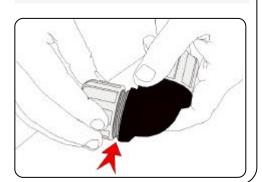
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Tighten the ring nut of the union without forcing it excessively:

reduce the distance between the body and the ring nut in the area indicated by the arrow.

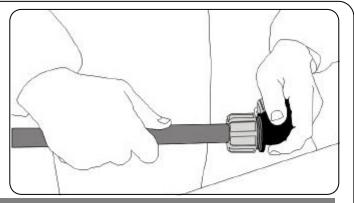


Unscrew the ring nut by half a turn: this will increase the distance between the body and the ring nut in the area indicated by the arrow.



Fit the tube into the union and push until it comes to rest against the stop.

To simplify this operation, grease the end of the tube and/or the contact surface of the O-Ring with Vaseline or other slip agents.

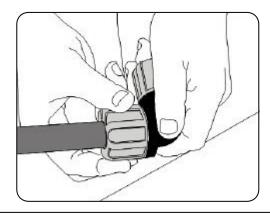


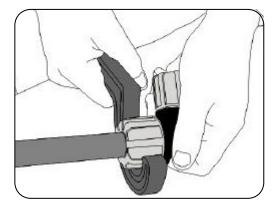
STOP

Do not use slip agents, oil or grease unless you are sure they are compatible. IF IN DOUBT, ASK US!



Fully tighten the ring nut. Sizes from *d* 12 to *d* 25 can normally be tightened by hand. Larger diameters can be tightened by hand and then with an appropriately sized pin wrench.





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OMEGA AIRCOM PIPING system joints do not require waiting times after installation; **the system can be pressurised immediately**.

After raise steam the system, control the shutting of all nuts and in case tighten them.

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DESIGN AND TESTING





1. GENERAL

The need for continuous developments, expansions and modifications to factory production lay-outs, together with evolutions in production technology with a strong emphasis on automation, require flexible and generously sized compressed air systems to be installed.

2. VIBRATIONS

Similarly to other energy sources, compressors produce vibrations that can damage the system. Never connect rigid OMEGA AIRCOM tubes to the compressor; use hoses instead.

If tubes must be connected to sources of vibrations, isolate them with flexible supports.

3. UV RADIATION

OMEGA AIRCOM UNIONS

Similarly to all thermoplastics, the engineering polymers used for the unions are sensitive to direct UV radiation (direct exposure to sunlight), while they withstand indirect UV radiation (behind a window or other protective shield). For outdoor installation and all other cases of direct exposure to UV radiation, shield the unions (anti-UV paint, lagging, aluminium film, etc.).

OMEGA AIRCOM Aluminum tube

The aluminium tube offers excellent UV resistance and can therefore be installed outdoors without any special protection.

4. SHOCK PROTECTION

Though the piping conveying compressed air must legally be fixed at least 2.5 metres from the ground, thereby making it unlikely to be hit, if the OMEGA AIRCOM system is installed at lower heights, even for short distances, it must be suitably protected as, though it is flexible, OMEGA AIRCOM piping cannot withstand violent impacts, especially from sharp points or cutting edges.

5. COLOUR

Pursuant to the UNI 5634-65 or NF A 571 standards, piping conveying compressed air must be painted light-blue. The OMEGA AIRCOM Aluminium system is powder electro-painted light-blue and offers excellent resistance to corrosion.

6. SOURCES OF HEAT

OMEGA AIRCOM Aluminum tube

The Aluminium tube can withstand temperatures up to 80 °C. The previous points also apply.





SIZING

The main line is a closed loop system.

The lines should slightly incline downwards (2‰) towards a condensation collector and drain.

The piping should be large enough to cater for the maximum air flow required for the rated operating pressure, in order to minimise pressure drops that are simply a waste of energy.

The maximum quantity of air required for each drop line is based on maximum consumption. Each drop line, multiplied by a factor (between > 0.1 and 1) representing the frequency of use of the connected equipment, will give average consumption.

The sum of the average consumption of all the drop lines will give the maximum air flow required for the main line. A percentage is added to this value for prudential reasons and future growth requirements. After obtaining the maximum air flows required for each drop line and for the main distribution line, the sizing of each pipe can easily be calculated from the tables.

Elements for calculating flow rates

The friction coefficient of the OMEGA AIRCM PIPING Systems offers much higher rates of flow than traditional products.

The following table shows the rates of flow in SRA – Standard Reference Atmosphere - at 20° C in litres/minute for a pressure drop of 2.5% every 100 metres.



