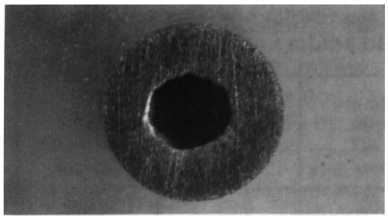
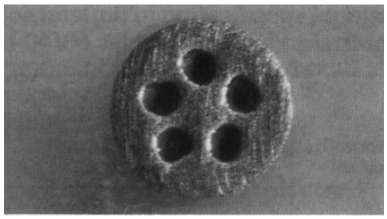
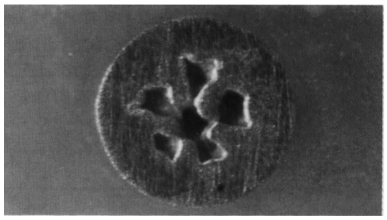
ERSIN® SOLDER WIRES



Competitors' single core solder



Ersin Multicore 5-core solder



Competitors' imitation 5-core solder

Flux-cored solder wire is universally made by an extrusion process followed by drawing through dies progressively reducing the wire diameter from say 16 mm to the required diameter which is normally in the range 3 mm to 0.2 mm. As solder is opaque and usually contains lead it is not possible to see and test inside the wire to check for flux presence. The extrusion process is subject to variations of pressure and temperature which can lead to occasional blockages or contractions of the flux core. The shortest of such a flux void at the extrusion stage results in a much longer length without flux in the drawn down wire. Any gap in the flux continuity will result in a "dry" faulty joint. Solder cannot join metals without flux.

Multicore Solders Ltd. has employed its own unique extrusion process for over 40 years to guarantee flux continuity. It has earned an enviable reputation for this reliability that has never been challenged.

Firstly we use machines of our own design to minimise variations of temperature etc. during extrusion.

Secondly we are the only company in the world, to the best of our knowledge, that extrudes 5 truly separate cores of flux inside the solder wire.

Until 1967 we had patents covering our principle of extruding more than one core of flux. Most competitors still make single-core solder. Some have tried to imitate our technology but we have proved that the shape of their flux cores (which sometimes collapse together at the centre as in the photo above) is due to flux being injected through a single nozzle having five holes in it. Such a crude imitation is no more technically reliable than a single-core solder.

The probability of all five cores being absent from Ersin Multicore 5-Core Solder is $5 \times 4 \times 3 \times 2 \times 1 = 120$ times less than competitors' cored solder, even if the single-core solder process was as closely controlled as Multicore's.

Faster Soldering

As the flux cores in Ersin Multicore 5-Core Solder Wire are closer to the circumference than in single-core solders it is only necessary for the soldering iron to melt a thin wall of solder before the flux is melted and liberated, enhancing heat transfer and melting of further solder.

Purity of Metals and Accurate Alloying

We could save considerable sums of money in a year by using lower purity metals for solder alloys which, when subsequently assayed, would meet the B.S.I., American, DIN or JIS standards for the respective alloys. However our research has shown that many impurities present at levels permitted by these specifications reduce the mobility and wetting force of the molten solder thus reducing soldering speed, increasing the weight of solder used per joint and reducing the strength of the adhesion. It should be clear therefore that the cheapest solder per kg or lb conforming to a particular specification is not necessarily the most economical in terms of overall solder usage, productivity or reliability.

Quality Control

We could also save considerable sums of money in a year by dispensing with our Works Inspectors and Laboratory Q.C. staff. We have always aimed to supply products of guaranteed reliability. This cannot be achieved without process control and Q.C. testing.

All Ersin Multicore Solders are made with tested discrete batches of alloys extruded with tested discrete batches of fluxes. The batch numbers of alloy/flux appear on every reel and shipping carton. They also appear on a batch card included in every shipping carton which shows the personnel number of every person in our factory who handled the material through the various stages of its manufacture and packing. We keep retain samples of every batch of solder and flux for a considerable period and test records for ever. If you have already used the solder and thrown away the packaging, our computer can identify the batch number if you can quote our Invoice number and require further technical information.

