



Johnson Matthey
Inspiring science, enhancing life



SOFT SOLDERS & FLUXES

SOFT SOLDERS & FLUXES

FILLER METALS & FLUXES FOR SOFT SOLDERING

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PRODUCTS AT A GLANCE

Compositions

Alloy Systems	Sn	Sn	Pb	In
Additional Elements	Cu	Ag	Sb	

Standard products are supplied to ISO9453 2014, while special products conform to proprietary Johnson Matthey specifications.

Uses for the Products

Johnson Matthey's 'soft' solders are most commonly used to form joints on a combination of the following materials:

- ▶ Stainless steel. Specialised solders such as the silver-tin products (page 3) and solder fluxes (page 6) are required for joining stainless steel.
- ▶ Mild / carbon steel.
- ▶ Copper and copper alloys, including brass, bronze, nickel silver.
- ▶ Occasionally other materials such as tungsten carbide.

Conditions for Use

Solders are primarily intended for use by soldering in air using a soldering iron, hand torch, fixed burner system, high-frequency induction or hot air-heating.

They should be used with a flux capable of removing the oxides found on the parent materials. This can be introduced to the joint by applying a separate flux liquid or paste. Alternatively for selected products the flux can be incorporated into a flux-cored wire or a soldering paste with a built-in flux binder system.



SOFT SOLDERS & FLUXES

PRODUCTS

SOFT SOLDER ALLOYS

Specification Properties

Silver-Tin Soft Soldering Alloys

These products have improved strength characteristics at moderately elevated temperatures over conventional tin-lead alloys.

	Sn	Ag		Melting Range °C	EN.29453	ISO 9453:2014	
Plumbsol™	97.5	2.5		221-225	-	-	Silver-tin alloys offer a number of advantages over tin-lead solders. They have excellent soldering characteristics of alloy flow, aesthetic appearance and wetting. They demonstrate improved strength characteristics over conventional tin-lead alloys, particularly where service at moderately elevated temperatures is a factor. Being lead-free they may be used for potable water, plumbing installations and food-handling equipment. They can be used on stainless steel where they provide good colour match, and the resulting joints are not prone to interfacial (crevice) corrosion. Typical joint gaps should be 0.075mm for these solders. With the correct choice of flux these alloys will join copper and its alloys, carbon steels and stainless steel. P35Sb™ is a special composition of silver-tin alloy which is only available as a solder paste.
P35™	96.5	3.5		221	-	Alloy No. 703	
P35Sb™	96.15	3.5	0.35	221	-	EN ISO 9453:2014	
P40™	96	4		221-228	Alloy No. 28	Alloy No. 701	
P5™	95	5		221-235	-	Alloy No. 704	

Copper-Tin Soft Soldering Alloys

These solders have been adopted as alternatives to tin-lead solders in many applications including plumbing and heat exchangers.

	Sn	Cu		Melting Range °C	EN.29453	ISO 9453:2014	
97C™	97	3		230-250	Alloy No. 24	Alloy No. 402	97C™ has a marginally longer melting range than 99C™ and can be used to build up fillets. It is now being used extensively on automotive radiators.
99C™	99.3	0.7		230-240	Alloy No. 23	Alloy No. 401	99C™ has a short melting range and good flow characteristics. It has been adopted as a universal lead free plumber's solder including potable water systems.

Other Lead-Free Soft Soldering Alloys

These solders have been developed for specialist applications including elevated temperature soldering.

	Sn	Ag	Cu	Melting Range °C	EN.29453	ISO 9453:2014	
LM10A™	87	10	3	214-275			LM10A™ has good electrical conductivity and offers strength at elevated temperatures. It exhibits good wetting on copper alloys, carbon and stainless steels.
95A™	95	5		230-240	Alloy No. 18	Alloy No. 201	95A™ is suitable for moderately elevated temperature applications, electronic soldering and plumbing applications.

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Silver-Tin-Lead and Silver-Lead Soft Soldering Alloys

These solders (JM 6236™ excepted) offer increased strength and creep resistance at elevated temperatures over tin-lead solders.

