



Global  
presence

Over 25 years  
experience

**ips**<sup>®</sup>

IPS is a technology-driven industrial company created in 1982 and dedicated to high performance spherical products.

The company developed various processes to manufacture high-quality, perfectly spherical metal granules of different materials to suit the needs of many different applications, particularly in the electronic and semiconductor industries. Often imitated but unmatched though, IPS ultrasonic processes are covered by international patents and the company consistently invests a significant fraction of its revenues in R&D programs to keep its technological edge.

Also, and to accompany the rapid adoption of the Surface Mount Technology by the electronic industry, IPS has developed an ultrasonic process to produce high-quality solder powders. The flexibility of the process and IPS know-how allow the production of leaded, lead-free and specialty powders in a broad range of alloys to meet most solder paste manufacturer's stringent needs at a competitive cost.

In-house  
International  
patents

Customers appreciate IPS total independence from any financial and industrial group. Privately held, the company is virtually the only really independent supplier of solder powders and holds a major share of the world-

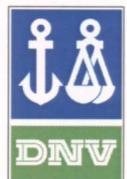
wide market serving the biggest names in the industry.

Headquartered in Annemasse, France, across the border of Geneva, the industrial complex includes several buildings accommodating the various production units, warehouses, R&D and administration.

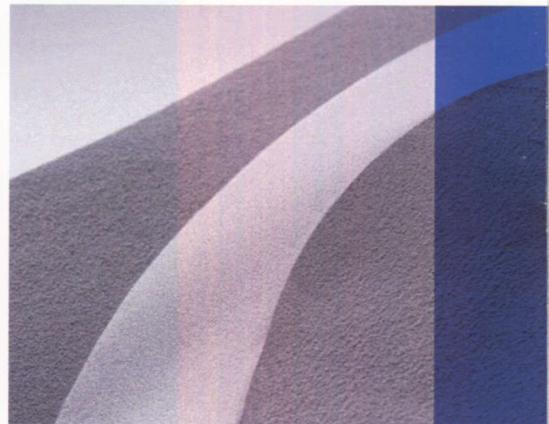
Furthermore, IPS has increased its presence in Asia establishing a second production site in Suzhou, China, to accompany the growing local demand. This state-of-the-art factory is aimed to serve the Chinese market as well as to enhance its competitiveness. Coverage of the Asian region is provided through IPS proprietary sales office based in Singapore.

IPS is ISO 9001 certified and employs today more than 110 people. Labour size is minimized thanks to the characteristics of the processes which require minimal manpower to be operated.

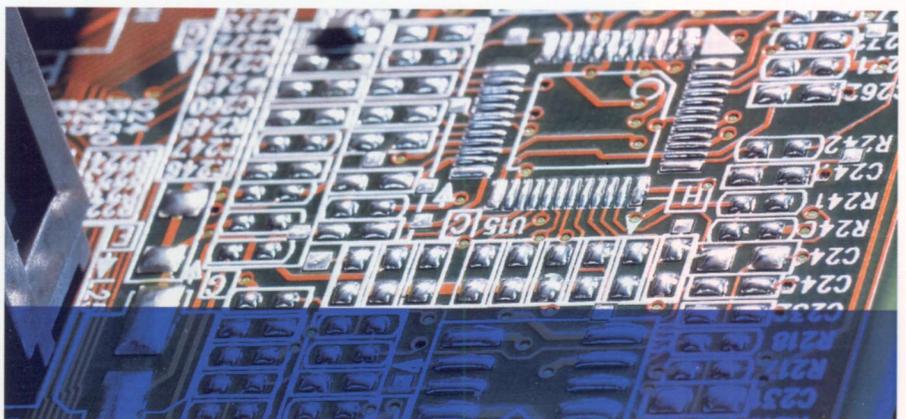
With constant economical performances and overall market recognitions in the segment it serves, IPS is set to remain one of the leading company serving solder products worldwide on a long term basis.