MAXIMUM FLOW RATE L/M (SRA)

Diameter of tube

bar	16	20	25	32	40	63
1	195	230	420	820	1.480	5.120
3	530	620	1.160	2.240	4.160	12.420
5	860	1.010	1.890	3.640	6.430	21.500
7	1.140	1.360	2.560	4.960	9.100	29.870
10	1.630	2.050	3.840	7.350	13.600	45.300
12	2.100	2.450	4.650	8.650	15.700	55.800
16	2.800	3.250	6.200	10.900	18.600	71.400

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NORMOGRAM FOR DETERMINING DIAMETER, FLOW RATE, PRESSURE DROP AND PRESSURE

1. Calculating the (external) diameter of the tube according to pressure, flow rate and permitted pressure drop:

draw a straight line from the pressure value (C axis) to the pressure drop value (A axis) meeting the R axis in X;

draw a straight line from the flow rate value (axis A) to X intersecting the B axis on the diameter to use;

2. Calculating the flow rate according to diameter, pressure, and permitted pressure drop:

draw a straight line from the pressure drop value (A axis) to the pressure value (C axis) meeting R in X;

draw a straight line from X to the diameter value (B axis) and a straight line intersecting the A axis on the flow rate value;

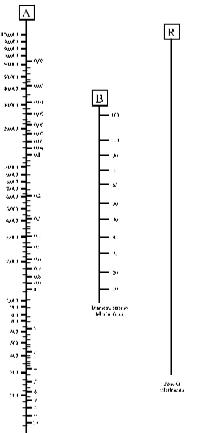
3. Calculating the pressure drop according to diameter, pressure, and flow rate:

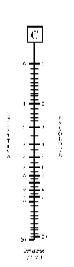
draw a straight line from the flow rate value (A axis) to the diameter value (B axis) intersecting the R axis in X;

draw a straight line from X to the pressure value (C axis) intersecting the A axis on the pressure drop value.

The flow rate is expressed in SRA = real flow rate of effective pressure (P+1) in bar.

Temperature correction factor: $\frac{273}{288}$ flow rate at 0°C = flow rate at 15°C x





NORMOGRAM at 15°C



The pressure drops in piping are caused by several factors:

- ? Friction in piping
- ? Changes of direction and curves
- ? Obstructions (valves, etc.)
- ? Gradual or sudden changes in cross-sections

It is therefore necessary to use equivalent lengths in tubes of the same diameter for all types of unions; these will be added to the length of the tube when calculating the design length "L".

PRESSURE DROPS OF UNIONS

Equivalent length of tube in metres

Ext. diam of tube	Coup. sleeve and union	90° elbow	45° elbow	Ti in line	Ti in deriv.	Single reducer	Double reducer	180° curve
16	0,1	0,3	0,15	0,1	0,7	0,45	0,55	0,25
20	0,15	0,4	0,2	0,15	0,85	0,55	0,65	0,35
25	0,2	0,5	0,25	0,15	1,05	0,7	0,9	0,45
32	0,25	0,6	0,3	0,2	1,35	0,9	1,15	0,55
40	0,3	0,8	0,4	0,25	1,7	1,1	1,4	-
50	0,4	0,95	0,5	0,35	2,15	1,35	1,7	-
63	0,5	1,25	0,6	0,45	2,7	1,7	2,3	-



TESTING

All the articles in the OMEGA AIRCOM PIPING System are produced according to European legislation, they are tested during all the phases of the production process and afterwards.

All products are guaranteed for use within the limits indicated in this technical document and satisfy the ESR (Essential Safety Requirements) pursuant to directive 97/23/EC PED.

The installations and systems produced with the OMEGA AIRCOM PIPING System are also guaranteed as long as the products are used and mounted according to the present specifications and limits.

During installation and afterwards certain checks and final testing should be performed.

INSPECTION 1.

After assembly, check that there are no faults, knocks, cuts, abrasions and make sure that the clamps and the line assembly comply with design specifications. In the event of problems, promptly replace the faulty parts or those parts that do not comply with design specifications.

AIR LEAK TESTING

Immediately after the last joint

PRESSURE TESTING

Pressure tests are performed with water at a pressure of least 1.5 times the maximum planned or designed operating pressure. Any components (valves, reducers, filters etc.) with lower test pressures should be appropriately isolated.

The "pneumatic" pressure test can be performed at values ranging from 1.2 to 1.5 times operating pressure, but only if the following conditions are respected:

- When the layout of the system does not allow it to be completely filled with water.
- b. When the system is working, it must contain no traces of the test liquid.

