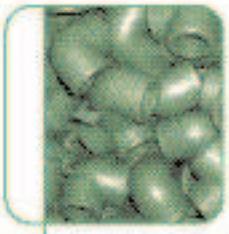
Summary



1. IPS: Quality piping for the world.

With this edition, IPS reflects its constant interest in generating exclusive services for its commercial and professional customers and users.

In the following pages you will find a comprehensive work and reference tool. These contents have been reviewed and updated from the prior version so that, as a construction professional, on your daily work you can count with the backing of a company with over 50 years of experience in thermoplastic piping installation.

IPS, an Argentinian company that knows what it does.

Regulations, Approvals and Laboratory Tests

2. Regulations, Approvals and Laboratory Tests

2.1 Quality, normalized processes, continuous improvement.

IPS's Quality Management System has been ISO 9001: 2000 certified by the IRAM-IQNet including the design, manufacturing, sales and technical assistance for all the company's products intended for fluid conduction.

It certifies that IPS has an organizational structure based on the concept of prevention, it acts on each one of the mentioned stages with the primary objective of meeting its client's needs.

By the scope of the certification, IPS is periodicaly audited and its Quality Management system is efficient. This proves that IPS:

- *Takes into account client's suggestions in order to improve the standards of its products and services.*
- *Performs inner controls through internal audits to improve processes from their origin.*
- *Has a formal method for the follow up of continous improvement actions (preventive and corrective actions).*
- *Sets quality improvement goals and specific measures to achieve them.*
- *Trains its personel to keep it up to date.*
- *Selects suppliers that are certified and have an accurrate capacity and performance according to the corresponding specifications.*


IQNet
THE INTERNATIONAL CERTIFICATION NETWORK
CERTIFICATE
I.P.S. S.A.I.C. y F.
Management System
ISO 9001:2000
Registration Number:


CERTIFICADO DE REGISTRO
IRAM
INSTITUTO ARGENTINO DE NORMALIZACION
I.P.S. S.A.I.C. y F.
IRAM - ISO 9001:2000

2.2 Technology, design and sizing

IPS Fusion System's products (Pipes and Fittings) are manufactured according to the following sizing and international tests:

Technical Standards	IRAM	DIN	ISO	EN ISO
IPS FUSION Fittings	13,472-1	16,962		12162
	13,472-2			
IPS FUSION Pipes	13,470	8077	161-1	12162
	13,471	8078		

ISO *International Organization for Standarization*
DIN *Deutsches Institut für Normung, Alemania*
IRAM *Argentine Institute for Material Rationalization*

IPS – IRAM Member Number. 2862

IPS actively participates of IRAM. As a highlight of this involvement, it has promoted the approval of different material manufacturing norms for fluid conduction in the Republic of Argentina. For the development of these norms, the DIN standards in Germany have always been taken into account.

2.3 National and International Approvals

IRAM SEAL of approval
As of 1999, IPS has been authorized to use the IRAM SEAL on IPS Fusion's Multilayer pipes, nominal pressure 20 kgf/cm2, in 20, 25 and 32 mm diameters.

Approvals for the conduction of liquids for human consumption

Bromatological aptitude:
The raw materials used to manufacture IPS's conduction systems are bromatologically suitable for contact with drinking water and foods, complying to the specifications established by:

- ***European Directive*** *UE/90/128*
- ***BGA*** *Bundesgesundheitsamt* ***- Germany***
- ***FDA Food and Drugs Administration*** *CFR 177.1520* ***- USA***
- ***National Food Code,*** *Resolution Number 1543* ***- Argentina***

IPS Fusion System international approvals

Uruguay: LATU Uruguay's Technological Laboratory
Description: Bromatological aptitude according to UNIT 217-70 norm
Tests according to UNIT 879-91 norms
Result: Satisfactory
Date: April 22, 1998
Product: ***IPS Fusion*** *piping*

Uruguay: LATU Uruguay's Technological Laboratory
Description: Dimensions, test of resistance to internal pressure, longitudinal variation, impact resistence, according to UNIT 799-90 norms.
Result: Satisfactory
Date: April 4, 1997
Product: IPS Fusion piping

Uruguay: Municipal Intendency of Montevideo
Urban Conditioning Department
Description: Approval in urban home installations, resolution record Nr. 161/98
Result: Approved
Date: May 13, 1998
Product: IPS Fusion System

Russian Federation: Gosstyart Rusia
Result: Approved
Date: October, 2003
Product: IPS Fusion System

2.4 Awards

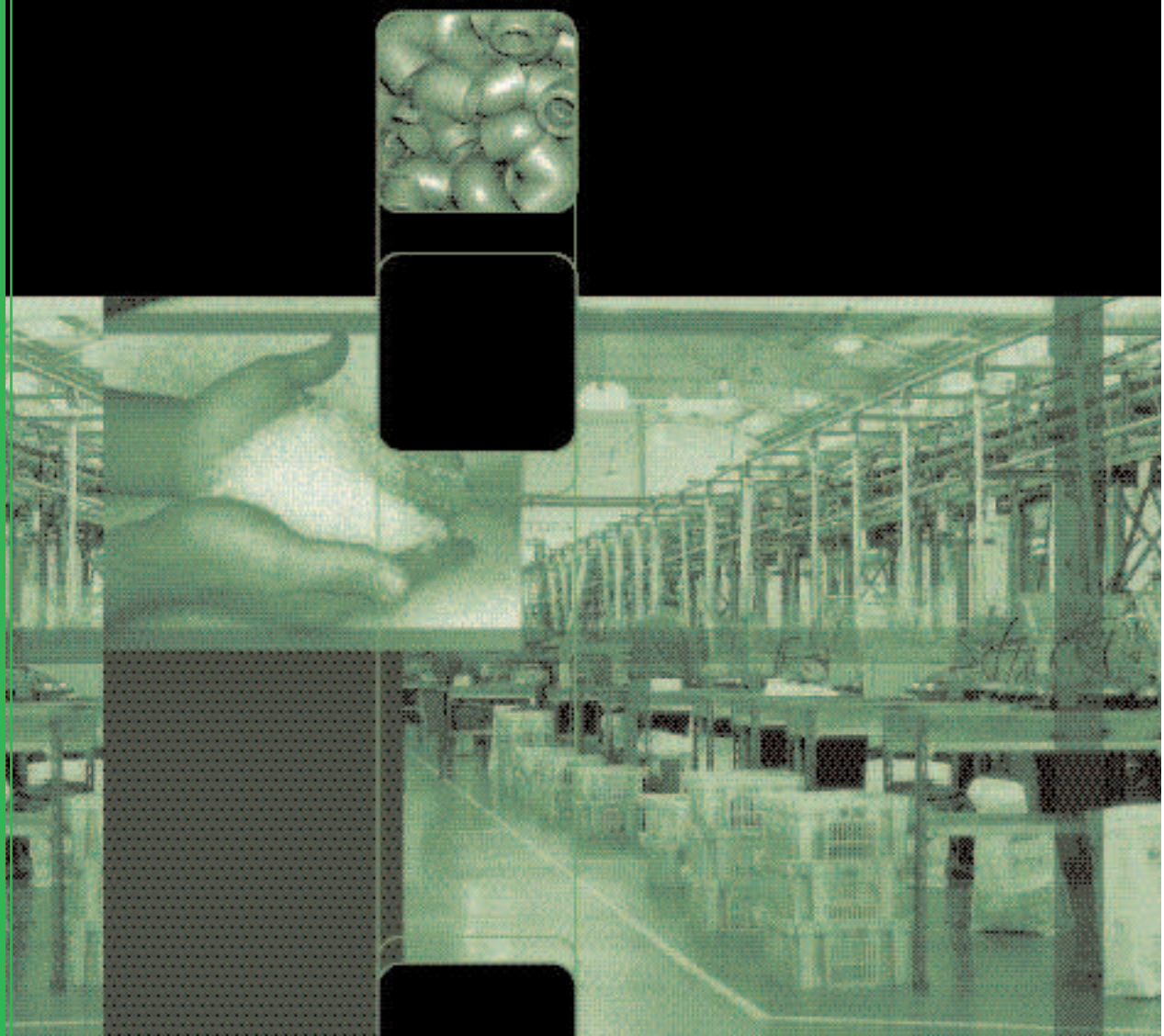
- *INTERNATIONAL GOLD STAR FOR QUALITY 99 granted by BID-Business Initiative Directors, 24TH Convention*
- *"Aguas Argentinas" recognized IPS as member of "Water Friend's Club" year 2002.*

Special awards received in "Exposanitarios"

Company image in the years 1998 and 1999, in the following categories:

- *Plastic pipe screw-fitting.*
- *Interfusion water conduction system.*
- *Polyethylene for irrigation.*

IPS Fusion System



3. IPS Fusion System

3.1 Attributes and Characteristics

IPS uses Random copolymer polypropylene or Type 3, which was designed and is manufactured in Europe, as raw material to manufacture the IPS Fusion System. IPS and Germany's DIN, according to their experience in the transformation of polymers and to the various tests performed, assure that it is the best suited to join by fusion, since thanks to its great firmness it has high resistance to the different mechanical requests.

Since it is a copolymer made up by the union of propylene and ethilene monomers, its range of use widens towards low temperature areas, including temperatures below zero. Also, this raw material was specially chosen for the great resistance it grants to the products that are subject to high temperatures and preasure over time.

Physical Properties

- ***Low thermal conductivity***
  Reduces the spreading of the heat of the fluid that circulates inside (0,21 W/mK); prevents the condensation that normaly occurs on the external surface of metal pipes under specific hydrometric conditions.
- ***Great elasticity***
  Allows a better absorbtion of the tensions created by the lineal dilation of the pipes (see item 6.1), and offers excellent behavior with vibrations or telluric movements.
- ***Impact resistance***
  Resists to construction or transport mistreats, or those that occur while functioning (water hammers).
- ***Higher resistance to temperatures and pressure over time***
- ***Eternally rust-proof***
- ***Ensures a higher flow over time***
  Internal surfaces are completely smooth and have a minimum friction coefficient, contributing to minimize load loss. They also avoid the buildup of scale, preventing the reduction of the flow area.
- ***Maximizes the use of network pressure***
  See table 6.3 for load loss.
- ***Light and easy to handle***
- ***High resistance to chemicals***
  Excellent behavior with hard waters and waters with acid and alacaline components, suitable for the conduction of liquids with highly agressive contents. See table 3.6 for resistance to chemicals.
- ***Completely non-toxic***
  See test results and bromatological suitability trials.

- ***No transmission of odor, color or flavor to the transported liquid***
- ***Not affected by galvanic currents***
- ***Not affected by microbial corrosion***
- ***Not affected by parasite currents***

3.2 Useful life of IPS Fusion System

IPS backs up the quality of its products. It guarantees 50 years of useful life in constant use. This backing is based on:

- *The quality of the raw materials used*
- *The system's design*
- *The quality of the moulds*
- *The machinery*
- *Leading edge technology*
- *Highly trained personnel*
- *Constant quality controls*

Also, to ensure the system's useful life, raw materials are combined with antioxidants, which extend the use of the pipes over time when they are used to transport liquids at high temperatures.

The exclusive pipe manufacturing system by coextrusion, allows the rational use of additives increasing its concentration in the ineterior white layer. At the same time, it is important to highlight that the fittings have the same concentration of additives as the pipes.

3.3 Random copolymer polypropylene or Type 3 - Properties (tables)

Table of properties of Random copolymer polypropylene or Type 3

General characteristics		***Test method***	***Measure unit***	***Value***
Density at 23ºC		*ISO 1183*	*g/cm³*	*0.905*
MFI (230g/2.16Kg)		*ISO 1133*	*g/10min*	*<0.5*
Mechanical Properties				
Effort at conventional de elasticity limit		*ISO 527*	*MPa*	*24*
Stretching in the limit conventional of elasticity		*ISO 527*	*%*	*10*
Elasticity module		*ISO 527*	*MPa*	*850*
Ball penetration hardness 132/30"		*ISO 2039/1*	*N/mm²*	*43*
Shore D hardness, value 3 s		*ISO 868*		*65*
Charpy impact resistance	23ºC	ISO 179/IeU	KJ/m²	Does not break
	0ºC	ISO 179/IeU	KJ/m²	Does not break
	-23ºC	ISO 179/IeU	KJ/m²	43
Thermic Properties				
Crystallite fusion temperature		*ISO 3146*	*ºC*	*147*
Softening temperature Vicat VST / A / 50		*ISO 306*	*ºC*	*135*
Lineal dilation coefficient Between 20 and 90ºC		*DIN 35752*	*K^{-1}*	*$1.1 \cdot 10^{-4}$*
Thermal conductivity at 20ºC		*DIN 52612*	*W/mK*	*0.21*
Specific thermal capacity at 20ºC		*Adiabatic calorimeter*	*KJ/Kg · K*	*1.7*
Electrical Properties				
Transversal resistivity		*DIN 53482*	*Ohm/cm*	*$>10^{16}$*
Superficial dielectric resistance		*DIN 53482*	*Ohm*	*$>10^{13}$*
Dielectric hardness		*DIN 53481*	*kV/cm*	*550-900*
Arch resistance		*DIN 53484*	*Class*	*L4*

Table of properties for thermoplastic insulating foam

Characteristics	***Test method***	***Measure unit***	***Value***
Cell structure			*Closed*
Density	*ASTM D 1622*	*Kg/m³*	*250*
Thermal conductivity	*DIN 52612*	*W/mK*	*0.035*
Water permeability	*Dir. EU Atc*	*Waterproof*	
Water absorption	*IRAM 1582*	*V/V*	*1.2%*
Water vapor permeability	*ASTM E-96*	*gr/m²h*	*0.033*
Impact noise insulation	*IRAM 4063*	*dBA*	*19*

Table of properties for "MAXUM" pipe

Characteristics	***According to values***	***Measure unit***	***Value***
Thermal conductivity at 20ºC	*DIN 52612*	*W/mK*	*0.0634*

3.4 Definitions for the normative design of polypropylene pipes

Service Pressure: *The maximun pressure that can be handled by pipes intended to conduct liquids in constant use.*

Nominal pressure (NP): *Alfanumeric designation related to the mechanical characteristics of a piping system components. It is used for reference purposes and its denomination is normalized according to ISO 161-1:1996.*

Safety Coefficient (SC): *Specified according to the material and the aplication area. IPS applies the DIN 8077:99 Norm service conditions.*

For cold and hot water calculation, the safety coefficient used is 1.25; for heating, the coefficient is 1.5.