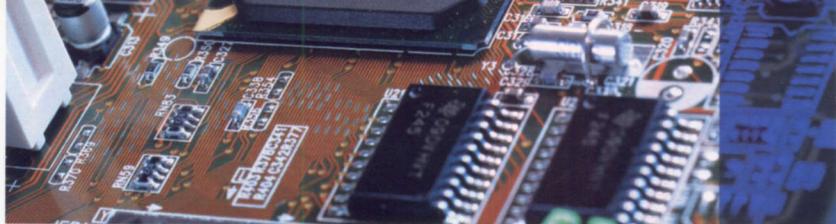
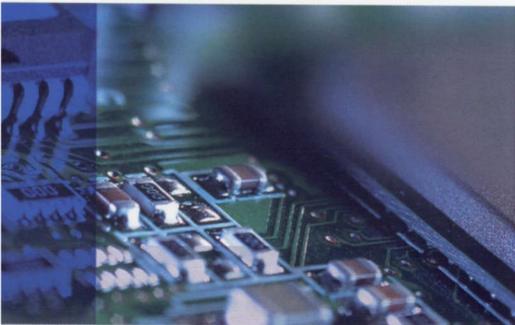


Metallurgical  
expertise



Lot-to-lot  
consistency





## IPS solder powder portfolio

### Quality

Both France and China plants have been designed to produce the same products range with the same quality levels. Furthermore, both sites proceed with similar quality tests and measurements for each batch as follow :

#### Alloy composition :

Each batch of alloy is analysed at ingots level. All alloys exceed J-STD-006 or ISO 9453 specifications. Composition analysis is performed with a spark spectrometer.

#### PSD ( Particle Size Distribution ) :

Particle Size Distribution is measured using image analyser equipment or laser diffraction device for very fine cuts. These measurements give Particle Size Distribution information, mean diameter and surface area (upon request).

#### Particle shape :

Exceeding 95% sphericity, particle shape control is performed through visual inspection on a microscope basis.

#### Solder balling test :

This test is performed using customer's standard QC flux and test procedures.

#### Oxide level and oxygen content (upon customer request)

#### Customized test :

IPS is set to co-operate with any of its clients to specific controls, including customer incoming-like tests, among them wettability test, slump test, flux test, etc.. These additional control tests are jointly performed under confidential agreement scheme.

**A Certificate of Analysis is provided with all quality results.**

High lead
Sn5Pb93.5Ag1.5
Sn5Pb92.5Ag2.5
Sn1Pb97.5Ag1.5
Sn15Pb82.5Ag2.5
Sn1.5Pb95.9Ag2.6
Sn2Pb95.5Ag2,5
Sn10Pb88Ag2
Sn10Pb90
Sn5Pb95
Sn10.5Pb89.5
Sn5Pb85Sb10

SnPb based
Sn60Pb36Ag4
Sn63Pb37
Sn62Pb36Ag2
Sn43Pb43Bi14

SnAg and SAC
Sn96.5Ag3.5
Sn95Ag5
Sn96Ag4
Sn95.5Ag4Cu0.5
Sn95.5Ag3.8Cu0.7
Sn99Ag0.3Cu0.7
Sn95.8Ag3.5Cu0.7
Sn95.5Ag3.9Cu0.6
Sn96.5Ag3Cu0.5
Sn98.3Ag1Cu0.7
Sn97Ag2.5Cu0.5
Sn95Ag4.5Cu0.5
Sn96Ag3.5Cu0.5
Sn95.2Ag3.8Cu1
Sn98.5Ag1Cu0.5
Sn95.75Ag3.5Cu0.75
Sn96.3Ag3.7
Sn98.45Ag1Cu0.5Ni0.05
Sn96.8Ag2.6Cu0.6
Sn98.2Ag1Cu0.75Ni0.05

SnBi based
Sn95Bi5
Sn42Bi58
Sn43Bi57
Sn42Bi57Ag1
Sn91.9Ag3.3Bi4.8
Sn93.5Ag3.8Bi2Cu0.7

SnCu
Sn97Cu3
Sn99.25Cu0.7Ni0.05
Sn99Cu1
Sn99.3Cu0.7

Others
Sn95.35Ag3.8Cu0.7Sb0.15
Sn88.5Cu0.5Ag3In8
Sn88Ag3.5In8Bi0.5
Sn95Sb5
Sn91.5Sb8.5

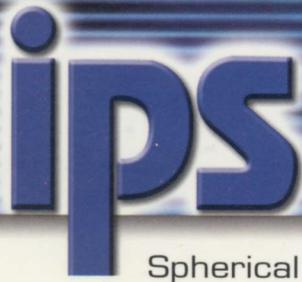
Other alloy compositions available upon request. Please consult your nearest representation office for product availability.

Certain alloys may require prior approval from the patent owner.