How do you prove the reliability and economy of Ersin Multicore Solders? The answer is simple. Use it for over 40 years like many of the world's leading manufacturers have done.

% Impurities permitted by major international specification in tin/lead solders are shown below compared with typical analysis of Ersin Multicore Solder 60/40 tin/lead solder.

Element	Chemical Symbol	U.K. BS.219 Grade KP max	U.S.A. ASTM Grade A max	Germany DIN 1707 max	Japan JIS Z-3282 max	ERSIN MULTICORE Typical
Arsenic	As	0.03	0.02	0.02	0.03	0.001
Bismuth	Bi	0.10	0.25	0.25	0.05	0.01
Iron	Fe	0.02	0.02	0.02	0.03	0.002
Copper	Cu	0.08	0.08	0.08	0.05	0.002
Silver	Ag	No limit	No limit	No limit	No limit	0.002
Aluminium	Al	0.001	0.005	0.005 total	0.005	0.0001
Cadmium	Cd	0.005	No limit		No limit	<0.0005
Zinc	Zn	0.003	0.005		0.005	<0.0005
Antimony	Sb	0.20	0.12	0.12	0.30	0.02
Phosphorus	P	NOT SPECIFIED but deleterious				<0.0005
Sulphur	S					<0.0001
Oxide	O					<0.001
Total of all others (Gold, Indium, Nickel etc.)		0.08	No limit	0.08	No limit	<0.005

Ersin Multicore Solders are available in the extensive range of standard alloys shown in our bulletin 1c.

Sizes

The standard wire diameters and reel sizes are shown in our bulletin 2h.

Ersin Non-Corrosive Rosin Fluxes

Exclusive Products of Multicore Solders Ltd.

As is well known, the most common fluxing medium for use when soldering electrical connections is a high-grade wood or gum rosin. Molten rosin wets both metals and metal oxides with ease, and on cooling leaves a hard protective, non-corrosive flux residue on the joint. Unfortunately, though it wets metal oxides it is not, generally, sufficiently acidic to dissolve them. Flow of solder is thereby impeded. To overcome this difficulty, the range of Ersin fluxes was introduced; many years of research has permitted the extension of this range so that it is now possible to

choose a flux to cope with almost any electrical soldering job, and to meet practically any public, government or industrial specification.

Ersin fluxes contain, dissolved in the rosin, a small proportion of complex substances ("activators"). The properties of these substances have been carefully chosen so that, on raising the flux to the soldering temperature, a small controlled quantity of a special reagent is liberated. This dissolves away the metal oxides and so promotes the flow of molten solder over the clean metal surface. Most of the reagent is either destroyed by combination with the metal oxide, or by the soldering heat. Any small quantity remaining in the flux is rendered innocuous by a re-combining with the activator, and so the flux residue is, like pure rosin, non-corrosive, hard, non-sticky and impervious to moisture.

The activator is itself a wetting agent, and so it augments the wetting effect and reduction of surface tension produced by the rosin.

Any of the various heating methods (soldering iron, flame, oven, induction, etc.) may be used with Ersin Fluxes, provided the recommended soldering temperature is not exceeded. Care should be taken that the flux is not allowed to char. Where the temperature is raised rapidly (as with a soldering iron in electronic assembly) full benefit of the rapid heating can only be gained by using a very fast flux, such as Ersin 362, 366 or 370.

Ersin Multicore Solder is manufactured in thousands of combinations of different alloys, fluxes and flux contents.

Generally any combination can be manufactured to order, but certain standard specifications which are in regular demand are those found by experience to be suitable for most existing applications and are as follows:

Standard flux/alloy Ersin Multicore Solders

Ersin R3 and 360 fluxes are supplied in Grade KP (60/40) and Sn60 alloys respectively.
Ersin 381 flux is supplied in Sn60, Sn62 and Sn63 alloys.
Ersin 304 flux is supplied in Grade KP (60/40) alloy.
Ersin 370 flux is supplied in alloys conforming to U.S. Spec, QQ-S-571E.
Ersin 362 flux is supplied in B.S. 219 tin/lead alloys, pure tin, Savbit, H.M.P., L.M.P., 96S and TLC alloys.
Ersin 366 flux is supplied in 60/40, Savbit, 40/60, H.M.P., 20/80, 15/85 and 10/90 alloys.
Ersin 362B2 flux is supplied in Grade KP (60/40) alloy and Sn62 alloy.
Ersin 399 flux is supplied in 60/40 alloy.

