

## B23K

**SOLDERING OR UNSOLDERING; WELDING; CLADDING OR PLATING BY SOLDERING OR WELDING; CUTTING BY APPLYING HEAT LOCALLY, e.g. FLAME CUTTING; WORKING BY LASER BEAM (making metal-coated products by extruding metal [B21C 23/22](#); building up linings or coverings by casting [B22D 19/08](#); casting by dipping [B22D 23/04](#); manufacture of composite layers by sintering metal powder [B22F 7/00](#); arrangements on machine tools for copying or controlling [B23Q](#); covering metals or covering materials with metals, not otherwise provided for [C23C](#); burners [F23D](#))**

### Definition statement

*This place covers:*

Machines, devices or processes for specific methods of soldering, welding, cladding or plating by soldering or welding, cutting by applying heat locally or working by laser beam ([B23K 1/00-B23K 26/00](#)).

Welding or cutting machines, devices or processes not covered by any of the preceding groups ([B23K 28/00](#)).

Soldering, welding or cutting processes specially adapted for particular articles or purposes ([B23K 31/00](#)).

Specially-profiled edge portions of workpieces for making soldering or welding connections and filling the seams formed thereby ([B23K 33/00](#)).

Rods, electrodes, materials or media for use in soldering, welding or cutting ([B23K 35/00](#)).

Auxiliary devices or processes, not specially adapted to a soldering, welding or cutting procedure covered by only one of the preceding main groups ([B23K 37/00](#)).

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Making metal-coated products by extruding metal	<a href="#">B21C 23/22</a>
Building up linings or coverings by casting	<a href="#">B22D 19/08</a>
Casting by dipping	<a href="#">B22D 23/04</a>
Manufacture of composite layers by sintering metal powder	<a href="#">B22F 7/00</a>
Metal-working machines other than soldering, welding, or flame-cutting machines; Arrangements on machine tools other than tools for soldering, welding, or flame-cutting for copying or controlling; Guiding means applicable to metal-working machines other than soldering, welding, or flame-cutting machines.	<a href="#">B23Q</a>
Cutting in general	<a href="#">B26D</a>
Welding of plastics	<a href="#">B29C 65/00</a>
Covering metals or covering materials with metals, not otherwise provided for	<a href="#">C23C</a>
Burners	<a href="#">F23D</a>

### Special rules of classification

Upon classifying in [B23K 31/00](#), [B23K 33/00](#), [B23K 35/00](#) or [B23K 37/00](#), the appropriate classification in [B23K 1/00-B23K 26/00](#) or subgroups should be added, if applicable.

## B23K 1/00

**Soldering, e.g. brazing, or unsoldering ([B23K 3/00](#) takes precedence; characterised only by the use of special materials or media [B23K 35/00](#); dip or wave soldering in the manufacture of printed circuits [H05K 3/34](#))**

### Definition statement

*This place covers:*

Soldering and brazing, which are processes in which two or more metal items are joined together by melting and flowing a filler metal (solder) into the joint, the filler metal having a lower melting point than the workpiece. Brazing is a form of soldering, wherein the temperatures used to melt the filler metal are above 450 °C.

Unsoldering, wherein solder is removed from a joint prior to resoldering.

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Arc brazing apparatuses	<a href="#">B23K 3/0384</a>
Dip or wave soldering in the manufacture of printed circuits	<a href="#">H05K 3/34</a>

### Special rules of classification

Arc soldering or brazing to be classified in [B23K 9/16](#) and [B23K 1/00](#).

MIG soldering or brazing to be classified in [B23K 9/173](#) and [B23K 1/00](#).

TIG soldering or brazing to be classified in [B23K 9/167](#) and [B23K 1/00](#).

### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "braze welding" and "arc brazing"

## B23K 3/00

**Tools, devices, or special appurtenances for soldering, e.g. brazing, or unsoldering, not specially adapted for particular methods (materials used for soldering [B23K 35/00](#))**

### Definition statement

*This place covers:*

Tools, devices for soldering, brazing or unsoldering.

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering lamps or blowworkpieceipes	<a href="#">F23D</a>
Electric heating in general	<a href="#">H05B</a>

## B23K 5/00

### Gas flame welding

#### Definition statement

*This place covers:*

Welding, where a flame is applied to the base metal and held until a small puddle of molten metal is formed with or without addition of more metal from a welding rod or filler rod into the molten metal puddle.

## B23K 7/00

### Cutting, scarfing, or desurfacing by applying flames {(thermal deburring [B23D 79/005](#))}

#### Definition statement

*This place covers:*

Cutting where the flame is not intended to melt the metal, but to bring it to its ignition temperature.