IPS is licensee of several alloy's patents.

### Product Size Distribution

Grades	Size	
	(µm)	(mesh)
Type 2	45-75	-200+325
Type 3	25-45	-325+500
Type 4	20-38	-400+625
Type 5	15-25	-500+750
Type 6	5-15	-750

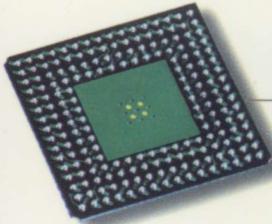


Spherical powder industries



## IPS SOLDER SPHERES

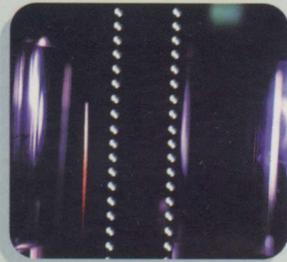
*FOR BGA, FBGA AND CSP APPLICATIONS*



### Company Profile

Established in 1982, IPS is a technology based industrial company dedicated to the development of high-performance spherical products for the electronic industry.

The company first participated in the rapid adoption of the SMT (Surface Mount Technology) by developing a proprietary powder atomization process.



IPS is now recognized as the leader in supplying the largest solder creams manufacturers and has a very significant market share in the segment it serves.

With its latest achievement the company expanded its presence in the electronic assembly industry by successfully entering the booming market of BGA (Ball Grid Array) and CSP (Chip Scale Package). Using its long time experience in spheres manufacturing, IPS applied a specific Solder Spheres patented ultrasonic technology from widely used metal atomizing processes, allowing the company to deliver the quality and performance that are particularly suitable for the component assembly's most stringent constraints and processes.

### Service from Experience

Engineering teams dedicated to the Solder Sphere activity, over 20 years' experience in metal granulation and a solid R&D background and metallurgical expertise in electronics soldering naturally drive IPS towards both process optimization and particularly well adapted customer support.

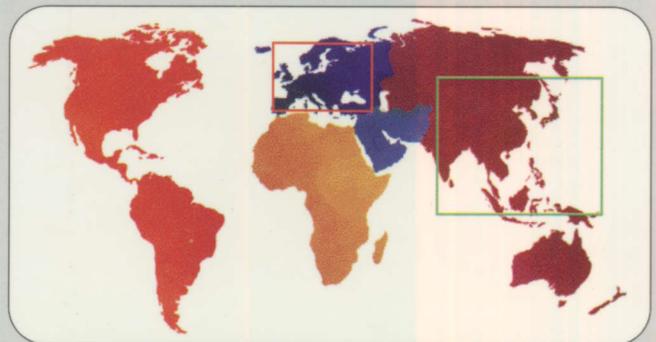
Moreover, IPS dedication to Solder Spheres results in important production capacity lines. Indeed, the company supports an extensive product portfolio in high volume which today obtains wide recognition at major OEM's and packaging assembly houses, worldwide.

IPS manufacturing process has been audited and approved by several international companies that are leaders in BGA manufacturing.

IPS patented process has been designed specifically for Solder Spheres production and all steps are addressing BGA production processes and constrains. As a matter of fact, it offers a very high lot-to-lot consistency that allows its customer perfect reproducibility at competitive cost.

### European Source

Being one of the main Solder Sphere manufacturer in Europe, IPS is offering to its customers fine engineering expertise, a strong knowledge of the semiconductor industry together with a stable economical environment.



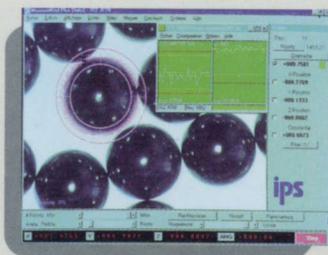
### IPS Asia

In addition of its comprehensive network of agents and representatives in Asia Pacific, the company is being physically represented in Kuala Lumpur since 2002 to carry some marketing activity, technical support as well as some Solder Sphere stock for its regional customers.

By opposition to the "oil process" for which additional cleaning process steps are mandatory, IPS patented process enables to have the final product immediately at granulation level. Granulation is performed on controlled gas environment following strict rules and parameters. No cleaning process steps are needed, surface being free from organic contaminants.

IPS manufacturing process is known as "dry process". This process has been designed to be very integrated and therefore comprises limited numbers of manufacturing step. Moreover, all steps are geographically concentrated in one large building with natural process steps lanes to insure logical movement of product.