The following table summarises the important features of the various standard Ersin fluxes. All are manufactured as 5-core solder with a nominal flux content of 3·0% w/w in 60/40 alloy. Equivalent volume in other alloys. Special flux contents can be supplied to order.

ERSIN FLUX	TYPE (Halide is max % w/w as Chloride)	Examples of Uses	British, American and German Specifications
R3 and 360*	Pure Rosin, non-activated.	Limited spread on parts of good solderability.	B.S. 441, Class 6 Grade 3 and D.T.D. 599A QQ-S-571E Type R* DIN 8511 Type F-SW 31
381*	Free from Chlorides and Bromides. Acidity as low as pure rosin. Mildly activated. (Good spread on oxidised copper).	Popular new flux for electronics requiring Type RMA flux with very high surface resistivity in all climates. Parts must have reasonable solderability.	D.T.D. 599A QQ-S-571E Type RMA*
304	Halide-free activated flux. Not as active as 370 or 362.	DIN preferred activated flux for electronics.	DIN 8511 Type F-SW 32
370*	Halide 0.4% max. Non-corrosive activated flux to type RA Specification.	Most popular flux for TV and electronics in solders for U.S.A. market.	D.T.D. 599A QQ-S-571E Type RA* DIN 8511 Type F-SW 26
362	Halide 0.5% max. Non-corrosive activated flux.	The most popular flux for TV, electronics and consumer products used throughout the world.	D.T.D. 599A and B.S. 441 Class 5a Grade 3 QQ-S-571E Type RA DIN 8511 Type F-SW 26
362B2	Halide 0.5% max. Non-corrosive activated flux. Latest type.	Special non-spitting flux for critical electronics applications. Less charring on tips, clear easy to clean residues.	D.T.D. 599A and B.S. 441 Class 5a Grade 3 QQ-S-571E Type RA DIN 8511 Type F-SW 26
366	Halide 1.0% max. Passes D.T.D. 599A Corrosion Test. Extra active flux.	Soldering more difficult surfaces. For use with higher temperature alloys. For very fast mass production.	DIN 8511 Type F-SW 26
399	Halide 0.5% max. Non-corrosive activated flux.	For soldering alloys containing nickel & chrome such as thermocouplewires.	D.T.D. 599A QQ-S-571E Type RA DIN 8511 Type F-SW 26

*On Qualified Products List of U.S. Defense Supply Agency.

Tinning/Cleaning of soldering iron tips.

If soldering iron tips become oxidised as a result of being left switched on for long periods of time without use, they can be easily retinned using Multicore Tip Tinner/Cleaner TTC1. Please ask for details.