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Thermal deburring	<a href="#">B23D 79/005</a>
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## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Scarfing	Also termed deseaming. It is a process for burning out defective areas on the surface of ingots or semi-finished products such as billets so that the product is suitable for subsequent rolling or forging
Desurfacing	removing surface metal by means of oxidizing gas jets

## B23K 9/00

**Arc welding or cutting (electro-slag welding [B23K 25/00](#); welding transformers [H01F](#); welding generators [H02K](#))**

### Definition statement

*This place covers:*

Welding methods and apparatus, wherein a welding power supply is used to create an electric arc between an electrode and the base material to melt the metals at the welding point.

Arc welding and cutting with direct (DC) or alternating (AC) current.

Arc welding with consumable or non-consumable electrodes.

Arc welding with or without shielding means.

Underwater arc welding.

Backing means for arc welding.

Inserts between the pieces to be joined through arc welding.

Power supply for arc welding.

Drag welding.

Submerged arc welding.

Stud welding.

Percussion welding.

Protecting means used during arc welding.

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Electro-slag welding	<a href="#">B23K 25/00</a>
Form or composition of electrodes	<a href="#">B23K 35/00</a>
Welding studs	<a href="#">B23K 35/0288</a>
Media used during welding or cutting	<a href="#">B23K 35/38</a>
Masks, shields or hoods for welders	<a href="#">A61F 9/06</a>
Copying in general	<a href="#">B23Q 35/00</a>
Protective means in general	<a href="#">F16P 1/06</a>
Welding transformers	<a href="#">H01F</a>
Electrical coupling means	<a href="#">H01R</a>
Earthing connections	<a href="#">H01R</a>
Welding generators	<a href="#">H02K</a>

## Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

TIG welding	Tungsten inert gas welding
MIG/MAG welding	Metal inert gas/metal active gas welding
SAW	Submerged arc welding
SMAW	Shielded metal arc welding
MMA	Manual metal arc welding
Stud welding	Stud welding is a form of spot welding where a bolt or specially formed nut is welded onto another metal part.
Percussion welding	Percussion welding (PEW) is a type of resistance welding that blends dissimilar metals together. Percussion welding creates a high temperature arc that is formed from a short quick electrical discharge. Immediately following the electrical discharge, pressure is applied which forges the materials together. This type of joining brings the materials together in a percussive manner.
Drag welding	known as gravity welding or gravity arc welding. It employs an electrode holder attached to an inclined bar along the length of the weld. Once started, the process continues until the electrode is spent.

## B23K 10/00

### Welding or cutting by means of a plasma

#### Definition statement

*This place covers:*

Plasma arc welding (PAW), wherein heat is produced between an electrode and a constricting orifice (nontransferred arc). Shielding is generally obtained from the hot, ionized gas issuing from the orifice of the constricting nozzle, which may be supplemented by an auxiliary source of shielding gas. Shielding gas may be an inert gas or a mixture of gases.

Plasma arc cutting (PAC), wherein a pilot arc is first generated between the electrode (cathode) and the nozzle (anode). The pilot arc ionizes gas passing through the nozzle exit orifice. After the ionized gas reduces the electrical resistance between the electrode and the workpiece, the arc transfers from the nozzle to the workpiece. The torch is operated in this transferred plasma arc mode, which is characterized by the conductive flow of ionized gas from the electrode to the workpiece, for the cutting of the workpiece.

#### References

##### Informative references

Attention is drawn to the following places, which may be of interest for search:

Circuits for plasma torches	<a href="#">H05H 1/36</a>
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## B23K 11/00

### Resistance welding; Severing by resistance heating

#### Definition statement

*This place covers:*

Electric resistance welding, where heat to form the weld is generated by the electrical resistance (Joule effect) of material vs the time and the force used to hold the materials together during welding.

Spot and seam welding.

#### References

##### *Informative references*

*Attention is drawn to the following places, which may be of interest for search:*

Brazing of honeycomb sandwich structure	<a href="#">B23K 1/0014</a>
Stud welding with an arc	<a href="#">B23K 9/20</a>
Form or composition of electrodes	<a href="#">B23K 35/00</a>
Electromagnetic counters	<a href="#">G06M</a>

## B23K 13/00

### Welding by high-frequency current heating

#### Definition statement

*This place covers:*

Welding by conduction heating, wherein a high frequency current produces heat in a tool contacting the workpiece.

Welding by induction heating, high frequency current (called eddy current or Foucault current) is produced by induction in the workpiece and is used to heat the same.

## B23K 15/00

### Electron-beam welding or cutting (electron- or ion- beam tubes [H01J 37/00](#))

#### Definition statement

*This place covers:*

Electron beam welding wherein a beam of high-velocity electrons is applied to the materials being joined.