SDR (Standard Dimensional Relation): *Value that relates the dimensions of the pipe and it is obtained by calculating of the quotinet between the pipe's external diameter and its thikness.*

$$SDR = \frac{\text{External D}}{\text{Thikness}}$$

Series (S): *Adimentional number used to name the different types of pipes. It is set according to the ISO 4065:1996 Norm.*

$$S = \frac{SDR - 1}{2}$$

Design Stress: *Of 6.3 MPa. for random polypropilene copolymer (type 3) according to 13470:2005 IRAM EA1 standards.*

Comparison between Series (S) and Nominal Pressure (NP) EA1 13470:2005

S	SDR	PN (bar)
8.3	17	8.3
5	11	12.5
3.2	7.4	20
2.5	6	25
2	5	32

Nominal pressure and continual service during 50 years

IPS Product	Service Pressure and Working temperature	Maximum resistance to pressure	PN	S
IPS Fusion Fittings	32.3 Kgf/cm² at 20ºC	120 Kgf/cm²	32	2
Strengthened Fusion Multilayer	30.9 Kgf/cm² at 20ºC	120 Kgf/cm²	25	2.5
IPS Fusion Multilayer S3.2 and Maxum S3.2	24.5 Kgf/cm² at 20ºC	100 Kgf/cm²	20	3.2
IPS Fusion Pipe (Cold water)	15.5 Kgf/cm² at 20ºC	80 Kgf/cm²	12.5	5

3.5 Table of temperatures and pressures through time

Safety coefficient 1.25
Work pressures for Random Copolymer or Type 3 pipes
According to DIN 8077: 1999-07Norm

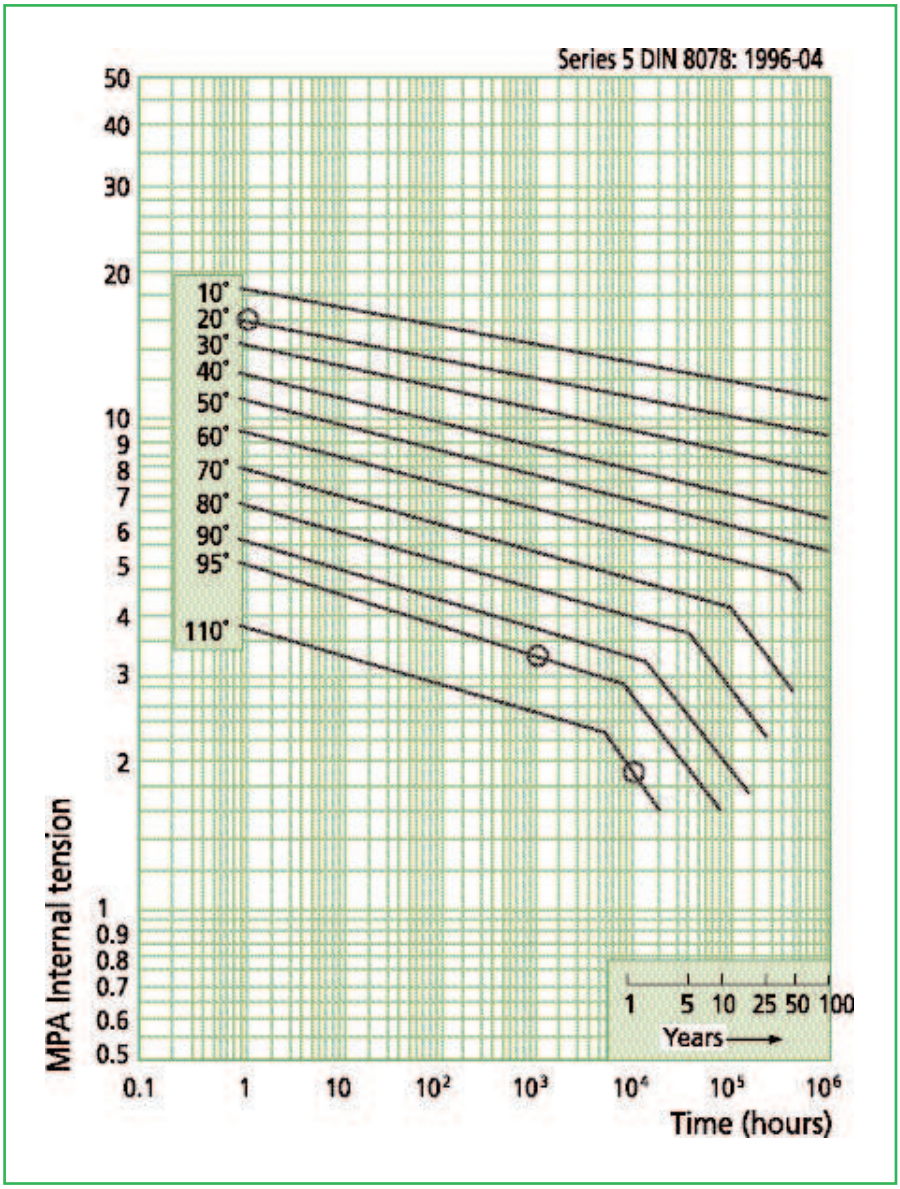
Temperature °C	Years of Use	Series S				
		8.3	5	3.2	2.5	2
		Standard Dimension Ratio (SDR)				
		17.6	11	7.4	6	5
		Acceptable work pressure (bar)				
10	1	12.7	21.1	33.4	42.0	52.9
	5	12.0	20.0	31.6	39.8	50.1
	10	11.6	19.3	30.6	38.5	48.5
	25	11.2	18.7	29.6	37.3	46.9
	50	10.9	18.2	28.8	36.3	45.7
	100	10.7	17.7	28.1	35.4	44.5
20	1	10.8	18.0	28.6	36.0	45.8
	5	10.2	16.9	26.8	33.8	42.5
	10	9.9	16.4	26.1	32.8	41.8
	25	9.6	16.0	25.3	31.8	40.4
	50	9.3	15.5	24.5	30.9	38.0
	100	9.0	15.0	23.8	29.9	37.7
30	1	9.2	15.3	24.3	30.6	38.5
	5	8.6	14.4	22.8	28.7	36.1
	10	8.4	13.9	22.0	27.7	34.9
	25	8.1	13.4	21.3	26.8	33.7
	50	7.9	13.1	20.7	26.1	32.9
	100	7.7	12.8	20.2	25.5	32.1
40	1	7.8	12.9	20.5	25.8	32.5
	5	7.3	12.1	19.2	24.2	30.5
	10	7.1	11.8	18.7	23.6	29.7
	25	6.8	11.3	18.0	22.6	28.5
	50	6.6	11.0	17.5	22.0	27.7
	100	6.4	10.7	16.9	21.3	26.9
50	1	6.6	11.0	17.5	22.0	27.7
	5	6.1	10.2	16.2	20.4	25.7
	10	6.0	9.9	15.7	19.7	24.9
	25	5.8	9.6	15.2	19.1	24.1
	50	5.6	9.3	14.7	18.5	23.3
	100	5.4	8.9	14.2	17.8	22.5
60	1	5.6	9.3	14.7	18.5	23.3
	5	5.2	8.6	13.7	17.2	21.7
	10	5.0	8.3	13.2	16.6	20.8
	25	4.8	8.0	12.6	15.9	20.0
	50	4.6	7.7	12.1	15.3	19.2
70	1	4.7	7.8	12.4	15.6	19.6
	5	4.3	7.2	11.4	14.3	18.0
	10	4.2	7.0	11.1	14.0	17.6
	25	3.6	6.1	9.6	12.1	15.2
	50	3.1	5.1	8.1	10.2	12.8
80	1	3.9	6.5	10.4	13.1	16.4
	5	3.5	5.7	9.1	11.5	14.4
	10	2.9	4.8	7.6	9.6	12.0
	25	2.3	3.8	6.1	7.6	9.6
95	1	2.8	4.6	7.3	9.2	11.6
	5	1.8	3.0	4.8	6.1	7.6
	10	1.5	2.6	4.0	5.1	6.4

Calculation done by extrapolation in the regression curve according to DIN 8078
Safety coefficient 1.5

		Series (S)		
		5	3.2	2.5
		SDR		
Temperature ºC	Years of use	11	7.4	6
		Acceptable work pressure (bar)		
80 ºC	50	2.8	4.32	5.53
90 ºC	50	1.8	2.83	3.62

NOTE: *All data is reliable with regards to updated norms*

Pressure of constant use during 50 years



3.6 Resistance to Chemicals - Tables

The following table has been provided by Hoechst Germany and it was prepared according to DIN ISO 175 Standards. This information is based on the knowledge and experience of the raw material's manufacturer.
However, this does not imply any legal obligation or responsability on part of IPS S.A.I.C. and F., or the raw material manufacturer. We maintain the right to make changes in accordance to the technological process or future developments. Users have the responsibility to carefully inspect and test the products received. The mentioning of commercial names does not impliy any sort of recomendation from IPS S.A.I.C.and F.
IPS recommends the application of the appropiate precaution norms with regards to the use of aggressive products.
Also, we inform that random copolymer polypropylene or Type 3 is highly resistant to aggresive fluids and therefore it is specially suitable for use in specific cases. This table's values are to be applied to the PP Random Copolymer and not to the metal inserts. In these cases it will be necessary to request specific information; when in doubt or for consultation we recommend contacting our technical department.

Simbols used in this table:
Classification: ** : respective boiling point* *V : possible decoloration*
Resistance: *+ : high* */ : Limited* *- : Does not resist*

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
2 - butendiol - 1.4	technically pure	+		+		
2 - butendiol - 1.4	technically pure	+		+	+	
2 - methylbutane - 2	technically pure	+	/			
Ácetacetic acid		+				
Acetaldehyde + Acetic acid	90/10	+				
Acetaldehyde	technically pure	+	/	/		
Acetamide		+	+	+	+	
Acetic acid (100% Glacial acetic acid)	technically pure	+	/ V	+	/ V	-
Acetic acid	100%	+	/ V	+	/ V	-
Acetic anhydride	technically pure	+	/	/	-	
Acetic butyl esther		+	/	+	/	
Acetone	technically pure	+	+*	+	+*	
Acetophenone		+		+	/	
Acetyl		+				
Acid for accumulators (battery)		+	+	+	+	
Acrilonitril		+	+	+		
Acronal - Dispersion	common use	+	/			
Acrylic viscosifier	common use	+		+	+	
Activine (Aqueous chloramine 1%)						
Adipic acid esther		+	/			
Aguardiente (liquor)		+	+	+	+	
Air	technically pure	+	+	+	+	+
Alcohol		+		+	+	+*
Alcoholic beverages		+		+		
Alilic acetate		+	+bis/	+	+	
Alilic alcohol (2 - Propenol - 1)	96%	+	+	+	+	
Alilic chloride		/	-			
Alumen	indistinct	+	+	+	+	

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Aluminic potassium aqueous sulphate	indistinct	+	+	+	+	+
Aluminum fluoride	high	+	+			
Aluminum hydroxic		+	+	+	+	
Aluminum metaphosphate		+	+	+	+	
Aluminum metaphosphate		+	+	+	+	
Amilo chloride	100%	/	-			
Amilo phthalate		+	/			
Aminoacid		+	+	+	+	
Ammonium essence	saturated	+	+	+	+	
Ammonium iron sulphate	saturated	+	+	+	+	
Ammonium thiocyanate		+	+	+	+	
Ammonium, gaseous		+	+	+	+	
Ammonium, liquid		+		+		
Amyl acetate	technically pure	+	+	/	-	
Amyl alcohol	technically pure	+	+	+	+	+
Anhydrous antimonium chloride		+	+	+	+	
Aniline	indistinct	+	+	+	+	
Animal oil		+	/	+	/	
Anisette essence		/	-			
Anisol		/	/bis-	/	/	
Antifoam		+	+bis/	+		
Antifreeze (Kfz)	common use	+	+	+	+	+
Antimonium pentachloride		+	+	+	+	
Antimonium trichloride		+	+	+	+	
Apple wine (cider)		+	+	+	+	
Apple wine		+	+	+	+	
Aqua regia	100%	-		-	-	
Aqueos Acetaldehyde	indistinct	+	/	+	+	
Aqueous Acetic acid	70%	+	+	+	+	+
Aqueous adipic acid		+	+	+	+	
Aqueous aluminum chloride	indistinct	+	+	+	+	+
Aqueous aluminum sulphate	saturated	+	+	+	+	+
Aqueous ammonium acetate	indistinct	+	+	+	+	+
Aqueous ammonium carbonate	indistinct	+	+	+	+	+
Aqueous ammonium chloride	indistinct	+	+	+	+	+
Aqueous ammonium fluoride	saturated	+	+	+	+	
Aqueous ammonium nitrate	indistinct	+	+	+	+	+
Aqueous ammonium phosphate	indistinct	+	+	+	+	+
Aqueous ammonium sulphate	indistinct	+	+	+	+	+
Aqueous ammonium sulphur	indistinct	+	+	+	+	
Aqueous ammonium	indistinct	+	+	+	+	
Aqueous aniline chlorohydrate	indistinct	+	+	+	+	
Aqueous anthraquinone sulphonic (Susp.)		+	+	+		
Aqueous arsenic acid	indistinct	+	+	+	+	
Aqueous barium hydroxide	indistinct	+	+	+	+	
Aqueous barium salts	indistinct	+	+	+	+	+
Aqueous benzaldehyde	indistinct	+	+bis/	+		
Aqueous benzoic acid	indistinct	+	+	+	+	+
Aqueous borax	saturated	+	+	+	+	+
Aqueous boric acid	indistinct	+	+	+	+	+
Aqueous bromhydric acid	50%	+	+	+	+	
Aqueous butanodiol	indistinct	+	+	+	+	
Aqueous butyric acid	indistinct	+	/	+		
Aqueous calcium chlorate	saturated	+	+	+	+	
Aqueous calcium chloride	saturated	+	+	+	+	+
Aqueous calcium hypochlorite (Susp.)	indistinct	+	+	+	+	
Aqueous calcium nitrate	50%	+	+	+	+	
Aqueous calcium sulphur	< = 10%	/	/			
Aqueous carbonic acid		+	+	+	+	
Aqueous carboniferous solution		+V	/ V	+V	/ V	
Aqueous chloral hydrate	indistinct	+	+V	/	-	
Aqueous chloramine	saturated	+		+		
Aqueous chlorhydric acid		+	+	+V	+V	/ V
Aqueous chloric acid	1%	+	+	+	/	-
Aqueous chloric acid	10%	+	+	+	/	-
Aqueous chloric acid	20%			+	-	