Each step has been designed to optimise product quality. All parameters and process steps are SPC monitored in real-time. Full traceability system is in place for all movements, from raw material to finish product shipment.



In addition, IPS patented process enables to operate with highly precise electronic-regulated granulators that give by default very tight size distribution products. From an economic point of view, this results naturally in highly price competitive products.

### **Ultra-Pure Metallurgy and Solder Joint Quality**

Metal segregation during cooling phase enables to have the exact same chemistry from one Solder Sphere to the other. The very fine and uniform microstructure of metal due to the uniform Sphere (tin/lead) composition and the quick cooling allows to have very low oxide content, thus very shiny and metallurgical sound Solder Spheres to be mounted on BGA packages for uniform reflow.

The IPS granulation process confers to the Solder Sphere structure a remarkably fine and homogeneous inter-metallic network on the original Sphere structure. The stable germination process during solidification gives excellent overall microstructure. This compound results in strong and uniform metallic organization before and after reflow process.

The solder joint strenght of IPS Solder Spheres is monitored during various ball shear tests, namely Time Zero, Storage, Jedec Level 3, Temperature Cycle and Prolonged Storage.

### **Surface Treatment**

In the field of semiconductors, brazing is a critical step whereby the solder component must have irreproachable composition and size, ensuring perfect solder wettability, coplanarity and joint strength.

BGA Solder Spheres, in their way, obey to the same rules and have additional potential constraints. As a matter of fact, Solder Spheres tend to oxidize by mechanical agitation while in jars, transportation or used in balling equipment. Indeed, shaking or repeated movement tend to oxidize product surface, creating flats cracks or flakes, thus leading to modify the Solder Spheres physical flow, to alter product behaviour in the balling equipment apparatus increasing Sphere electrical contact and bulk resistivity. These damages also tend to tarnish or darken the product surface, resulting in loss of bright reflective Sphere surface, creating rejects at automated vision system stages. Sphere darkening may also result in poor solder wetting, altering the overall joint reliability.

IPS has addressed these potential problems by patenting a unique surface treatment that confers to the product a durable physical protection that ameliorate or eliminate mechanical damage due to contact and collision of the Solder Spheres. This surface treatment indeed protects the ultra-pure metallurgical properties of IPS Solder Spheres, avoids darkening, ensures a low oxidized product while stored, shaken, in transit or used in situ when processed in the balling equipment, giving consistent product physical behaviour and reliable solder joint.

That patented process guarantees a uniform surface treatment free from any additional or residual element and gives to the user an optical shiny finish product with re-enforced physical properties and preserved alloy joint with optimum wetting and strength.

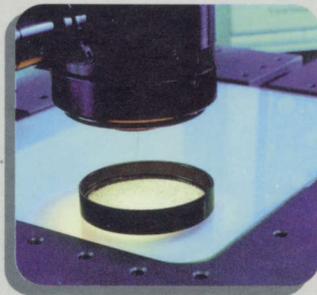
### Sorting Steps

IPS sorting process includes four different steps. Each Sorting Step has been specifically designed by IPS to address BGA Solder Spheres most stringent constrains. These steps address coplanarity problem by eliminating oversize and undersize Spheres and guarantee ultra low rate of undersized products. Also, ball bonder potential mismatch is addressed by eliminating dog bones, oblong and non-spherical Spheres.

The use of non-abrasive sorting processes results in scratch-free and bright surface and thus controlled oxidation level.

### Quality Control

As solder alloys are usually soft alloys, there can be different types of defects on Solder Spheres. Among them flats, cavities and protrusions. To address these potential defects, IPS performs systematic continuous visual inspection.



Dimensional checks are also systematically performed on every lot by powerful computer optical tool (OGP). This enhanced computer system has been specifically developed to handle Spheres measurement for sphericity and diameter with complete statistical analysis.

During final visual inspection, checkings of brightness level and surface (presence of dots, brightness) and sphericity, dog-bones and oblong are performed.

Also, mean diameter is determined for each lot with standard deviation and Cpk calculations. Diamentional analysys are based on a minimum of 200 measurements (Spheres). The roundness is also determined as per ISO 4291 procedure.

Moreover, IPS long-time experience in alloy manufacturing (IPS production of quality Solder Powder for Solder Pastes is today recognized and being used by all major Solder Paste Manufacturers worldwide) implies metallurgical expertise in-house.