Principal Requirements of National Flux Standards

Together with corresponding results on Ersin Fluxes

COUNTRY STANDARD AND TEST	BRIEF DESCRIPTION OF TEST METHOD (For full details see Standard)	Standard Requirements	Corresponding Ersin Multicore Flux Ref. and average results
U.K. B.S. 441 Corrosion	As described in BS 5625. A chemically cleaned copper sheet with a depression is used as the test piece. 1 g of the cored solder wire is formed into a flat spiral, placed in the centre of the depression and heated to 50°C above the liquidus of the solder until the solder melts. Heating is maintained for a further 5 seconds. After cooling for 15 mins the test piee is placed in a humidity chamber operating at 40°C, 93% R.H. for 72 hours and then examined.	No corrosion or pitting	All Pass
Halide % w/w	0.5g of the flux is extracted from the cored solder with hot alcohol. After evaporating the bulk of the solvent, the halide content (calculated as chloride) is determined by titration with silver nitrate solution.	(Class 6 Grade 3) Nil	R3/360/304 Nil 370 0.38 362/362B2 0.48 399 0.48
Hardness of Residues	A specimen joint is cooled for up to 30 minutes and the flux residue assessed.	It must not be readily indented by the finger-nail nor prevent powdered chalk from being readily removed	All Pass
U.K. D.T.D. 599A Corrosion	Two abrasion cleaned copper sheets are mounted 6 mm apart, the lower sheet having a depression into which 1 g of cored solder is placed. The test piece is heated until the solder melts, cooled, placed in a humidity cabinet at 100% RH and ambient temperature for 24 hours and then examined for evidence of corrosion and for homogeneity and deliquescence of the flux residues.	No corrosion or deliquescence	All Pass
Insulation Resistance	A trough with conductors at each end in a PTFE block is filled with flux and the insulation resistance at 500 volts is measured between the conductors 1 hour and 24 hours after filling and after a further 24 hours in a humidity cabinet at 100% RH and ambient temperature.	>1,000 megohm	All Pass
U.S.A. QQ-S-571E Water Extract Resistivity	The flux is extracted from the cored solder with hot isopropanol and 0.1 cc of a 35% solids flux solution is added to each of three clean beakers containing water of minimum resistivity 500,000 ohm-cm. The contents of each beaker are boiled for 1 minute, cooled rapidly and the resistivity of the water measured.	Type R & RMA 100,000 ohm-cm min.	R3/360, 381 } Over 200,000
		Type RA 50,000 ohm-cm min.	370 87,000 362 76,000 362B2 140,000
Spread Factor	**Types R and RMA** Five thin, acid cleaned, copper sheets are oxidised at 150°C. A 0.5 g ring of cored Sn60 solder is placed on each test piece which is then heated at 205°C for 6 minutes. The height (Hcm) of each solder spot is measured and the spread factor expressed as a function of $\frac{D-H}{D} \times 100\%$ Where D is the diameter of a sphere of solder of the same weight.	80% min.	R3/360 85% 381 89%
	Type RA As above but with oxidizing temperature of 205°C.	80% min.	370/362 over 90%
Chlorides and Bromides	One drop of flux solution obtained by extraction with hot isopropanol is placed on a piece of silver chromate paper. After 15 minutes the paper is washed in isopropanol, dried for 10 minutes and examined for colour change.	Type R & Type RMA Should not discolour silver chromate paper	R3/360/381 Pass
Solder Pool	0.2g of cored Sn60 solder is placed on each of three, acid cleaned, thick copper sheets which are then heated at 315°C until the solder melts. The solder pool is examined for thickness of edge and the coupons for flux spattering.	Should not spit, feathers to a thin edge	All Pass
Copper Mirror Test	**Types R and RMA** 0.05 ml each of 35% w/w solutions in isopropanol of the flux and WW rosin are placed on a copper film, vacuum deposited on to glass. The mirror is placed horizontally in a humidity chamber at 23°C and 50% RH for 24 hours. The flux is removed from the mirror with isopropanol and the mirror examined.	Must not have completely removed the copper mirror	R3/381 Pass
GERMANY DIN 8516 Area of Spread	0.5 g of cored solder wound into a spiral, is placed on an etched brass sheet which is then heated at 310°C for 5 seconds. The area covered by the solder is measured on 10 such sheets and averaged. There are different requirements for types F-SW 31, F-SW 32 and F-SW 26.	80-200 mm^2	All Pass
Corrosion F-SW 31 and F-SW 32	**F-SW 31 and F-SW 32** 1 g of cored solder is placed inside a halved tube of abrasion cleaned steel which is then heated at 300°C for 1 minute. The halves of the tube are separated and placed in a humidity cabinet at 83% RH and 23°C for 14 days. The inside surfaces of the tubes are examined for signs of corrosion. When testing F-SW 32 a parallel test with F-SW 31 for flux cored solder is carried out. For fluxes to F-SW 26 the tests can be carried out inside a halved tube of abrasion cleaned copper.	F-SW 31 & F-SW 32 Nil on Steel F-SW 26 Nil on copper	All Pass the tests

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