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Aqueous chloroacetic acid	< = 85%	+	+	+	+	
Aqueous chrome salts	indistinct	+	+	+	+	
Aqueous chromic acid	50%	/	-V	/ V	-V	
Aqueous chromic trioxyde	50%	/	-V	/ V	-V	
Aqueous citric acid	saturated	+	+	+	+	+
Aqueous copper fluoride						
Aqueous copper salts	saturated	+	+	+	+	
Aqueous creosole	diluted	+	+V	+	+V	
Aqueous dextrin	18%	+	+	+	+	
Aqueous diglicolic acid	30%	+	+	+	+	
Aqueous ephetin	10%	+	+	+	+	+
Aqueous ferrous chloride	indistinct	+	+	+	+	
Aqueous fertilizer salts	indistinct	+	+	+	+	
Aqueous fluorboric acid		+	/			
Aqueous fluorhydric acid	40% - 85%	+	/	+		
Aqueous formic acid	10%	+	+	+	+	
Aqueous formic acid	85%	+	+	+	/	
Aqueous fructose (fruit sugar)	indistinct	+	+	+	+	+
Aqueous glucose	indistinct	+	+	+	+	+
Aqueous glycerin	indistinct	+	+	+	+	+
Aqueous glycol	common use	+	+	+	+	+
Aqueous hexacianoferrate (III)	saturated	+	+			
Aqueous hexafluorosilic acid	40%	+	+			
Aqueous hydrofluosilicic acid	indistinct	+	+			
Aqueous hydrogen sulphur	saturated	+	+	+	+	
Aqueous hydrogenated ammonium carbonate	saturated	+	+	+	+	
Aqueous hydrosulphite	up to 10%	+	+	+	+	
Aqueous hydrosulphur ammonium	indistinct	+	+	+	+	
Aqueous hydroxylammonium sulphate	12%	+	+	+	+	
Aqueous iron chloride (II)	saturated	+	+	+	+	
Aqueous iron chloride (III)	saturated	+	+	+	+	+
Aqueous iron nitrate (III)	saturated	+	+	+	+	
Aqueous iron sulphate (II)	saturated	+	+	+	+	
Aqueous iron sulphate (III)	saturated	+	+	+	+	
Aqueous kitchen salt	indistinct	+	+	+	+	
Aqueous Koper chloride	saturated	+	+	+		
Aqueous Koper cyanide (I)	saturated	+		+	+	
Aqueous Koper nitrate	30%	+	+	+	+	
Aqueous Koper sulphate	indistinct	+	+	+	+	
Aqueous lactic acid	indistinct	+	+	+	+	+
Aqueous lead acetate	indistinct	+	+	+	+	
Aqueous magnesium chloride	indistinct	+	+	+	+	
Aqueous magnesium salts	indistinct	+	+	+	+	+
Aqueous magnesium sulphate	indistinct	+	+	+	+	
Aqueous magnesium sulphate	indistinct	+	+	+	+	+
Aqueous maleic acid	up to 100%	+	+	+	+	
Aqueous methylamine	32%	+		+		
Aqueous monochloroacetic acid		+	+	+	+	
Aqueous monochloroacetic acid	indistinct	+	+	+	+	
Aqueous nickel salts		+	+	+	+	
Aqueous nickel sulphate	indistinct	+	+	+	+	
Aqueous oxalic acid	indistinct	+	+	+	+	+
Aqueous oxygen peroxide	10%	/	-	+	/	
Aqueous oxygen peroxide	30%	/	-	+	/	
Aqueous perchloric acid	20%	+	+	+	+	
Aqueous perchloric acid	50%	+	/			
Aqueous perchloric acid	70%	+	-			
Aqueous phosphoric acid	50%	+	+	+	+	+
Aqueous phosphoric acid	80% - 95%	+	/ V	+	+V	+V
Aqueous phytosanitary products	practical use	+	+	+		
Aqueous picric acid	1%	+		+		
Aqueous polymer phosphate	indistinct	+	+	+	+	
Aqueous potassic chromic sulphate	saturated	+	+	+	+	
Aqueous potassic cyanide	indistinct	+	+	+	+	
Aqueous potassic ferric sulphate	saturated	+	+	+	+	
Aqueous potassium bicarbonate	saturated	+	+	+	+	

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Aqueous potassium bichromate	indistinct	+	+	+	+	
Aqueous potassium bisulphate	saturated	+	+	+	+	+
Aqueous potassium bisulphite	saturated	+	+			
Aqueous potassium borate	1%	+	+	+	+	
Aqueous potassium bromate	up to 10%	+	+	+	+	+
Aqueous potassium bromide	indistinct	+	+	+	+	+
Aqueous potassium carbonate	indistinct	+	+	+	+	
Aqueous potassium chlorate	indistinct	+	+	+	+	+
Aqueous potassium chloride	indistinct	+	+	+	+	+
Aqueous potassium chromate	40%	+	+	+	+	+
Aqueous potassium cyanide	indistinct	+	+	+	+	
Aqueous potassium dichromate	saturated	+	+	+	+	
Aqueous potassium ferricyanide	indistinct	+	+	+	+	
Aqueous potassium ferricyanide	indistinct	+	+	+	+	
Aqueous potassium fluoride						
Aqueous potassium hexacyanideferrous	indistinct	+	+	+	+	
Aqueous potassium hydrosulphate	saturated	+	+	+	+	+
Aqueous potassium hydrosulphur	saturated	+	+			
Aqueous potassium hydroxide	indistinct	+	+	+	+	
Aqueous potassium hypochlorite	saturated	/	-			
Aqueous potassium iodire	indistinct	+	+	+	+	
Aqueous potassium perborate		+	+			
Aqueous potassium perchlorate	1%	+		+	+	
Aqueous potassium perchlorate	indistinct	+	+	+	+	+
Aqueous potassium perchlorate	up to 10%	+	/			
Aqueous potassium permanganate	up to 6%	+	+V	+	+V	
Aqueous potassium persulphate	indistinct	+	+	+	+	
Aqueous potassium phosphate	saturated	+	+			
Aqueous potassium sulfite	saturated	+	+	+	+	
Aqueous potassium sulphate	indistinct	+	+	+	+	
Aqueous potassium sulphur	saturated	+	+	+	+	
Aqueous potassium tetracyanide	saturated	+	+			
Aqueous potassium thiosulphate	saturated	+	+	+	+	
Aqueous propanol	7%	+	+	+	+	
Aqueous silicic acid	indistinct	+	+	+	+	
Aqueous silver nitrate	indistinct	+	+	+	+	+
Aqueous silver salts	saturated	+	+	+	+	
Aqueous soap solution	indistinct	+	+	+	+	
Aqueous soda (sodic carbonate)	indistinct	+	+	+	+	+
Aqueous sodic bisulphate	saturated	+	+	+	+	
Aqueous sodic hydrocarbonate	saturated	+	+	+	+	+
Aqueous sodic sulfhydrate	saturated	+	+	+	+	
Aqueous sodic sulphate	indistinct	+	+	+	+	
Aqueous sodic thiosulphate	40%	+	+	+	+	
Aqueous sodium acetate	indistinct	+	+	+	+	+
Aqueous sodium benzonate	36%	+	+	+	+	
Aqueous sodium benzonate	indistinct	+	+	+	+	
Aqueous sodium bicarbonate	saturated	+	+	+	+	+
Aqueous sodium bisulphate	saturated	+	+	+	+	
Aqueous sodium bisulphite	saturated	+	+	+	+	
Aqueous sodium carbonate	indistinct	+	+	+	+	+
Aqueous sodium chlorate	saturated	+	+	+	+	
Aqueous sodium chloride	indistinct	+	+	+	+	+
Aqueous sodium chlorite	50%	+		+	/	
Aqueous sodium hydroxide	indistinct	+	+	+	+	
Aqueous sodium hypochlorite	with 12.5% active chlorine	/	-	/	/	i -
Aqueous sodium nitrate	indistinct	+	+	+	+	
Aqueous sodium nitrite	indistinct	+	+	+		
Aqueous sodium perborate	indistinct	+	/	+	+	+
Aqueous sodium peroxide	10%	+	+			
Aqueous sodium peroxide	saturated	+	+			
Aqueous sodium phosphate	saturated	+	+	+	+	+
Aqueous sodium silicate	indistinct	+	+	+	+	
Aqueous sodium sulfite	indistinct			+	+	+
Aqueous sodium sulphate	indistinct	+	+	+	+	+
Aqueous sodium sulphate	saturated	+	+	+	+	+

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Aqueous sodium sulphur	saturated	+	+	+	+	
Aqueous sodium tetraborate	saturated	+	+	+	+	+
Aqueous solution sulphate	indistinct	+	+	+	+	
Aqueous starch	indistinct	+	+	+	+	
Aqueous succinic acid	50%	+	+	+	+	
Aqueous sugar cane	indistinct	+	+	+	+	
Aqueous sulphur dioxyde	indistinct	+	+	+	+	
Aqueous sulphuric acid	70%	+	+	+	/	
Aqueous sulphuric acid	80%	+	+	+	/	
Aqueous sulphuric acid	98%	/	-	/	-	
Aqueous sulphuric acid	up to 50%	+	+	+	+	
Aqueous tannic acid	10%	+	+	+	+	
Aqueous tannin	10%	+	+	+	+	
Aqueous tartaric acid	indistinct	+	+	+	+	
Aqueous tin chloride (II)	indistinct	+	+	+	+	
Aqueous tin chloride (IV)	saturated	+	+	+	+	
Aqueous trichloroacetic acid	50%	+	+	+	+	
Aqueous Trietanolamine		+	/	+		
Aqueous trietanolamine	indistinct	+	/	+		
Aqueous trimethylolpropane		+	+	+	+	
Aqueous urea	up to 33%	+	+	+	+	
Aqueous zinc chloride	indistinct	+	+	+	+	
Aqueous zinc salts	indistinct	+	+	+	+	
Aqueous zinc sulphate	indistinct	+	+	+	+	+
Aromatic acid	50%	+	+	+	+	
Aromatic oil		/	-	/	/bis-	
Arsenic anhydric		+	+	+	+	
Ascorbic acid		+	+	+	+	
Asphalt		+	/ V	+	/ V	
Aspirin		+		+		
Beer yeast	common use	+	+	+	+	
Beer		+	+	+	+	
Bees wax		+	/bis-	+	/bis-	
Beet juice		+	+	+	+	+
Benzaldehyde in iso propilic alcohol	1%	+	+			
Benzene chloride		/	-	/	-	
Benzene	technically pure	/	-	/	-	
Benzolic mix	80/20	+	/	/	-	
Benzolium chloride		/	/	/		
Benzolsulfonic acid		+	+	+	+	
Benzyle chloride		/	-	/	-	
Benzylic alcohol		+	+	+	+	
Bismuth salts		+	+	+		
Bitumen		+	/ V	+	/ V	
Bleach bisulphite		+	+	+	+	
Boron trifluoride		+	+bis/			
Bovine fat		+	+bis/	+	+	
Break fluid		+	+	+	+	
Brine		+	+	+	+	
Brome vapors		-		-		
Brome water	saturated	+		/		
Bromic acid	high	-		/		
Bromine chlorine methane		-		-		
Butadiene	technically pure	/	-	/	-	
Butanetriol	indistinct	+	+	+	+	
Butanol	indistinct	+	+	+		
Butanon		+	/bis-	+	/	
Buten - Fluid glycol	technically pure	+	+	+		
Buthylic esther glycolic acid		+	+			
Butilic alcohol		+	+	+		
Butilphenol	technically pure	+	+	+		
Butilphenone	technically pure	-		-		
Butoxile		+	/	+		
Butter		+		+	+	
Butyl - Glycol	technically pure	+		+		
Butyl acetate	technically pure	+	/	/	-	

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Butyl Acrilato		+	/	+		
Butyl benzylftalate		+	+			
Calcium carbide		+	+	+	+	
Calcium carbonate (Cal)		+	+	+	+	+
Calcium carbonate		+	+	+	+	+
Calcium hydroxide		+	+	+	+	
Calcium oxide		+	+	+	+	
Calcium phosphate		+	+	+	+	
Calcium sulphate		+	+	+	+	
Camphor oil		-		-		
Camphor		+	/	+		
Carbazol		+	+	+	+	
Carbolic acid		+	+V	+	+V	
Carbolic oil (Fenol)		+	+V	+	+V	
Carbolin	common use	+		+		
Carbon dioxide	technically pure	+	+	+	+	
Carbon sulphur		/		/		
Caustic potash	50%	+	+	+	+	+
Caustic soda						
Cetilic alcohol		+	+	+		
Chloral (Triclhoracetaldehyde)	technically pure	+	+	+	+	
Chlorated lime chloride		+	+	+	+	
Chlorhydric ethylene	technically pure	+	+	+	+	
Chlorhydrin glycerin		+	+	+		
Chloric acid, see Perchloric acid						
Chlorine bleach		/	-	/	/	-
Chlorine water	saturated	+	/	/	-	
Chlorine, aqueous solution	saturated	+	/	/	-	
Chlorine, dry gas		/	-	-		
Chlorine, humid gas		/	-	-		
Chlorine, liquid		-		-		
Chlorocarbonic acid esther		+	/			
Chloroform	technically pure	/bis-	-	/	-	
Chloropicrin		+bis/	-			
Chlorosulphonic acid	technically pure	-		-		
Chlorous acid		+bis/	/	+bis/	/	
Chrome alumen	saturated	+	+	+	+	
Chrome anodic mud		+	+	+		
Ciclane	common use	+	+	+	+	
Ciclohexane		+	+	+		
Citric juice		+	+	+	+	
Cliclohexanone		+	/	+	/	
Clophen A 50 y A 60		+	/bis-	+	/	-
Coconut fat alcohol		+	/	+	/	
Coconut oil		+		+		
Coffee extract		+	+	+	+	
Cognac		+		+		
Coloring		+V	+V			
Combustion engine oil		+	+bis/	+	,/	
Concentrated cola		+	+	+	+	
Condensed vapor		+	+	+	+	
Consistent aluminum chloride		+	+	+	+	
Consistent aluminum sulphate		+	+	+	+	
Cotton seedes oil	technically pure	+	+	+	+	
Creosate		+	+V	+	+V	
Creosole	100%	+	/ V	+	/ V	
Crotonaldehyde	technically pure	+	/	+		
Cumarone resin		+	+	+		
Cyclohexanol		+	+	+	+	
Cyclohexanone		+	/	+	/	
Dekalin	technically pure	+	/	/	/	
Demineralized alcohol	96% (Vol.)	+		+		
Destabilizer		+	+	+	+	
Detergent		+	+	+	+	
Detergent	usual	+	+	+	+	
Detergent, synthetic	high	+	+	+	+	

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Detonating gas	common use	+		+		
Dextrin	18%	+	+	+	+	
Dextrose		+	+	+	+	
Diaminoethane	technically pure	+	+	+	+	
Dibromoethane		/	-	/		
Dibromureethylene		/	-			
Dibutilftalate	technically pure	+	/	+	/	
Dibutyl ether		+bis/	-	/	-	
Dibutyl phthalate	technically pure	+	/	+	/	
Dibutyl sebacate		+	/	+		
Dichloroacetic acid	50%	+	+	+		
Dichloroacetic acid	technically pure	+	/ V	+		
Dichlorobenzene		/	-	/		
Dichlorodyfenil - trichlorine - ethane		+	+	+	+	
Dichloroethane		/	/	+		
Dichloroethylene	technically pure	-				
Dichromate - Sulphuric acid	high	-		-		
Diesel Fuel (Gasoil)		+	/	+	/	
Diethanolamine	technically pure	+		+		
Diethylene glycol		+	+	+	+	
Dietylic ether		+bis/	/*	/		
Difenil oxide		+	/			
Difenilamine		+	/			
Dihexyl ftalate	technically pure			+	/	
Diisobutyl ketone	technically pure	+	/bis-	+	-	
Diisodecyl ftalate	technically pure	+	/	+	/	
Di-isopropilic ether		+bis/	-			
Dimethylamine		+	/	+		
Dimetihylformamide	technically pure	+	+bis/	+	+	
Dinolyl phthalate	technically pure	+	/	+	/	
Dioctyl phthalate		+	/	+	/	
Dioxane		+	+	+	/	-
Disodic phosphate		+	+	+	+	
Disodium sulphate		+	+	+	+	
Distilled water		+	+	+	+	+
Dodecil - benzene sulphuric acid (Toluene)		+	/	+		
Drinkable water, contains chlorine		+	+	+	+	+
Dry carbonic acid		+	+	+	+	
Eau de Javelle		+bis/	-	+bis/	/	
Eau de Labarraque		+bis/		+bis/	/	
Epiclorhidryn		+	+	+		
Estearic acid		+	/	+	/	
Esther, aliphatic	technically pure	+	+bis/			
Estheric dichloromethyl acid		+	+	+	+	
Estirol		/	-	/	-	
Ethane		+	+			
Ethanol	96%	+	+	+	+	+
Ethanolamine	technically pure	+		+		
Ether		+bis/	/*	/		
Etheric oil		/	-	/	-	
Ethyl acetate	technically pure	+	/	+	/	
Ethyl chloride	technically pure	/*		-		
Ethyl oxide, gaseous	technically pure	+	+	+		
Ethylbenze	technically pure	/		/	-	
Ethylene chloride	technically pure	/		-		
Ethylene diamine	technically pure	+	+	+	+	
Ethylene dichloride		/	-	/		
Ethylene		+	+			
Ethyleneglycol		+	+	+	+	+
Ethylenglycolmonobuthylether	technically pure	+		+		
Ethylic alcohol + Acetic acid	industrial use	+	+	+	+	
Ethylic alcohol	96%	+	+	+	+	+
Ethylic chlorine	technically pure	+	+V	+	+V	
Ethylic ether	technically pure	+bis/	/*	/		
Euro B		/	/			
Euro G		+	+			