Indeed, IPS manufactures its own alloy from selected raw material and controls Solder Spheres alloy impurity levels. Moreover, IPS performs alloy chemical analysis before ingots casting to ensure exact composition of the alloy. Also, a chemical analysis of manufactured Solder Spheres end products is performed for cross-checking controls.

### Sales Program

### Product Offering

The IPS Solder Spheres portfolio covers all applications, from Plastic BGA (PBGA) to Fine pitch BGA (FBGA), Ceramic BGA (CBGA) and Chip Scale Packages (CSP). Typical alloys are

Sn63Pb37, Sn62Pb36Ag2, Sn10Pb90, and lead-free alloys including the use of Ag, Cu, Sb... All alloy compositions comply with J-STD-006 standard.

		11,8 mils 300µm	12 mils 305µm	14 mils 356µm	15,7 mils 400µm	16 mils 406µm	18 mils 457µm	19,7 mils 500µm	20 mils 508µm	24 mils 609µm	25 mils 635µm	29,9 mils 760µm	30 mils 762µm	30,5 mils 775µm	31,5 mils 800µm	35 mils 889µm
Standard Alloys	Sn63Pb37	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
	Sn62Pb36Ag2	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
High Lead	Sn10Pb90	AD	AD	AD	AD	AD	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
	Sn10,5Pb89,5	AD	AD	AD	AD	AD	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
Lead-Free	Sn + Ag, Cu, Sb...	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD

<b>FP</b>	<b>Full Production</b>
<b>AD</b>	<b>Available on Demand</b>

Remarks:

- ✓ Certain alloys (not show in the above list) and/or their applications may require the prior approval of the patent owner.
- ✓ Custom sizes & other alloys available on demand.

### **Micro-Spheres**

Like most of the package types, array packages are driven by a constant miniaturization. BGA migration to Fine pitch BGA (FBGA) or Chip Scale Packages (CSP) implies smaller Solder Spheres. Again, IPS Solder Sphere manufacturing process has proven to be the most adapted process to Micro-Spheres (Micro-Spheres diameters are understood below 20 mil or 508µm) enabling the Company to produce Spheres with very tight size distribution and irreproachable surface condition.

### **Lead-Free Spheres**

The whole semiconductor industry is today driven by ecological consideration and safe handling products. IPS is today ready to supply its customers with any kind of alloy requested by the market. The company having its own foundry in addition to its metallurgical expertise, IPS is able to response fast to any lead-free alloy inquiry guaranting fine product and JIT delivery.

### **IPS Spheres Offer Competitive Advantages**

IPS optimized industrial technology is specifically designed to address the needs of high quality Solder Spheres for BGA & CSP packages.

IPS product features include :

- ✓ **Economical competitiveness**
- ✓ **Remarkable lot-to-lot consistency**
- ✓ **Perfect size distribution and roundness**
- ✓ **Preserved bright surface with controlled oxidation level**
- ✓ **Uniform alloy composition**

### **Additional Benefits**

IPS standard packaging comes with sealed antistatic plastic jars filled with inert gas. Custom services are also available :

- **Special colour labels for size differentiation**
- **Custom labellings**
- **Bar codes for stock and GIT management**
- **Dessicant and/or vaccum sealing**
- **Glass jars available**

COST EFFECTIVE  
LOT-TO-LOT  
CONSISTENCY  
VOLUME COMMITMENT

#### **Headquarters :**

IPS – Spherical Powder Industries –  
24A, rue de la Résistance – B.P.438 –  
74108 Annemasse – France

Tel : +33 450 37 38 33 Fax : +33 450 87 14 00  
Email : [ips@ipsphere.com](mailto:ips@ipsphere.com) Website : [ipsphere.com](http://ipsphere.com)

Contact : Chris COQUILLOT  
Sales and Marketing Manager – [ccoquillot@ipsphere.com](mailto:ccoquillot@ipsphere.com)

#### **IPS Asia :**

N0 68 Sungei Kadut Loop # 06-00  
SINGAPORE 729504

Tel : +65 63 665 319 Fax : +65 63 670 763  
Mobile : +65 98 166 603  
Website : [ipsphere.com](http://ipsphere.com)

Contact : Roger ONG  
Area Manager – [rong@ipsphere.com](mailto:rong@ipsphere.com)