JM6236™	Ag	Sn	Pb	Melting Range °C	EN 29453	ISO 9453:2014	JM6236™ has reduced silver solubility when soldering silver-coated surfaces in electronic applications.
	2	62	36	178-190	Alloy No. 30	Alloy No. 171	
Comsol™	Ag	Sn	Pb	Melting Range °C	EN 29453	ISO 9453:2014	Comsol™ has excellent creep resistance when compared to tin-lead solders at room and elevated temperature. It has improved wetting and flow on copper alloys compared with A25™ / A5™ and can be used for step soldering.
	1.5	5	93.5	296	Alloy No. 34	Alloy No. 191	
A25™	Ag	Pb		Melting Range °C	EN 29453	ISO 9453:2014	A25™ and A5™ offer increased strength and creep resistance at elevated temperatures over tin-lead solders. The silver addition promotes wetting of these alloys on to carbon steel and copper and copper alloys. However solder alloy flow is very restricted.
	2.5	97.5		304	Alloy No. 32	Alloy No. 181	
A5™	Ag	Pb		Melting Range °C	EN 29453	ISO 9453:2014	
	5	95		304-370	Alloy No. 33	Alloy No. 182	



LM™ Indium Bearing Alloys

This is a range of highly specialized indium-containing soft solders.

LM118E™	In	Sn		Melting Range °C	ISO 9453:2014
	52	48		118	Alloy No. 601
LM149E™	In	Pb	Ag	Melting Range °C	ISO 9453:2014
	80	15	5	149	
LM195™	In	Pb	Ag	Melting Range °C	ISO 9453:2014
	58	39	3	165-195	
LM157E™	In			Melting Range °C	ISO 9453:2014
	100			157	
LM210™	In	Pb		Melting Range °C	ISO 9453:2014
	50	50		184-210	

LM118E™ wets glass, quartz and many ceramics. It has low vapour pressure and is used in low temperature physics applications.

LM149E™ and LM195™ are compatible with gold showing minimum gold-leaching. They are resistant to thermal fatigue and can be used in step soldering.

LM157E™ is used in seals for electronic applications.

LM210™ is used for electronic soldering of gold surfaces where it shows less dissolution of the gold.

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PRODUCTS

SOFT SOLDER ALLOYS & FLUXES

Tin-Lead Soft Soldering Alloys

Tin-Lead soft solders can be supplied in a range of compositions. The most common product in the range is JM6040™ (60% tin - 40% lead) which has a short melting range (183 - 190°C). It is relatively free-flowing and is widely used in soldering copper and copper-based alloys.

Tin-lead alloys with 30 - 40% tin are an economic alternative to the higher tin alloys but have much wider melting ranges, and are less free-flowing. Their wide melting range makes them useful where controlled joint gaps cannot always be maintained.

All these alloys are available in flux-cored versions containing either rosin-based or inorganic acid fluxes depending on the application.

This chart shows the range of tin-lead solders currently available. Customers are advised to check with current legislation to ensure that the use of lead-containing solder is acceptable for each application.

JM595™	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
	5	95		300-315	-	Alloy No. 123
JM1090™	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
	10	90		268-302	Alloy No. 8	Alloy No. 122
JM1585™	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
	15	85		225-290	-	Alloy No. 121
JM2080™	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
	20	80		183-275	-	Alloy No. 117
JM3070™	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
	30	70		185-255	Alloy No. 7	Alloy No. 116
JM3565™	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
	35	65		183-245	Alloy No. 6	Alloy No. 115
JM4060™	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
	40	60		183-235	Alloy No. 5	Alloy No. 114
JM4552™	Sn	Pb	Sb	Melting Range °C	EN.29453	ISO 9453:2014
	45	52.5	2.5	185-215	-	-
	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
JM4555™	45	55		183-224	Alloy No. 4	Alloy No. 113
	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
JM5050™	50	50		183-215	Alloy No. 3	Alloy No. 112
	Sn	Pb	Sb	Melting Range °C	EN.29453	ISO 9453:2014
JM5840™	40	58	2	185-231	Alloy No. 14	Alloy No. 134
	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
JM5941™	59	41		183-190	-	-
	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
JM6040™	60	40		183-190	Alloy No. 2	Alloy No. 103
	Sn	Pb		Melting Range °C	EN.29453	ISO 9453:2014
JM6337™	63	37		183	Alloy No. 1	Alloy No. 102