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Fat acid amides		+	/	+		
Fat acid		+	+bis/	+	+	
Fat alcohol		+	/	+		
Fat	technically pure	+	+	+	+	
Fenil sulphonate		+	+	+	+	
Fixing bath	common use	+		+	+	
Flavored molasses		+	+	+	+	
Fluoride, gaseous		-		-		
Fluorsilicic acid	indistinct	+	+			
Formaldehyde	up to 40%	+	+	+	+	
Formamide sulfoxide		+	+			
Formamide		+	+	+	+	
Frigen 12 (Freon 12)	100%	/	-	/		
Fruit pulp		+	+	+	+	
Fruit sauce, fermented		+	+	+	+	
Fruit sauce, unfermented	indistinct	+	+	+	+	+
Fruit syrup	indistinct	+	+	+	+	+
Ftalatic acid dibuthylic esther	technically pure	+	/	+	/	
Ftalatic acid esther		+	+bis/	+	+	
Ftatalos acid	50%	+	+	+	+	
Fuel oil		+	/	+	/	
Fuel		+	/	+	/	
Fuming nitric acid		+	+	+	-	
Furfurilic alcohol		+	+V	+	/ V	
Furfurol		+	/			
Galvanic bath for electrolysis		+bis/	/			
Gaseous bromhydric acid	technically pure	+	+			
Gaseous bromine methane	technically pure	-		-		
Gaseous butane		+		+	+	
Gaseous carbon monoxide		+	+			
Gaseous chloromethane	technically pure	/		-		
Gaseous glycolic acid	up to 70%	+	+	+		
Gaseous hydrogen sulphur		+	+	+	+	
Gaseous methyl bromide	technically pure	-		-		
Gaseous phosgene		/		,/	/	
Gaseous sulphur dioxyde		+	+	+	+	
Gaseous, humid and dry chlorohydrate		+	+	+	+V	
Gasoline	technically pure	+	/	/	-	
Gelatin		+	+	+	+	
Genantin		+	+	+	+	+
Gin		+		+		
Glucose		+	+	+	+	
Glue		+	+	+		
Glutin glue	common use	+	+	+	+	
Glycocoll		+	+	+	+	
Glysantin		+	+	+	+	+
Grisiron 8302		/	/			
Grisiron 8702		+	+			
Gross petroleum		+	/	+	/	
Halothan		/	/bis-			
Heptane		+	/	/	/	
Hexa - Aqueous sodium metaphosphate	saturated	+		+	+	
Hexaethanol		+	/	+		
Hexane		+	/	+	/	
Honey		+	+	+	+	
Hydracine hydrate		+	+	+		
Hydraulic fluid		+	/			
Hydroquinone		+V	+V	+V		
Hypochloric acid		+	/	+bis/	/	
Iodine - potassium iodire	3% iodine	+	+	+	+	
Iso - propanol		+	+	+	+	
Isoamilic alcohol	technically pure	+	/			
Isobutilic alcohol		+	+	+		
Isobutyric acid	technically pure	+	/			
Isooctane		+	/	+	/	
Isopropanol (isopropilic alcohol)	technically pure	+	+	+	+	+

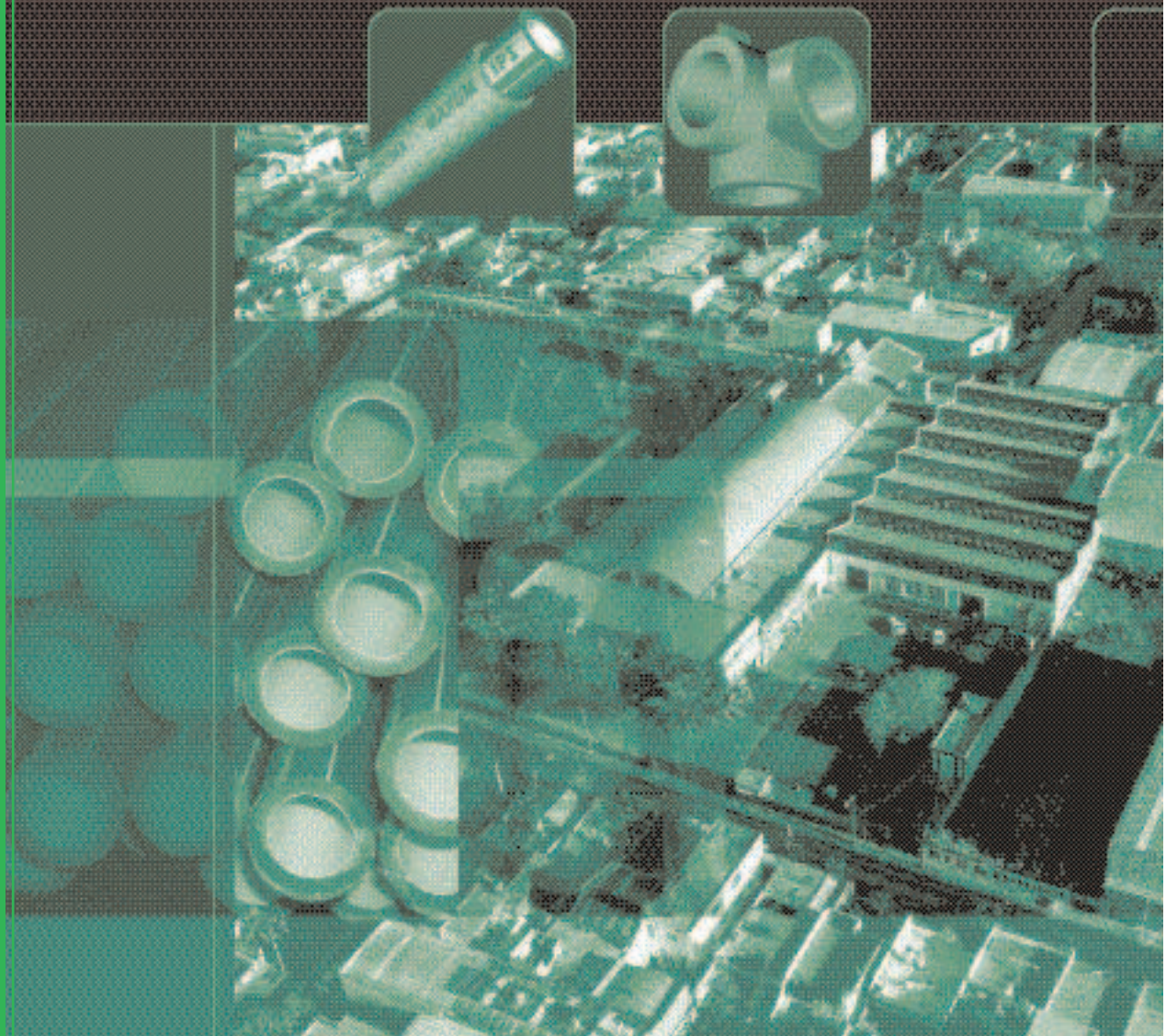
Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Isopropilacetate	100%	+	/			
Isopropileter	technically pure	+bis/	-	/	-	
Kerosene		+	/	/	/	-
Kerosene		+bis/	/bis-	+bis/		
Ketone diethyl		+	/			
Lactose		+	+	+	+	
Lanoline		+	+	+	/	
Latex		+	+	+	+	
Lead tetraethyl		+		+		
Lemon juice		+	+	+	+	
Lime water		+	+	+	+	
Linseed oil	technically pure	+	+	+	+	+
Liquid bromine	100%	-		-		
Liquid butilen	technically pure			/		
Liquid phosgene	100%	-		-		
Liquid soap		+	+	+	+	
Liquor		+		+		
Lisol		+	/	+	/	
Lithium bromide		+	+	+	+	
Lubricant oil	technically pure		+	+bis/	+	
Machine oil		+	/	+	/	-
Magnesium carbonate		+	+	+	+	
Magnesium fluorosilicate		+	+			
Magnesium hydroxide		+	+	+	+	
Magnesium iodire		+	+	+	+	
Magnesium sulphate		+	+	+		
Malic acid	50%	+	+	+	+	
Malt		+	+	+	+	
Malt fermentation	common use	+	+	+	+	
Malt oil		+	/	+	/	
Margarine		+	+	+	+	
Marmalade		+	+	+	+	+
Mayonnaise		+		+		
Mercury chloride		+	+			
Mercury salts		+	+	+	+	
Mercury		+	+	+	+	
Metallic corrosive		+				
Metallic soap		+	+	+		
Methacrylic acid		+	+	+	+	
Methanol	technically pure	+	+	+	+	
Methilic alcohol		+	+	+	+	
Methoxi butyl acetate		+	/	+		
Methoxylbutanol		+	/	+		
Methyl - 4 - penthanol - 2		+	+bis/V	+		
Methyl benzoic acid	saturated	/				
Methyl acetate	technically pure	+		+	+	
Methyl boric acid		+	/bis-			
Methyl chloride, gaseous	technically pure	/		-		
Methyl metacrilate		+	+			
Methyl salicylate		+	/	+		
Methylacrilate		+	+			
Methylbenze		/	-	/	-	
Methylcyclohexane		/	/bis-	/		
Methylene chloride		/	/*	/	-*	
Methylethylcetone	technically pure	+	/	+	/	
Methylglycol		+	+	+	+	
Methylisobutylamine		+	+bis-	+		
Methylpropylcetone		+	/	+		
Methylpyrrolidone		+	+			
Methylsulphuric acid	50%	+	+	+	+	
Milk		+	+	+	+	+
Mineral oil	no additives	+	+	+	/	-
Mineral water		+	+	+	+	+
Mint essence		+		+		
Mint		+	/	+		
Molasses		+	+	+	+	

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Monochloroacetic acid ethylic esther		+	+	+	+	
Monochloroacetic acid methylic esther		+	+	+	+	
Monochlorobenzene		/	-	+		
Morphine		+	+	+	+	
Moth balls		+	/	+		
Mowilith - Dispersion		+	+	+		
Mustard		+	+	+		
Nail polish remover		+	/	+	/	
Natural gas	technically pure	+		+		
Nickel chloride		+	+	+	+	
Nickel nitrate		+	+	+	+	
Nicotine		+	+			
Nicotinic acid	< = 10%	+		+		
Nitro - propanol		+	+	+	+	
Nitrobenzene		+	/	+	+	
Nitrocelulose		+		+		
Nitrotoluene		+	/	+	/	
Noni alcohol		+	+	+		
Normal benzene DIN 51635		+	/	/	-	
Nut oil		+	/	+	+	
Octil creoslate	technically pure	/	-	/	-	
Oil for two cycle motors		+	/	+		
Oils	indistinct	-		-		
Oleic acid		+	/	+	/	-
Olive oil		+	+	+	+	+
Optical whiteners		+	+	+	+	
Orange juice		+	+	+	+	
Oxychloride phosphorus		+	/	+	/	
Oxygen		+	+	+	+	
Ozone	50 pphm	/	-	+	/	
Palm oil		+		+		
Palmitic acid		+	+	+	+	
Palmitilalcohol		+	+	+	+	
Paraffin - Emulsion	common use	+	/	+	+	
Paraffin oil		+	+	+	/	-
Paraformaldehyde		+	+	+		
Peanut oil	technically pure	+		+	+	
Pentanol		+		+		
Perchlorethelene		/	-	/	-	
Petroleum ether		+	/	+	/	
Petroleum		+	/	/		
Phelynethyl acetate		+	+	+		
Phenol resin		+	+	+	+	
Phenol		+	+V	+	+V	
Phenylhydracine	technically pure	/	/bis-	/		
Phenylhydracinehydrochloride		+	-	+		
Phosphorus pentoxyde	100%	+	+	+		
Phosphorus trichloride		+	/	+		
Photographic developer		+V	+V	+V	+V	
Phthalate hexidiethyl		+	/	+	/	
Pine essence		+		+	+	
Pine oil		+		+	+	
Pineapple juice		+	+	+	+	
Piridine		+	/	/	/	
Poliglycol		+	+	+	+	
Polyacrylic acid		+	+			
Polyester acid		/	-	/		
Polyester laminator		+	+bis/	+		
Polysolvan O		+	+			
Potassium nitrate	indistinct	+	+	+	+	
Potassium permanganate		+	+	+		
Propane dichlorine		/	-			
Propane dichlorine		/	-			
Propane, gaseous	technically pure	+		+		
Propargylic alcohol	indistinct	+	+	+	+	
Propilenoxyde		+	+			