Pneumatic tests should be performed as follows:

- The test fluid must not be a flammable or toxic gas (nitrogen is better than air).
- Before reaching the planned test pressure, perform a preliminary test up to a maximum of 1.5 bar in order to identify any leaks and/or incomplete or imperfect joints in advance. After performing the checks and making the relative adjustments, keep the pressure at 1.5 bar and wait at least 5 minutes before increasing it.

For both the above test methods, increase the pressure gradually and constantly (1 bar every 4÷6 seconds) until you reach half the test pressure.

Then slowly increase the pressure by "steps" of about one tenth of the maximum test value, waiting 5÷10 seconds every time.

Once the test pressure is reached, it must remain constant (without any appreciable drops) for at least 10 minutes.

START-UP

After performing the above procedures, clean and dry the system with compressed air, leaving one or more points in the system open in order to eliminate all the foreign bodies and dry the system.

After the first 48 to 96 hours of operation, check all the joints and make sure all the ring nuts are tight as these may have loosened due to the settling of the components.



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	DESCRIPTION	CODE*	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE
}	Aluminum Pipe	TUAL	12	16	20	25	32	40	50	63	80
	Double Bend	SCI	12	16	20	25					
	90° Elbow f/f	GO9010	12	16	20	25	32	40	50	63	80
	45° Elbow f/f	GO4510			20	25	32	40	50	63	
	Equal Tee	TE10	12	16	20	25	32	40	50	63	80
	Equal Pipe Tee to Female NPT	TP10	20x1/2"	25x1/2"							80x2 1/2"
	Reducing Tee	TR10		16x12	20x12 20x16	25x12 25x16 25x20	32×20 32×25	40x20 40x25 40x32	50x25 50x32 50x40	63x25 63x32 63x40 63x50	
	Coupling	MA10	12	16	20	25	32	40	50	63	80
	Reducing Coupling	RID10				25×20	32×20	40x32	50×40	63x50	
	Pipe Coupling to Male NPT Thread	MN10	12x1/4" 12x3/8" 12x1/2"	16x3/8" 16x1/2"	20x1/2" 20x3/4"	25x1/2" 25x3/4" 25x1"	32x1" 32x11/4"	40x1" 40x11/4" 40x11/2"	50x11/2" 50x2"	63x2" 63x21/2"	
	Pipe Coupling to Female NPT Thread Brass Body	MPM10			20x1/2" 20x3/4"	25×1″	32x11/4"	40x11/2"	50x2"	63x21/2"	
	Pipe Coupling to Male NPT Thread Brass Body	MNM10			20x1/2" 20x3/4"	25x1"	32x11/4"	40x11/2"	50x2"	63x21/2"	80x21/2" 80x3"
	Union Adapter to Female NPT Thread Brass Body	BP10				25x1"	32x11/4"	40x11/2"	50x2"	63x21/2"	
	End Cap	CA10			20	25	32	40	50	63	80
	Quick Branch Drop Leg	DER10				25x12 25x16 25x20	32x12 32x16 32x20	40x12 40x16 40x20 40x25	50x16 50x20 50x25	63x20 63x25 63x32	80x20" 80x25" 80x32"
	Quick Branch Drop Leg to Brass Female NPT Thread	DERFF				25x1/2″	32x1/2"	40x1/2" 40x3/4"	50x1/2" 50x3/4"	63x1/2" 63x3/4" 63x1"	80x1/2" 80x3/4" 80x1"
	Two Port Wall Mount Manifold f/f Brass NPT	APL	12x1/2"x1/2"	16x1/2"x1/2"	20x1/2"x1/2"	25x1/2"x1/2"	1/2" Inlet x1/2"x1/2"	3/4" Inlet x1/2"x1/2"			
	Elbow for Wall Mounting F/F Thread, Brass NPT	GM	1/2"x1/2"								
	Elbow for Wall Mounting M/F Thread, Brass NPT	GMMF	3/8"x3/8"	1/2"x1/2"	3/4"x3/4"						
	Quick Line Ball Valve	VA10	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"			
G	Pipe Bracket	FE	12	16	20	25	32	40	50	63	80
	Pipe Bracket c/w M8 Threaded Inserts	FEM8			20	25	32	40	50	63	80
	Flexible Expansion Hose	FLEX			20	25	32	40	50	63	

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MILLIMETERS INCHES 0.473" 12MM 0.63" 16MM 20MM 0.788" 0.985" 25MM 32MM 1.26" 1.575" 40MM 50MM 1.969" 2.48" 63MM 3.15" 80MM

NOTES:





Omega Compressors

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