Electron beam cutting wherein high-velocity electrons concentrated into a narrow beam are directed toward the work piece, creating heat and vaporizing the material.

#### References

##### *Informative references*

*Attention is drawn to the following places, which may be of interest for search:*

Electron- or ion- beam tubes	<a href="#">H01J 37/00</a>
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## B23K 17/00

### Use of the energy of nuclear particles in welding or related techniques

#### Definition statement

*This place covers:*

Welding, micromachining using an ion beam.

## B23K 20/00

### Non-electric welding by applying impact or other pressure, with or without the application of heat, e.g. cladding or plating

#### Definition statement

*This place covers:*

Wire welding; Capillary welding; Ball bonding.

Isostatic pressure welding.

Thermo-compression bonding, bonding tips therefore.

Explosive welding.

Ultrasonic welding.

Friction welding; friction stir welding.

#### References

##### Informative references

Attention is drawn to the following places, which may be of interest for search:

Coating by spraying the coating material in the molten state, e.g. by flame, plasma or electric discharge e.g. Cold spray coating	<a href="#">C23C 4/00</a>
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## B23K 23/00

### Alumino-thermic welding

#### Definition statement

*This place covers:*

Alumino-thermic welding during which a reacting composition of iron oxide red (rust) powder and aluminium powder is ignited at high temperatures and a strongly exothermic (heat-generating) reaction occurs that produces through reduction and oxidation a white hot mass of molten iron and a slag of refractory aluminium oxide.

Welding, wherein heat is generated by an exothermic reaction other than alumino-thermic (e.g. US2007/0295782).

## B23K 25/00

Slag welding, i.e. using a heated layer or mass of powder, slag, or the like in contact with the material to be joined ([B23K 23/00](#) takes precedence; submerged-arc welding [B23K 9/18](#))

### Definition statement

*This place covers:*

Electroslag welding (ESW) which is a single pass welding process for thick materials in a vertical or close to vertical position wherein an electric arc is initially struck by a wire that is fed into the desired weld location, flux is added until the molten slag, reaching the tip of the electrode, extinguishes the arc upon which the wire is then continually fed through a consumable guide tube into the surfaces of the metal workpieces and the filler metal are then melted using the electrical resistance of the molten slag to cause coalescence.

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Submerged arc welding (SAW)	<a href="#">B23K 9/18</a>
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## B23K 26/00

Working by laser beam, e.g. welding, cutting or boring

### Definition statement

*This place covers:*

Laser scribing for making a weakened layer, even without notching.

Laser shock processing.

Apparatuses for laser surface treatment.

Laser ablation.

### References

#### Limiting references

*This place does not cover:*

Laser lift-off by applying laser at an interface through the front layer	<a href="#">B23K 26/402</a>
Laser sintering of metallic powder	<a href="#">B22F 3/105</a>
Rapid manufacturing and prototyping of 3D objects by additive depositing, agglomerating or laminating of plastics material, e.g. by selective laser sintering	<a href="#">B29C 64/00</a>
Laser sintering of plastics	<a href="#">B29C 67/04</a>
Laser marking for applying identification marks	<a href="#">B41M 5/24</a>
Laser sintering of glass	<a href="#">C03B 19/06</a>
Laser sintering of ceramics	<a href="#">C04B 35/64</a>
Re-melting metals	<a href="#">C22B 9/00</a>



Laser assisted deposition	<a href="#">C23C</a>
Laser assisted chemical etching	<a href="#">C23F 1/00</a>
Measuring length, thickness, angles, areas, irregularities of surfaces using laser	<a href="#">G01B</a>
Originals for photomechanical production of textured or patterned surfaces, e.g., masks, photo-masks, reticles; Mask blanks or pellicles therefor	<a href="#">G03F 1/00</a>

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Photomechanical production of textured or patterned surfaces	<a href="#">G03F 7/00</a>
Recording or reproducing by laser	<a href="#">G11B 7/00</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Electroplating using locally applied laser (e.g. galvano)	<a href="#">C25D 5/024</a>
Lasers per se	<a href="#">H01S 3/00</a> , <a href="#">H01S 5/00</a>

### Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "multiphoton lithograph", "direct laser lithography" and "direct laser writing (DLW)"

In patent documents, the word/expression in the first column is often used instead of the word/expression in the second column, which is used in the classification scheme of this place:

"Masers, X-ray lasers, gamma lasers, optical amplifiers"	"Laser"
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## B23K 26/0006

{taking account of the properties of the material involved ([B23K 26/32](#), [B23K 26/40](#) take precedence)}