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Propionic acid	100%	+	+	+	+	
Propylene dichloride		-		-		
Propylene glycol		+	+	+	+	
Prussic acid		+	+	+	+	
Pseudocumol		/	/			
Quinine		+	+	+	+	
Residual gas with sulphuric acid	indistinct	+	+	+	+	
Residual gas, carboniferous acid	indistinct	+		+	+	
Residual gas, carboniferous dioxide	indistinct	+	+	+	+	
Residual gas, carboniferous monoxide	indistinct	+	+	+	+	
Residual gas, with chlorydric acid (humid)	indistinct	+	+	+	+	
Residual gas, with fluoramine	traces	+	+			
Residual gas, with nitrose	traces	+	+			
Residual gas, with sulphuric trioxide	traces	-		-		
Residual gas, with sulphuryl	low	+	+	+	+	
Residual gases, dry	indistinct	+	+	+	+	
Resin oil	indistinct	+	+	+	+	
Sagrotan	25%	+	/	+	/	
Salicylic acid	indistinct	+	+	+	+	
Sauerkraut (fermented cabbage)		+	+	+	+	+
Seawater						
Septic water		+	+	+	+	
Shoe polish		+	+	+	+	
Silicone - emulsion	common use	+	+	+	+	
Silicone oil	technically pure	+	+	+	+	+
Silver nitrate		+	+	+	+	
Soda bleach	saturated	+	+	+	+	+
Sodic hydroxic		+	+	+	+	
Sodium aluminum sulphate		+	+	+	+	
Sodium borate		+	+	+	+	
Sodium bromide		+	+	+	+	
Sodium chromate		+	+	+	+	
Sodium cyanide		+	+	+	+	
Sodium dichromate		+	+	+	+	
Sodium dodecyl benzene sulphate		+	+	+	+	
Sodium ferricyanide		+	+	+	+	
Sodium fluoride						
Sodium hexacyanide (II)		+	+	+	+	
Sodium hydroxide, solid		+	+	+	+	
Soft soap		+	+	+	+	
Solvent gasoline	technically pure	+	/	/	-	
Soy oil		+	+	+	/	
Spindle oil		+bis/	/	+	-	
Stain remover		+bis/	/			
Sulphur chloride	technically pure	-		-		
Sulphur trioxyde		-		-		
Sulphur		+	+	+	+	+
Sulphuric chromic acid		-		-		
Sulphuric ether		+bis/	/*	/		
Sulphurous acid		+	+	+	+	
Sulphuryl chloride		-		-		
Sweet syrup		+	+	+	+	+
Tan extract, vegetable	common use	+		+	/	
Tar oil		+V	/ V	+V		
Tetrabromomethane		/bis-	-	/bis-		
Tetrachloroethane		/bis-	-	/	-	
Tetrachloroethylene		/bis-	-	/	-	
Tetrachloromethane	technically pure	/	-	-		
Tetractilendiamin acid		+	+	+	+	
Tetrahidrofurano	technically pure	/bis-	-	/	-	
Tetrahydronaphtalene (Tetralin)	technically pure	+	-	-		
Thinner		+	/	+	/	
Thionyl chloride		-		-		
Thiophene		/	-	/	-	
Tincture of iodine, DAB 6	common use	+	/ V	+		
Tincture		+	+	+	+	

Material	Concentration	PE Temp.		PP Temp.		
		20°C	60°C	20°C	60°C	100°C
Tioglicolic acid		+	+	+	+	
Toilet solution, aqueous	technically pure	+	+	+	+	
Toilet solution, solid		+	+	+	+	
Toluic acid	saturated	/				
Toluol	technically pure	/	-	/	-	
Tomato juice		+	+	+	+	
Transformers oil	technically pure	+	/	+	/	
Tributylphosphate		+	+	+	+	
Trichloracetaldehyde	technically pure	+	+	+	+	
Trichlorbenzene		-	-			
Trichlorethylene phosphate		+	+	+		
Trichlorethylene	technically pure	+bis/	-	/	/	
Trichloroacetic acid	technically pure	+	/bis-	+		
Tricreil - phosphate		+	+	+	/	
Trietanolamine	saturated	+	+V	+	+V	
Trietihylenglicol		+	+	+	+	
Trilon		+	+			
Trimethylborate		+	/bis-			
Trioctilphosphate		+	/	+		
Triolhexane		+	+	+	+	+
Trisodic phosphate		+	+	+	+	
Turpentine	technically pure	+bis/	/	-		
Tutogen U		+	+	+	+	
Tween 20 and 80		+	-	+	+	
Unprimed cod liver oil		+	/	+		
Urea, aqueous	up to 33%	+	+	+	+	
Uric acid		+	+	+		
Urine		+	+	+	+	
Varnish	high	+	+bis/			
Vaseline oil	technically pure	+bis/	/	+	/	-
Vaseline	technically pure	+bis/	/	+	/	
Vegetable and animal oil		+	+bis/	+	+bis/	
Vinegar (wine vinegar)	common use	+	+	+	+	
Vinilidenchloride	technically pure	-		-		
Vinyl acetate		+	+	+	/	
Viscose solution		+	+	+	+	
Viscosifier (photographic)		+	+	+	+	
Viscosifiers		+	+	+	+	
Vitamin C		+		+		
Vitamins preparation, dry		+		+		
Water glass		+	+	+	+	
Water vapor		+	+	+	+	
Wax alcohol		/	/	/	-	
Wax		+	+bis/	+	+bis/	
Whale sperm		+	/	+		
Whey		+	+	+	+	
Whisky		+		+		
Whitening bleach with 12.5% active chlorine		/	-	/	/	-
Wine vinegar	common use	+	+	+	+	
Wine		+		+	+	
Xylol		/	-	-		
Yeast		+	+	+		
Zinc carbonate		+	+	+	+	
Zinc chloride		+	+	+	+	+
Zinc estearate		+	+	+	+	+
Zinc fat		+	+	+	+	
Zinc oxide		+	+	+	+	

Special Developments

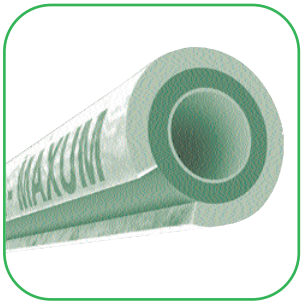


4. Special Developments

4.1 Piping

Maxum S3.2

IPS's persistent innovation resulted in the development of the ideal piping for radiator heating and hot water installations. MAXUM is the only product with an exclusive closed cell isolating thermoplastic foam layer, manufactured by coextrusion over a Multilayer IPS FusionS3.2 pipe; achieving much higher thermal and mechanical resistance with the smallest external diamerter in the market.

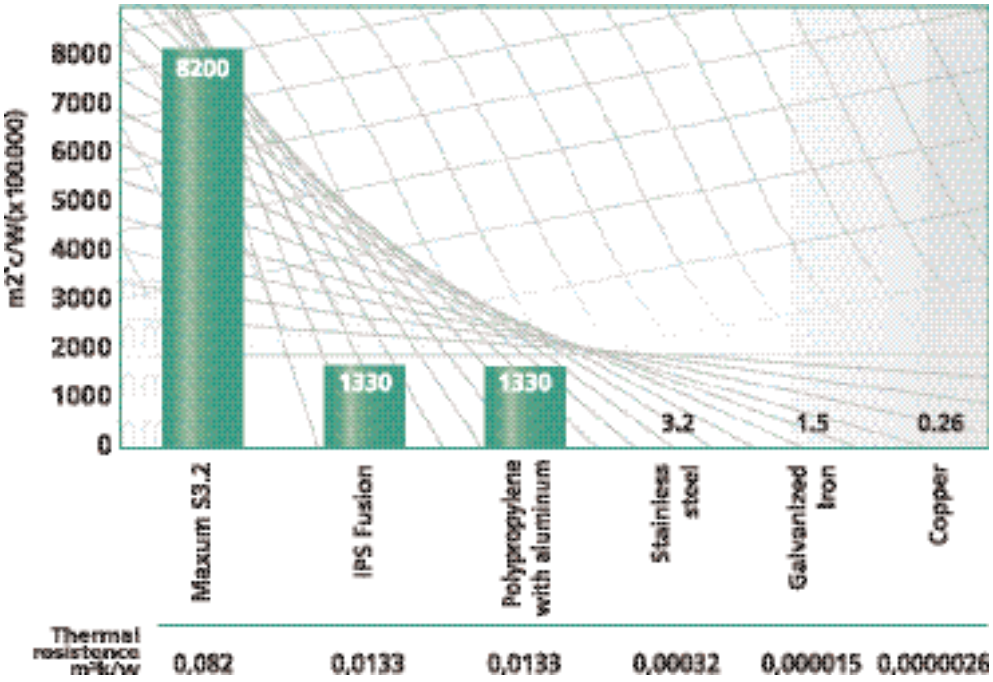


Maxum S3.2 Main Advantages

- ***Excellent thermal insullation***

MAXUM's thermal resistance is 30.000 times superior than that of copper and between 5 and 6 times superior than that of other polypropylene pipes without insulation, therefore it reduces the transported liquid's heat loss to the minimum.

- ***Thermal resistance of different pipings (Ø20mm - 1/2")***



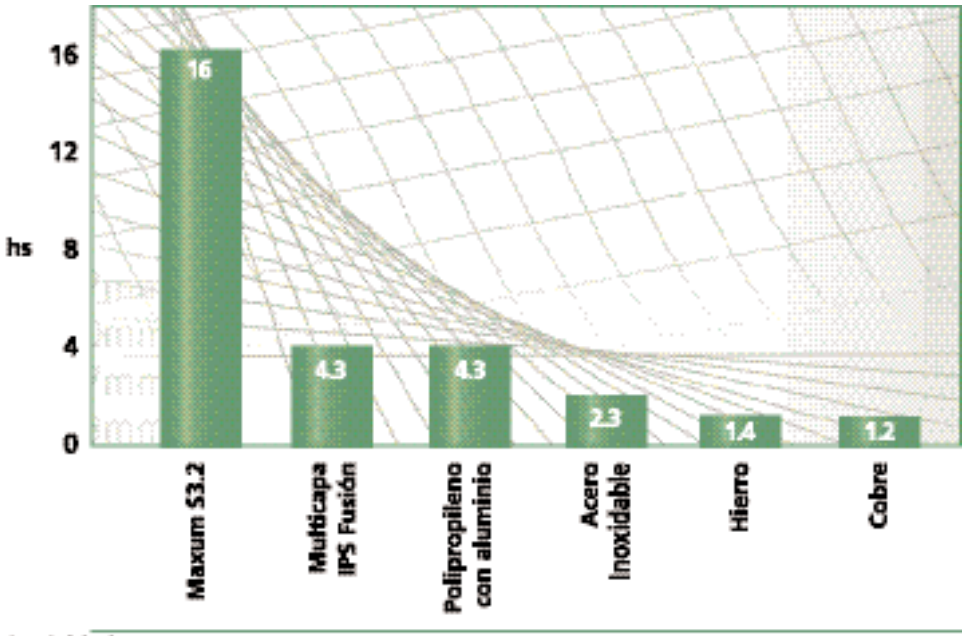
It is possible to achieve important gas, electricity, water and time savings thanks to this insulation since the piping acts as a thermos in itself, allowing it to rapidly reach the desired temperature.

- ***Extension of water heater useful life:***

There is no need to over-heat. Gas water heaters, tank water heaters, boilers, etc., can achieve the same results working at a lower demand level.

- ***Delays freezing***

Thermic conductivity (λ=w/nk) of different pipings



- ***Higher resistance to impact***

MAXUM's thermoplastic foam coating also constitutes an effective cushion and protective barrier against impact, effectively protecting the pipes from bad handling/damage during transportation, and installation.

- ***Greater outdoor useful life***

For those pipes exposed to harsh weather conditions, MAXUM's thermoplastic foam offers higher ultraviolet ray protection.

- ***Better behavior at extreme temperatures***

MAXUM pipes are specially indicated for extreme climate regions, either for high temperature areas or those with temperatures below zero.

- ***Acoustic insulation***

MAXUM considerably reduces the noises caused by "water hammer" vibration and pressure variations.

- ***Lack of condensation***

The thermal insulation also prevents the condensation of humidity on the pipe's surface and consequetly stops water from spreading towards the wall's exterior. Because of its manufacturing system, there are no gaps between the thermoplastic foam and the pipe, preventing any possible condensation, which could lead to delamination.

- ***Easy installation***

MAXUM's thermoplastic foam coating avoids the need to cover the piping, allowing free dilation. In addition, MAXUM offers the higher thermal resitance with the smallest external diameter in the market, avoiding the need for large gutters when installing.

4.2 Fittings

IPS fittings are injected they have the highest technical development level in the country. Among its most important characteristics and advantages is the fact that they are developed for a nominal pressure of 25 kgf/cm² and whilst having the smallest size in the market, and advantage to both its installation and performance. Also, IPS produces with an extensive selection of exclusively developed fitting with hardened metal inserts –manufactured with a copper alloy covered in nickel– allowing union compatability with all other piping systems.

Corner elbow

IPS has exclusively designed the "rapid flow" corner elbow for its accessory line. It is an ideal piece to reach the corner of the installations with a three-way derivation, optimizing the time and space available.

4.3 Accessories

IPSOLAR strip

It is the self-adhesive strip to protect pipings and fittings from sun exposure. The protection material is Anti UV laminated aluminum. It is placed helicoidally, covering with each turn the end of the prior turn, with a superposition of no less than 5mm at a 60º angle, which increases along with the pipe's diameter. If its use is exposed, it can be applied following the pipe's direction. After applying, the covered sections must be pressed by hand to avoid air bubbles.

Pipe diameter	20mm	25mm	32mm	40mm	50mm	63mm	75mm	90mm
Strip yield in m	5	4	3	2.5	2	1.5	1	0.5

IPSOBAND Strip

Self-adhesive strip to protect piping and fitting from sun exposure or low temperatures. It provides thermo-acustic insulation thanks to its closed cell thermoplastic foam coating.

UV protection: *Laminated aluminum*
Thermo-acustic insulation: *Foam with a thikness of aprox. 2mm.*
Insulation index: *0.09 Kcal/hmºC.*

It must be installed in a helicoidal manner without any gaps, superposing layers by no less than 5 mm at a 60º angle, which increases along with the pipe's diameter. Once applied, the adhesive sticks over time.

Pipe diameter	20mm	25mm	32mm	40mm	50mm	63mm	75mm	90mm
Strip yield in m	4.5	3.5	3	2.5	2	1.5	1	0.5

Clamps

They are manufactures with an incorporated peg. It is sold with the corresponding screw. The curved support follows the curve of the pipe. The width of its body, as well as the use of titanium dioxide extends its outdoor life. It is rust-proof and respects the separation between the pipe and the wall. 20mm to 63mm diameters.

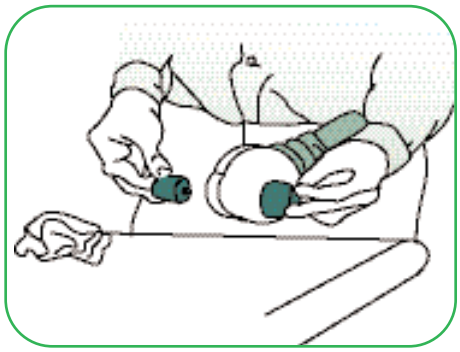
Fusion device

It is a 1000 W heating iron thermostatically regulated by our laboratory. It can work with fusion welding sockets of all diameters. It has a small design in the front part, so that it can be inserted in the wall gutters.