Please note: Johnson Matthey recommends the use of lead-free products wherever possible. Unless a sound technical reason exists for doing otherwise we do not recommend the use of lead and cadmium-containing materials. The use of lead in products is increasingly recognised as being undesirable both in terms of the long-term environmental impact and recyclability of products. The End of Life Vehicles (ELV) Directive (2000/53/EC), the RoHS Regulations in Directive 2002/95/EC and WEEE Directive on waste electrical and electronic equipment (2002/96/EC) prevent the use of certain hazardous substances including lead-containing materials. The use of lead in potable water systems has also been prohibited in Europe and in many countries worldwide.

SOFT SOLDERS & FLUXES

SOFT SOLDER FLUXES

Soft Solder Flux No. 1S



Recommended for

- Working Range: 180-350°C
- Ferrous materials - stainless and carbon steel
- Copper alloys - when a more active flux is required

Description

A liquid soft soldering flux
Conforms to: **Proprietary**
Flux Residues: **Corrosive**

Flux Characteristics

Activity High
Flux Residue Removal  30 min  60°C
Standard Packaging 1l

Soft Solder Flux No. 2S





Recommended for

- Working Range: 180-350°C
- Copper and copper alloys

Description

A liquid soft soldering flux
Conforms to: **Proprietary**
Flux Residues: **Intermediate**

Flux Characteristics

Activity Medium
Flux Residue Removal  30 min  60°C
Standard Packaging 500ml

Soft Solder Flux No. 3S





Recommended for

- Working Range: 180-350°C
- Copper and copper-containing alloys
- Ferrous materials

Description

A soft soldering flux paste
Conforms to: **Proprietary**
Flux Residues: **Corrosive**

Flux Characteristics

Activity High
Flux Residue Removal  30 min  60°C
Standard Packaging 1kg

Soft Solder Flux No. 4S





Recommended for

- Working Range: 180-350°C
- Automatic flux application
- Copper and copper alloys
- Ferrous materials

Description

A dispensable soft soldering flux paste
Conforms to: **Proprietary**
Flux Residues: **Corrosive**

Flux Characteristics

Activity Medium
Flux Residue Removal  30 min  60°C
Standard Packaging Cartridges - various sizes

Flux Core Products

Most of the Johnson Matthey Metal Joining range of soft solder alloys can be supplied as a flux cored solder wire. Standard type of flux core available:

Rosin (Colophony) both with and without halide activation.

Standard product "RA" flux core contains 0.5% halide activation (J STD 004 ROM 1 type) has a flux core to solder alloy ratio of 2% weight for weight. Other levels of halide activation and core ratios are available on request.

Fluxing ability increases with increasing level of halide activation, but use is typically restrictive to clean copper and copper alloys such as brass. Flux residues are generally considered to be "non-corrosive".

Note: Rosin (Colophony) is known industrial sensitiser and can lead to occupational asthma and allergic contact dermatitis/skin irritation. Reference to the HSE document "Controlling health risks from rosin (colophony)-based solder flux fume" is recommended.

Acid Cored/A cored

This is an inorganic flux cored based on ammonium chloride. The standard flux core ratio is 3% weight for weight. Active inorganic flux core facilitates solder alloy wetting onto both carbon and stainless steel. Flux residues are corrosive and should be washed off in hot water. When used with a flame heating process flux residues will substantially vaporise leaving minimal residues.

Other flux cores

Synthetic resin J STD 004 'RE', Organic J STD 004 'OR' and "No clean" can be supplied when requested.

SOFT SOLDERS & FLUXES



KEY

Elements

Sn Tin

Pb Lead

Ag Silver

Cu Copper

Sb Antimony

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