Instalation

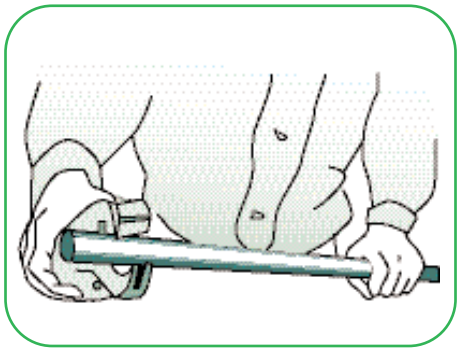
5. Installation

5.1 IPS Fusión Technology

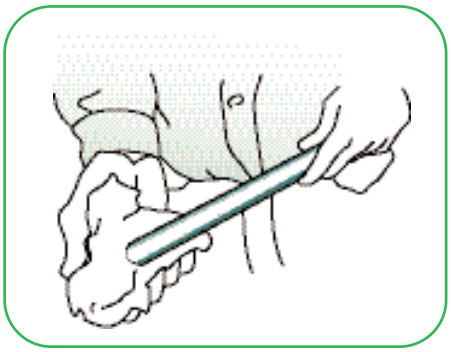


1. *Plug in the fusion device, after conveniently placing and tightening the sockets with an Allen wrench. Make sure they are clean, dry and free of dust. Ensure that there is a good contact in between both sockets and the tool to reach an homogeneous temperature.*

2. *Check the fusion machine lights, the green one that indicates the power (always on) and the red one, that when it goes off it means that the tool has reached its optimal working temperature.*

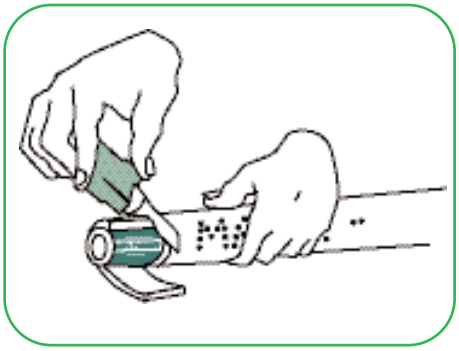


3. *Cut the IPS Fusion pipe, with a pipe cutting scissor or saw; try to make the cut perpendicular to the pipe's axis. Be careful not to leave shavings on the pipe.*

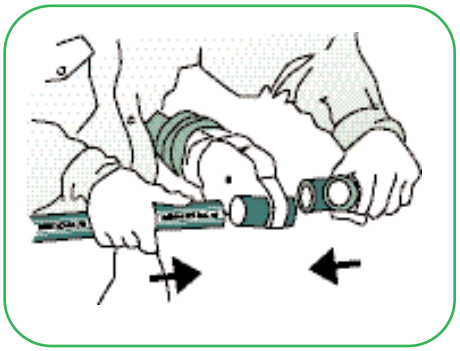


4. *Clean and dry the pipe and the fitting thoroughly before proceeding with the fusion.*

5. *Mark on the pipe the length up to which it will be introduced in the socket. See table in item 5.2, Fusion.*



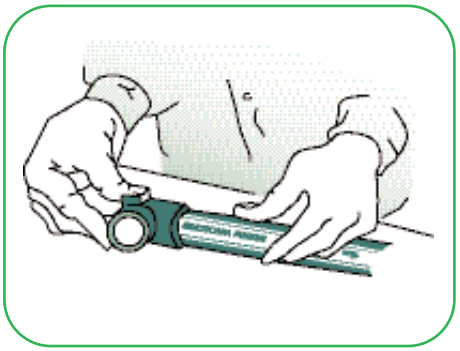
6. *When using MAXUM pipes mark and cut with a cutter the coatings before proceeding with the fusion.*



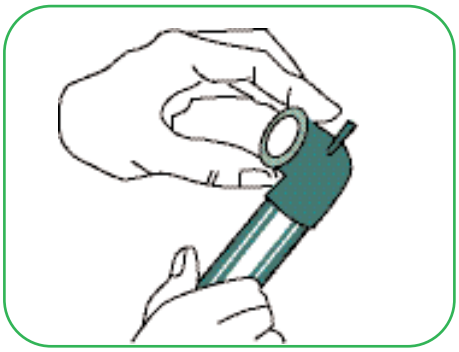
7. *Insert the pipe and the fitting simultaneously in the fusion device's welding sockets, when it has reached a temperature of 260° C., (red light off).*

8. *Press (without twisting) the pipe and the fitting into the respective welding sockets until they reach the limit. Do not exceed the markings.*

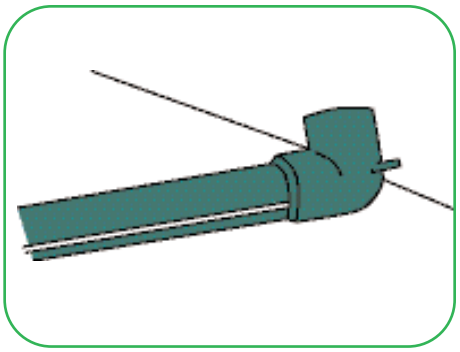
9. *Once you have reached the limit, leave in and wait the minimum time required indicated in the table in item 5.2, Fusion.*



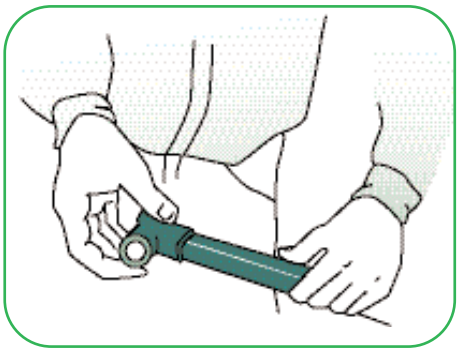
10. *Once the required time has elapsed, remove both parts and join them slowly and steadily having previously thought about the direction the fitting should have. The white lines on the IPS Fusion pipes and the green marks on the fitting can be of help as a guide for this task.*



11. *Stop inserting the pipe into the fitting when the rings of swept material on each part are joined.*



12. *After stopping the pressure, there still is the possibility to make small adjustments in the fitting for about 3 seconds.*



13. *Let each fusion settle until it is completely cold.*

14. *Wait at least 3 hours from the last fusion before applying pressure to the installation.*

5.2 Fusion

Pipe insertion in the welding sockets and minimum heating time requirement table

Ø	Penetration	Warm up Time
20mm	1.2cm	5 seconds
25mm	1.3cm	7 seconds
32mm	1.45cm	8 seconds
40mm	1.6cm	12 seconds
50mm	1.8cm	18 seconds
63mm	2.4cm	24 seconds
75mm	2.6cm	30 seconds
90mm	2.9cm	40 seconds

5.3 Late Fusion

This option can be used when working in difficult to reach areas or when it is impossible to join the pipe, the fitting and the welding socket at the same time. To do so, first place the fitting in the corresponding welding socket, keeping it double the amount of time indicated in 5.2, then continue with the pipe and leave it the established time. Finally, join as usual.

5.4 Concealed piping

To mount a concealed IPS Fusion installation, the thickness of the wall where the fitting will be placed must be taken into consideration. If the wall is wide enough, the fitting or inflexibility can be done with minimum coating, such as the diameter of the pipe, without the need for a strong mixture. If the wall is thin, the increase in the height of the gutter must be taken into account in order to adequately separate the hot and cold water pipes. This gap must be equal to the diameter of the pipes and the coating must be strong enough to fit both pipes.

5.5 Exposed piping

Table of recommeded distances between clamps in exposed horizontal stretchs (expressed in cm, flexion less than 2/00) for different working temperatures (temperature in ºC).

Ø / tº	0º	20º	40º	60º	80º	100º
20mm	66	61	57	54	49	43
25mm	74	69	63	60	55	49
32mm	87	81	75	71	63	57
40mm	97	90	84	80	71	64
50mm	105	97	90	86	78	69
63mm	119	111	103	98	88	79
75mm	135	125	116	111	100	90
90mm	150	140	130	125	115	100

To place an exposed installation it is necesary to stiffen the derivation knots, placing a fixed clamp under the Ts derivation. In vertical runs it is suggested that the distance between fixed points does not exceed three meters. Place a mobile point in between two fixed points. Remember that fixed clamps must hold the piping without damaging it. (Use IPS omega clamps, designed for that purpose).

Calculations

6. Calculations

6.1 Piping dilation

Lineal dilation formula for hot water pipes

$$\Delta l = a \, \Delta t \times L$$

Δl — Longitudinal variation between two fixed points (mm)

a — Lineal dilation coefficient IPS: 0.11mm/m°C

Δt — Temperature difference between:
Room temperature on piping installation day and normal working temperature (°C)

L — Length of the piping between twofixed points (m)

Lineal dilation table for IPS Fusion System pipes

Δt	10°C	20°C	30°C	40°C	50°C	60°C	70°C	80°C	90°C	100°C
L										
0.1m	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.0	1.1
0.2m	0.2	0.4	0.7	0.9	1.1	1.3	1.5	1.8	2.0	2.2
0.3m	0.3	0.7	1.0	1.3	1.7	2.0	2.3	2.6	3.0	3.3
0.4m	0.4	0.9	1.3	1.8	2.2	2.6	3.1	3.5	4.0	4.4
0.5m	0.6	1.1	1.7	2.2	2.8	3.3	3.9	4.4	5.0	5.5
0.6m	0.7	1.3	2.0	2.6	3.3	4.0	4.6	5.3	5.9	6.6
0.7m	0.8	1.5	2.3	3.1	4.2	4.6	5.4	6.2	6.9	7.7
0.8m	0.9	1.8	2.6	3.5	4.4	5.3	6.2	7.0	7.9	8.8
0.9m	1.0	2.0	3.0	4.0	5.0	5.9	6.9	7.9	8.9	9.9
1m	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9	11.0
2m	2.2	4.4	6.6	8.8	11.0	13.2	15.4	17.6	19.8	22.2
3m	3.3	6.6	9.9	13.2	16.5	19.8	23.1	26.4	29.7	33.0
4m	4.4	8.8	13.2	17.6	22.0	26.4	30.8	35.2	39.6	44.0
5m	5.5	11.0	16.5	22.0	27.5	33.0	38.5	44.0	49.5	55.0
6m	6.6	15.5	19.8	26.4	33.0	39.6	46.2	52.8	59.4	66.0

6.2 Advisable speeds depending on pressure

Table A

m.c.a.	Pressure kg/cm2	Speed m/s
01 to 05	up to 0.5	0.50 to 0.60
05 to 10	0.5 to 1	0.60 to 1.00
10 to 20	1 to 2	1.00 to 1.50
20 or more	2 or more	1.50 to 2.00

6.3 Load loss and diameter verification for IPS Fusion System pipes

- *The load loss indicates the loss of pressure of a piping installation design due to friction, direction and section changes.*

Factors that increase load loss:

- *Very reduced internal layout.*
- *Large extension installation layout design.*
- *Pipes with rough internal walls, encrustings or scale.*
- *Sudden direction changes.*
- *Sudden diametre reductions.*

Total load loss calculations in an installation.

The following formulas and tables apply to all IPS polypropylene pipes, regardless of the union system used, wether they are coated or not.

To calculate a piping's total load loss the following must be added:

1. *Amount of meters of intalled piping, differentianting the various diameters (Example: 20m of 20mm, 12m of 25mm and 5m of 40mm).*
2. *Add to each piping size stretch the equivalent in meters of the installation localized resistances of each similar size, as direction changes and reductions (calculated according to table B and C).*
3. *Establish load loss per diameter according to the table D nomogramme.*
4. *Add the obtained values = Total load loss*

Table B

Diameter reductions

a / de	*25mm*	*32mm*	*40mm*	*50mm*	*63mm*	*75mm*	*90 mm*
20mm	*0.10m*	*0.18m*	*0.21m*	*0.24m*	*0.31m*	*0.32m*	*0.86m*
25mm		*0.12m*	*0.20m*	*0.25m*	*0.30m*	*0.32m*	*0.81m*
32mm			*0.17m*	*0.23m*	*0.26m*	*0.28m*	*0.72m*
40mm				*0.22m*	*0.24m*	*0.25m*	*0.63m*
50mm					*0.19m*	*0.20m*	*0.54m*
63mm						*0.18m*	*0.45m*
75mm							*0.36m*

Table C

Direction changes

The values resulting from tables are aproximate and thay are expressed in equivalent longitudinal meters in one pipe.

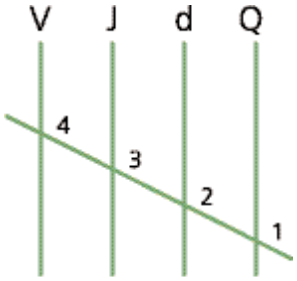
	20mm	*25mm*	*32mm*	*40mm*	*50mm*	*63mm*	*75mm*	*90mm*
90°elbow	*0.4m*	*0.5m*	*0.6m*	*0.8m*	*1.0m*	*1.2m*	*1.4m*	*1.7m*
45°elbow	*0.2m*	*0.2m*	*0.3m*	*0.4m*	*0.5m*	*0.7m*	*0.9m*	*1.0m*
90°curve	*0.2m*	*0.3m*	*0.3m*	*0.4m*	*0.4m*	*0.5m*	*0.6m*	*0.7m*
90° T direct link	*0.2m*	*0.3m*	*0.3m*	*0.4m*	*0.5m*	*0.7m*	*0.9m*	*1.1m*
90° T lateral exit	*0.5m*	*0.6m*	*0.7m*	*0.9m*	*1.2m*	*1.5m*	*1.7m*	*2.0m*
90° T bilateral exit	*0.4m*	*0.5m*	*0.7m*	*0.8m*	*1.0m*	*1.3m*	*1.6m*	*1.9m*

Nomogram guide to use the load loss nomogram and diameter verification

load loss calculations for localized resistance

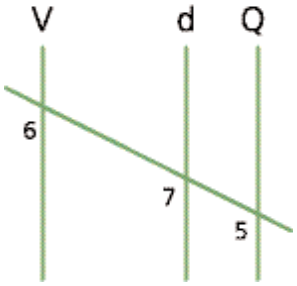
J *Load loss mm.c.a. per meter of piping lenght.*
Q *Desired flow (l/s).*
L *Piping lenght (m).*
d *Pipe's inner diameter (mm).*
V *Speed (m/s).*

a) Load loss



1. *Place in the fist Q scale the estimated flow. Point 1.*
2. *Determine the pipe's inner diameter. Point 2.*
3. *Join both points with a ruler. This line intersects **J** and **V**.*
4. *Establish the load loss in mm.c.a. per ml. of piping in J. Point 3.*
5. *Verify the speed, Point 4, according to Table A.*

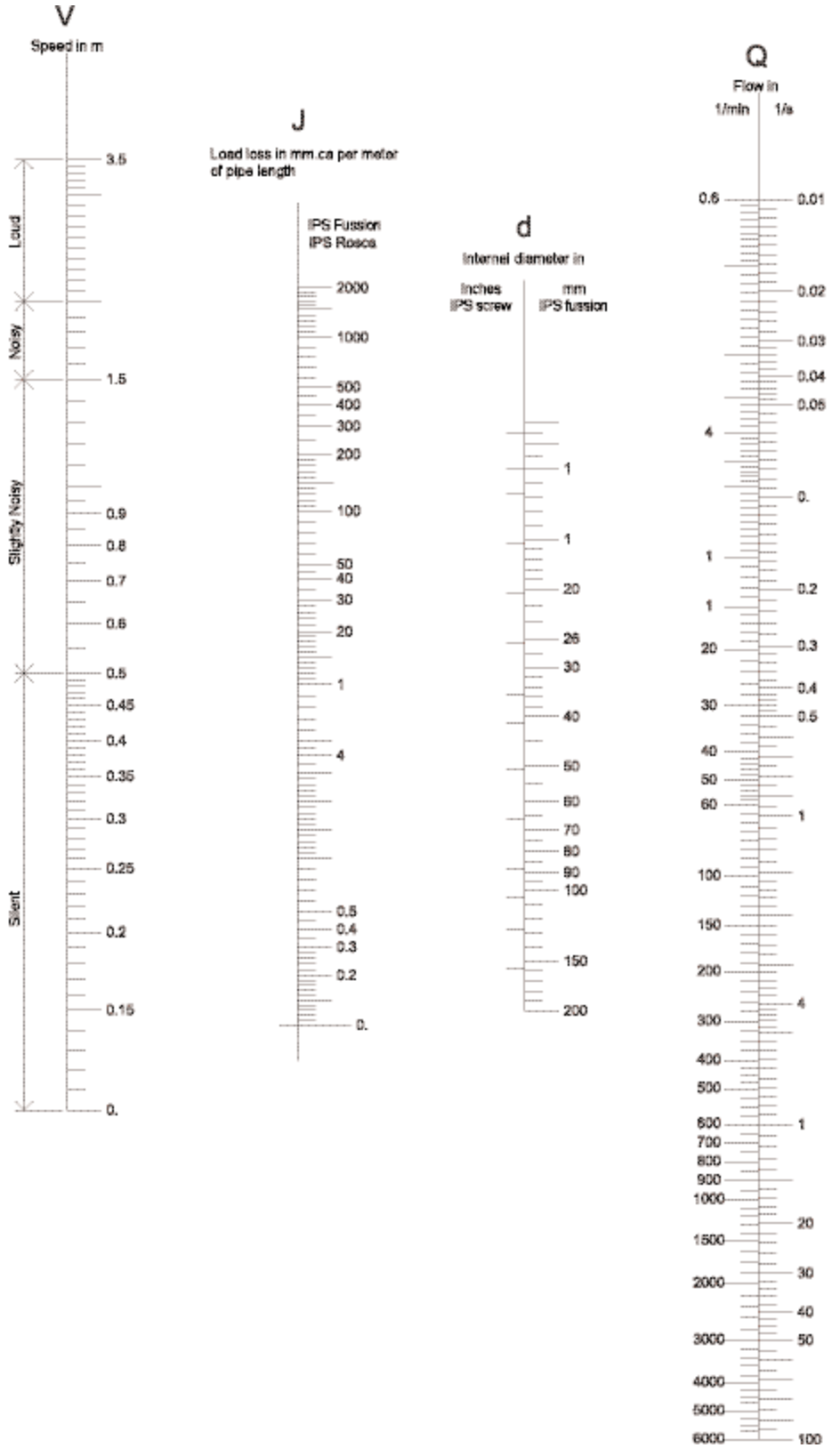
b) Diameter verification



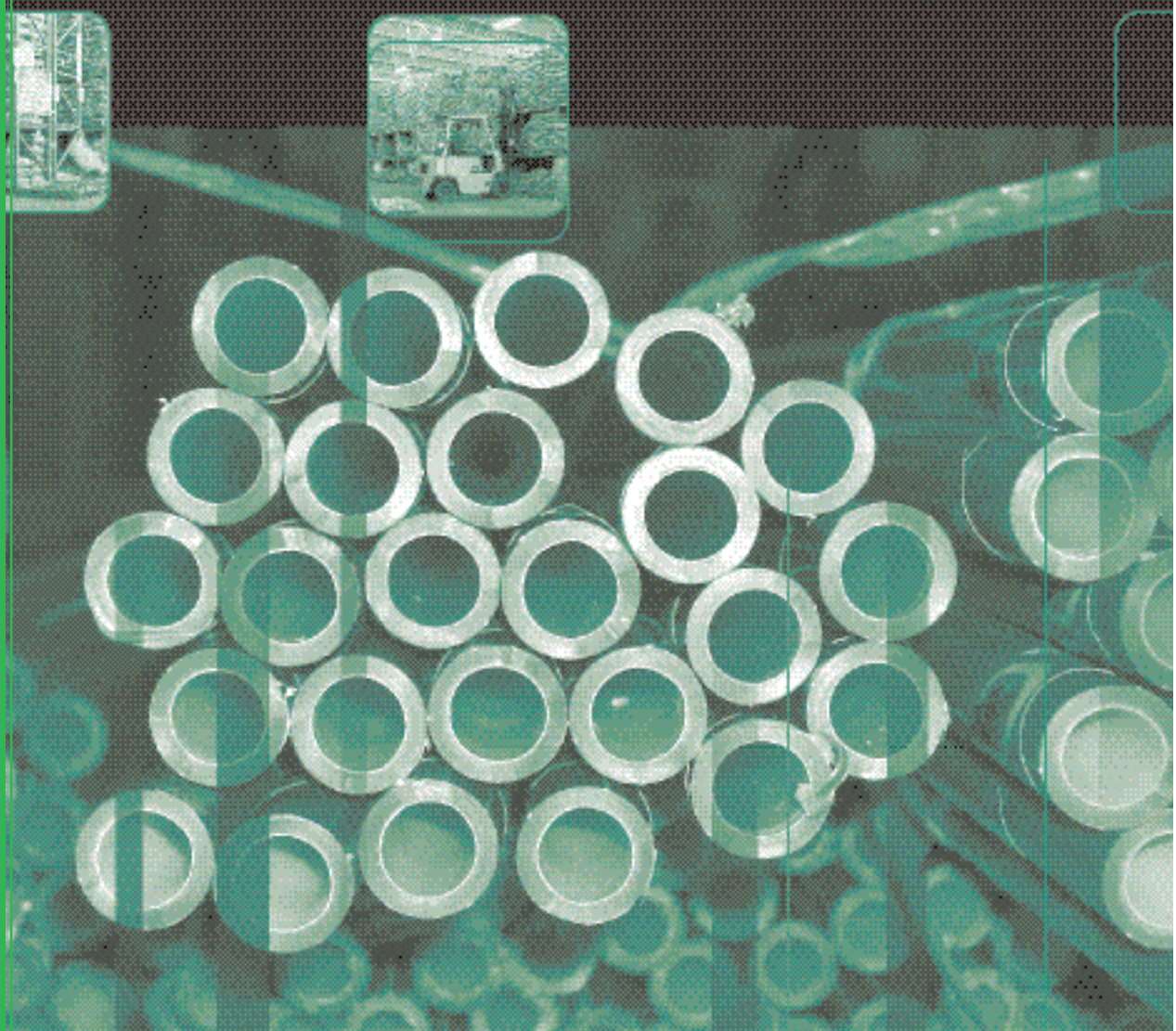
1. *Do not consider line J.*
2. *With flow Q, establish Point 5.*
3. *Consider the desired speed, according to Table A.*
4. *Join 5 and 6 with a straight line.*
5. *Determine point 7, check the diameter.*

ADVICE: *In the event of minimal flows, the section will have to be increased by 1 diameter in the following cases:*
- In horizontal stretches, every 24 meters of installation.
- In columns, in stretches from 20 to 25 meters.

Load loss and diameter verification nomogram

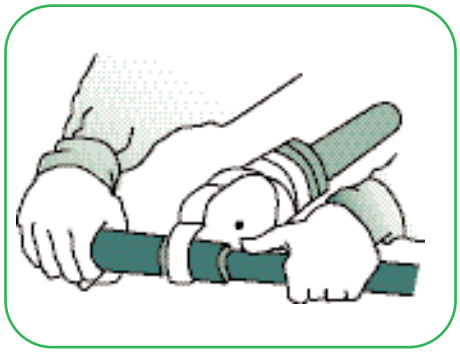


IPS recommendations

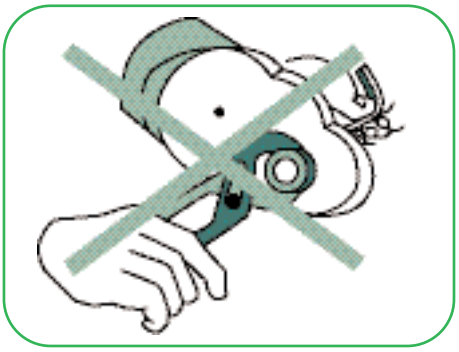


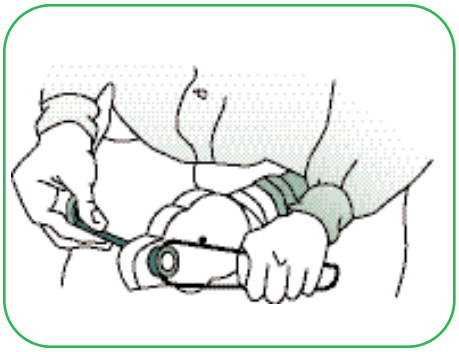
7. IPS recommendations

1. *For a correct fusion, both pipe and the fitting must be totally clean and dry.*

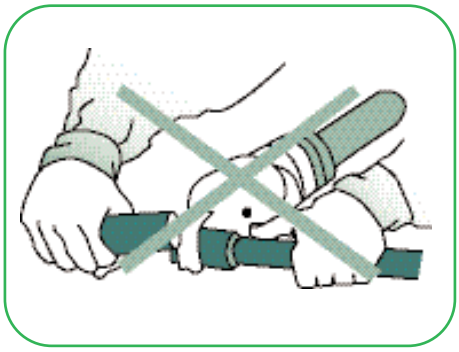


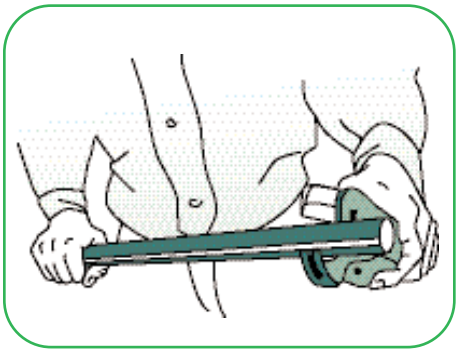
2. *Make sure the welding sockets operating temperature is 260 ºC.*



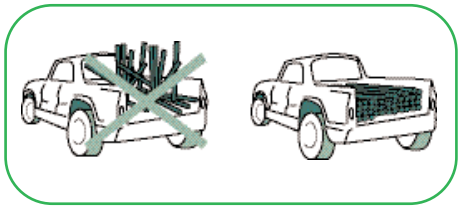


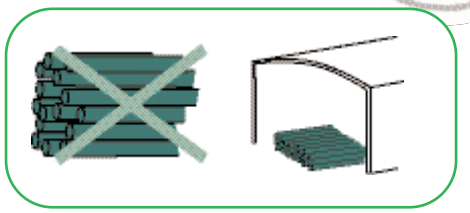
3. *To change the hot welding sockets use welding sockets remover and an Allen wrench (these tools do not harm welding sockets´ teflon).*



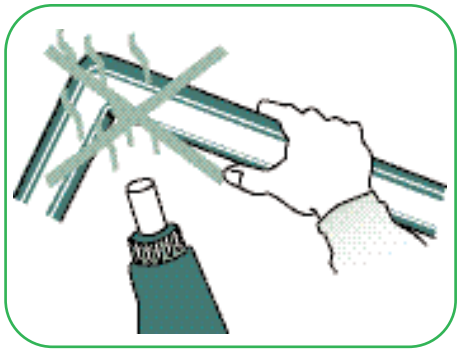


4. *In the event of choosing the wrong pieces we suggest to continue with the fusion, since afterwards the pieces can be cut and used again at another time.*

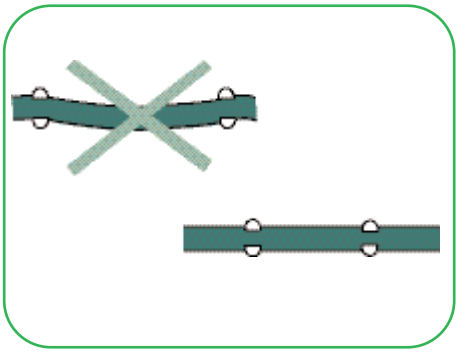




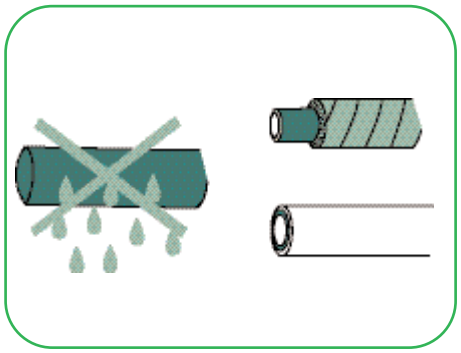
5. *Transport IPS pipes in an orderly manner. Store pipes in piles no higher than 1.5 meters and protected from ultraviolet rays.*



6. *Do not use hot air blowlamps or direct flame to curve the pipes or fittings since it degrades the material.*

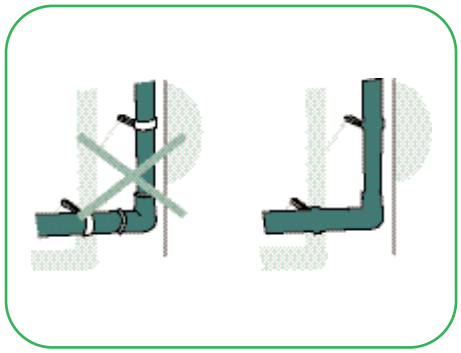


7. *In external installations use IPS CLAMPS, to avoid flexions greater than 2 $^{0}/_{00}$.*



8. *Use the MAXUM pipe (with insulation) or the IPSOBAND strip to cover pipes and fittings in external installations, in cases of extremely cold conditions, or to prevent condensation and for UV ray protection.*

9. *To remove the foam covering from the MAXUM pipe use a cutter.*

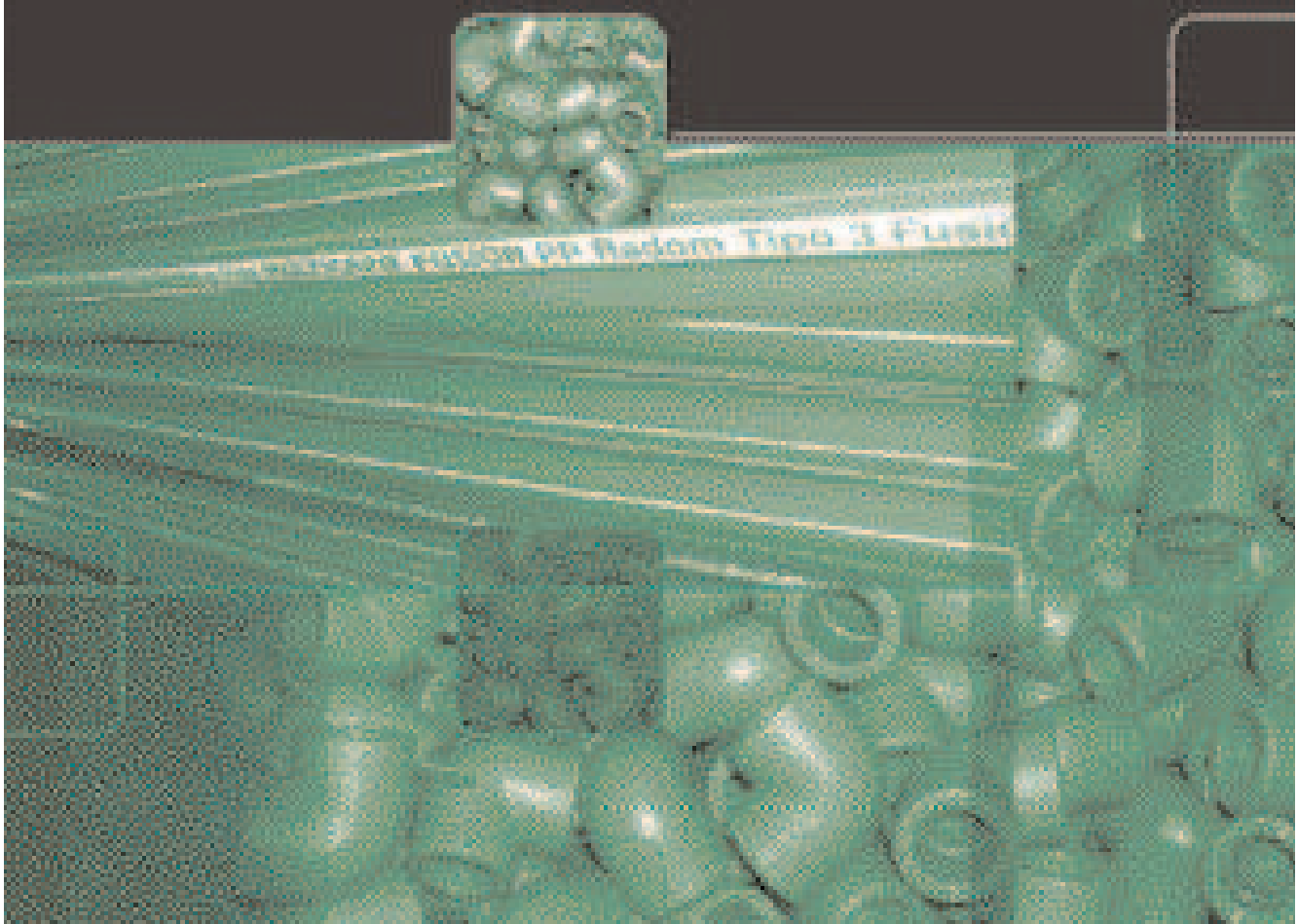


10. *For installations exposed to the sun, we recommend using IPSOLAR or MAXUM pipes with fittings protected with IPSOLAR or IPSOBAND.*

11. *In low temperature areas use MAXUM with IPSOBAND covered fitting.*

12. *For installations in cold places it is convenient to close the main tap and open the faucets to empty the piping. This prevents water freezing due to extended exposure to low temperatures. MAXUM pipes delay freezing for 16 hours.*

IPS Fusion System Components



8. IPS Fusion System Components

IPS Fusion System Piping

Maxum S32 Super Insulating
(IPS Fusion S3.2 + thermal insulation)
Use: hot water and radiators*
* Recommended by ROCA

	20mm	25mm	32mm	40mm	50mm	63mm	75mm	90mm	110mm
Item N°	2921	2922	2923	2924	2925	2926	2927	2928	2929
Wall thickness	2.8mm	3.5mm	4.5mm	5.6mm	6.9mm	8.7mm	10.4mm	12.5mm	15.2mm
m per strip	4	4	4	4	4	4	4	4	4
Norms	★	★	★	★	★	★	★	★	★

Reinforced Multilayer Fusion
IRAM seal for 20, 25 and 32 mm diam.
Use: hot water

	20mm	25mm	32mm	40mm	50mm	63mm	75mm	90mm	110mm
Item N°	2601	2602	2603	2604	2605	2606	2607	2608	2609
Wall thickness	3.4mm	4.2mm	5.4mm	6.7mm	8.4mm	10.5mm	12.5mm	15mm	18.4mm
m per strip	4	4	4	4	4	4	4	4	4
Norms	★	★	★	★	★	★	★	★	★

Multilayer IPS Fusion S32
Use: hot water

	20mm	25mm	32mm	40mm	50mm	63mm	75mm	90mm	110mm
Item N°	2901	2902	2903	2904	2905	2906	2907	2908	2909
Wall thickness	2.8mm	3.5mm	4.5mm	5.6mm	6.9mm	8.7mm	10.4mm	12.5mm	15.2mm
m per strip	4	4	4	4	4	4	4	4	4
Norms	★	★	★	★	★	★	★	★	★

IPS Fusion Pipe
Use: cold water

	32mm	40mm	50mm	63mm	75mm	90mm	110mm
Item N°	2503	2504	2505	2506	2507	2508	2509
Wall thickness	3mm	3.7mm	4.6mm	5.8mm	6.9mm	8.2mm	10.0mm
m per strip	4	4	4	4	4	4	4
Norms	★	★	★	★	★	★	★

IPS Fusion System fittings

Corner Elbow
HHH
FCE

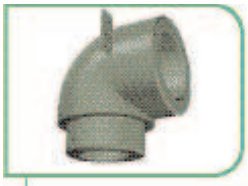
	20mm	25mm	32mm
Item N°	1211	1212	1213
Units per Big bag	60	60	30
Units per bag	10	10	5
Norms	●	●	●

90 Elbow
HH
FCU

	20mm	25mm	32mm	40mm	50mm	63mm	75mm	90mm	110mm
Item N°	101	102	103	104	105	106	107	108	109
Units per Big bag	375	375	150	30	18	12	6	6	6
Units per bag	25	25	10	1	1	1	1	1	1
Norms	●	●	●	●	●	●	●	●	●

90 Elbow Net
FCO net

	25x20	32x20	32x25
Item N°	1220	1221	1222
Units per Big bag	90	90	60
Units per bag	15	15	10
Norms	●	●	●



90 Elbow

MH
FCUMH

	20mm	25mm	32mm
Item N°	121	122	123
U. per Big bag	375	375	150
U. per bag	25	25	10
Norms	●	●	●

45 Elbow

HH
FCA

	20mm	25mm	32mm	40mm	50mm	63mm	75mm
Item N°	131	132	133	134	135	136	137
U. per Big bag	90	90	60	30	18	12	6
U. per bag	15	15	10	1	1	1	1
Norms	●	●	●	●	●	●	●

90 Curve

HH
FBU

	20mm	25mm	32mm	40mm	50mm	63mm
Item N°	281	282	283	2848	285	286
U. per Big bag	90	90	60	30	12	12
U. per bag	15	15	10	1	1	1
Norms	●	●	●	●	●	●

Overpass

MM
FSOB

	20mm	25mm	32mm
Item N°	291	292	293
U. per Big bag	90	90	60
U. per bag	15	15	10
Norms	●	●	●

90 T

HHH
FTU

	20mm	25mm	32mm	40mm	50mm	63mm	75mm	90mm	110mm
Item N°	161	162	163	164	165	166	167	168	168
U. per Big bag	375	375	150	30	18	12	6	6	6
U. per bag	25	25	10	1	1	1	1	1	1
Norms	●	●	●	●	●	●	●	●	●

90 T

HHH
FTU RED

	25x20	32x20	32x25	40x20	40x25	40x32	50x20	50x25
Item N°	241	242	243	244	245	246	247	248
U. per Big bag	225	90	60	30	30	30	30	18
U. per bag	15	15	10	1	1	1	1	1
Norms	●	●	●	●	●	●	●	●

	50x32	50x40	63x20	63x25	63x32	63x40	63x50	75x20	75x25	75x32	75x40	75x50	75x63
	249	250	251	252	253	254	257	258	259	260	261	263	264
	18	18	12	12	12	12	12	6	6	6	6	6	6
	1	1	1	1	1	1	1	1	1	1	1	1	1
	●	●	●	●	●	●	●	●	●	●	●	●	●

Overpass

HH
FC

Item N°	20mm	25mm	32mm	40mm	50mm	63mm	75mm	90mm	110mm
U. per Big bag	375	375	150	30	12	12	6	6	6
U. per bag	25	25	10	1	1	1	1	1	1
Norms	●	●	●	●	●	●	●	●	●

Cupla net

MH
FCMH

Item N°	25x20	32x20	32x25	40x20	40x25	40x32	50x20
U. per Big bag	150	150	60	30	30	30	18
U. per bag	25	25	10	1	1	1	1
Norms	●	●	●	●	●	●	●

50x25	50x32	50x40	63x20	63x25	63x32	63x40	63x50	75x50	75x63	90x63	90x75
148	149	150	151	152	153	154	155	156	157	158	159
18	18	18	12	12	12	12	12	6	6	6	6
1	1	1	1	1	1	1	1	1	1	1	1
●	●	●	●	●	●	●	●	●	●	●	●

Lid

H
FTH

Item N°	20mm	25mm	32mm	40mm	50mm	63mm	75mm
U. per Big bag	111	112	113	114	115	116	117
U. per bag	150	150	60	30	12	12	12
Norms	25	25	10	1	1	1	1
	●	●	●	●	●	●	●

Cross

HHHH
FCZ

Item N°	20mm	25mm	32mm
U. per Big bag	751	752	753
U. per bag	120	90	60
Norms	20	15	10
	●	●	●

Double Union

HH
FUD

Item N°	20mm	25mm	32mm	40mm	50mm	63mm	75mm
U. per Big bag	231	232	233	234	235	236	237
U. per bag	90	72	48	30	12	12	6
Norms	15	12	8	1	1	1	1
	●	●	●	●	●	●	●

Double Union

HH
FUDrH

Item N°	20x1/2"	25x3/4"	32x1"	40x1 1/4"	50x1 1/2"	63x2"	75x2 1/2"
U. per Big bag	531	532	533	534	535	536	537
U. per bag	90	72	48	30	12	12	6
Norms	15	12	8	1	1	1	1
	●●	●●	●●	●●	●●	●●	●●

Double Union

MH
FUDrM

		20x1/2"	25x3/4"	32x1"
Item N°		921	922	923
U. per Big bag		150	120	60
U. per bag		25	20	10
Norms		◉◆	◉◆	◉◆

90 Elbow iH with support

HH
FCUiHS
with metal insert

		20x1/2"
Item N°		1201
U. per Big bag		60
U. per bag		10
Norms		◉

90 Elbow iH

HH
FCUiHS
with metal insert

		20x3/8"	20x1/2"	25x3/8"	25x1/2"	25x3/4"	32x3/4"	32x1"
Item N°		200	201	205	202	203	209	204
U. per Big bag		120	120	120	120	120	60	60
U. per bag		20	20	20	20	20	10	10
Norms		◉	◉	◉	◉	◉	◉	◉

90 Elbow iM

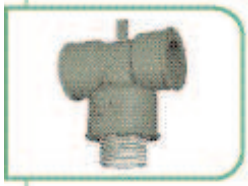
MH
FCUiM
with metal insert

		20x1/2"	25x1/2"	25x3/4"	32x3/4"	32x1"
Item N°		1121	1122	1123	1129	229
U. per Big bag		120	120	60	60	60
U. per bag		20	20	10	10	10
Norms		◉	◉	◉	◉	◉

90 T iH

HH
FTUiH
with metal insert

		20x3/8"	20x1/2"	25x1/2"	25x3/4"	32x1"
Item N°		210	211	212	213	214
U. per Big bag		60	60	60	60	60
U. per bag		10	10	10	10	10
Norms		◉	◉	◉	◉	◉



90 T iM

HMH
FTUiM
with metal insert

		20x1/2"	25x3/4"	32x3/4"	32x1"
Item N°		761	763	769	764
U. per Big bag		60	60	60	60
U. per bag		10	10	10	10
Norms		◉	◉	◉	◉

Cupla iH

HH
FCiH
with metal insert

		20x3/8"	20x1/2"	20x3/4"	25x1/2"	25x3/4"	32x1/2"
Item N°		270	271	290	278	272	284
U. per Big bag		120	120	60	72	60	60
U. per bag		20	20	10	12	10	10
Norms		◉	◉	◉	◉	◉	◉

Cupla IH

HH
FCIH
with metal
insert

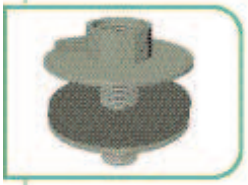
	32x3/4"	32x1"	40x1 1/4"	50 x1 1/2"	63x2"	75x2 1/2"	90x3"
Item N°	279	273	274	275	276	277	280
U. per Big bag	60	60	6	6	6	6	6
U. per bag	10	10	1	1	1	1	1
Norms	●	●	●	●	●	●	●

Cupla IM

MH
FCIM
with metal
insert

	20x1/2"	25x1/2"	25x3/4"	32x1/2"	32x3/4"	32x1"
Item N°	221	220	222	119	228	223
U. per Big bag	120	60	60	60	60	60
U. per bag	20	10	10	10	10	10
Norms	●	●	●	●	●	●

	40x1 1/4"	50x1 1/2"	63x2"	75x2 1/2"	90x3"
Item N°	224	225	226	227	230
U. per Big bag	6	6	6	6	6
U. per bag	1	1	1	1	1
Norms	●	●	●	●	●



Adaptator

FOR FATA
TANK

	20 mm	25 mm
Item N°		
U. per Big bag		
U. per bag		
Norms		

Water valves

Water valve
IPS – FV/20

FLLPFV

	20mm	25mm
Item N°	1941	1942
U. per Big bag	18	18
U. per bag	3	3
Norms	●	●

Water valve

FLLP

	20mm	25mm	32mm
Item N°	171	172	173
U. per Big bag	120	120	75
U. per bag	8	8	5
Norms	●	●	●

Water valve

BELL HOOD
FCLLP

	20mm	25mm
Item N°	181	182
U. per Big bag	30	30
U. per bag	5	5
Norms	●	●

Water valve

METALLIC
HEAD
FCMLLP

	20mm	25mm
Item N°	1801	1802
U. per Big bag	1	1
U. per bag	1	1
Norms	●	●

Spherical valve

METAL
WHEEL
FVEV

	20mm	25mm	32mm
Item N°	1931	1932	1933
U. per Big bag	18	18	18
U. per bag	3	3	3
Norms	●	●	●

Spherical valve

HANDLE
FVEM

	20mm	25mm	32mm	40mm	50mm	63mm
Item N°	1911	1912	1913	1914	1915	1916
U. per Big bag	18	18	18	4	4	4
U. per bag	3	3	3	1	1	1
Norms	●	●	●	●	●	●

References

★ IRAM 13470 y 13471
DIN 8076 y 8078

● IRAM 13472-1 y 13472-2
DIN 16962

◗ IRAM 13472-1 y 13472-2
DIN 16962
IRAM 5063
DIN 2999
BSPT
ISO 7/1 Rc

✦ IRAM 13472-1 y 13472
DIN 16962
IRAM 13478-1 y 13472-2
IRAM 5063
DIN 2999
BSPT
ISO 7/1 Rc

✪ DVS 2208

✷ IPS QUALITY STANDARDS

▲ IRAM 13330 y 13346

◆ IRAM 13478-1 y 13478-2
DIN 16962
IRAM 5063
DIN 2999
BSPT
ISO 7/7 Rc

✚ IRAM SEAL
IRAM 13478-1 y 13478-2
DIN 16962
IRAM 5063
DIN 2999
BSPT
ISO 7/1 Rc

▮ IRAM 13473 y 13479
DIN 8077 y 8078
IRAM 5063
DIN 2999
BSPT
ISO 7/1 Rc

▼ ASTM D-2609

✧ ASTM D-2609
IRAM 5063
DIN 2999
BSPT
ISO 7/1 Rc

❖ IRAM SEAL
IRAM 13470 y 13471
DIN 8077 y 8078