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Surgical instruments, devices or methods for applying laser energy to the body	<a href="#">A61B 18/20</a>
Dental laser	<a href="#">A61C 1/0046</a>
Eye surgery using laser	<a href="#">A61F 9/008</a>
Laser surface treatment of glass not in the form of fibres or filaments	<a href="#">C03C 23/0025</a>
Laser surface treatment of glass in the form of fibres or filaments	<a href="#">C03C 25/6208</a>

## Special rules of classification

In this group, the involved material should be identified by allocating the appropriate indexing codes as foreseen in [B23K 2203/00](#) and subgroups

### B23K 26/0066

{for surface treatment (for changing the physical structure of ferrous metals or alloys [C21D](#), of non-ferrous metals or alloys [C22F](#); for alloying [C23C](#); annealing crystalline material [C30B 33/02](#); laser treatment of semiconductors [H01L](#))}

### Definition statement

*This place covers:*

Glazing.

Nanostructuring, e.g. colouring metal

Melting

### References

#### Limiting references

*This place does not cover:*

Laser melting or welding of glass	<a href="#">C03C</a>
Surface treatment of glass	<a href="#">C03C</a>
For changing the physical structure of ferrous metals or alloys	<a href="#">C21D</a>
Annealing metallic materials	<a href="#">C21D</a> , <a href="#">C22F</a>
Laser re-melting of metals by wave energy	<a href="#">C22B 9/22</a>
For changing the physical structure of non-ferrous metals or alloys	<a href="#">C22F</a>
Chemical coating, alloying or chemical coating of metallic materials	<a href="#">C23C</a>
Annealing non-metallic materials	<a href="#">C30B</a>
Annealing crystalline material	<a href="#">C30B 33/02</a>
Laser treatment of semiconductor	<a href="#">H01L 21/20</a>

### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Annealing	Process that produces conditions by heating to above the recrystallization temperature, maintaining a suitable temperature, and then cooling.
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## B23K 26/02

**Positioning or observing the workpiece, e.g. with respect to the point of impact; Aligning, aiming or focusing the laser beam**

### Definition statement

*This place covers:*

Method and devices for positioning or observing the workpiece.

Aligning, aiming or focussing the laser beam by exchanging the focussing optics.

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Interchange of lenses in general	<a href="#">G02B 7/14</a>
Automatic generation of focusing signals for optical elements	<a href="#">G02B 7/28</a>
Optical focussing aids	<a href="#">G02B 7/40</a>

## B23K 26/0626

{Energy control of the laser beam ([B23K 26/0622](#) takes precedence)}

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Temporal shaping of laser beams	<a href="#">H01S 3/0057</a>
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## B23K 26/066

**by using masks**

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Masks for photomechanical production of textured or patterned surfaces	<a href="#">G03F 1/00</a>
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## B23K 26/08

**Devices involving relative movement between laser beam and workpiece**

### Special rules of classification

Features of workpiece holding or support member [B23K 26/702](#) + [B23K 26/08](#) or subgroup.

If the workpiece is immobile at the moment of being laser processed [B23K 26/10](#).

Robots [B23K 26/0884](#).

**B23K 26/0821**

{using multifaceted mirrors, e.g. polygonal mirror}

**References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Scanning devices using multifaceted mirrors, in general	<a href="#">G02B 26/12</a>
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**B23K 26/12**

in a special atmosphere, e.g. in an enclosure

**References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Features inside the nozzle for feeding the fluid stream through the nozzle	<a href="#">B23K 26/1476</a>
Selection of media, e.g. special atmospheres for surrounding the working area for use in soldering, welding, or cutting	<a href="#">B23K 35/38</a>
Reactive-ion etching	<a href="#">H01L 21/3065</a>

**B23K 26/126**

{in an atmosphere of gases chemically reacting with the workpiece}

**References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Chemical etching of glass	<a href="#">C03C 15/00</a> , <a href="#">C03C 25/68</a>
Chemical etching of metallic material	<a href="#">C23F 1/00</a>
Etching of crystallised non-metallic material with defined structure in gas atmosphere	<a href="#">C30B 33/12</a>

**B23K 26/14**

using a fluid stream, e.g. a jet of gas, in conjunction with the laser beam;  
Nozzles therefor ([B23K 26/12](#) takes precedence)

**References****Limiting references**

This place does not cover:

Working by laser in a special environment or atmosphere	<a href="#">B23K 26/12</a>
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**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Ionisation of the arc gap by radiation	<a href="#">B23K 9/0675</a>
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**B23K 26/16**

Removal of by-products, e.g. particles or vapours produced during treatment of a workpiece (by a fluid stream [B23K 26/142](#))

**Definition statement**

*This place covers:*

Configurations for evacuating by-products between pieces.

**References****Limiting references**

*This place does not cover:*

Removal of by-products by a fluid stream	<a href="#">B23K 26/142</a>
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**B23K 26/18**

using absorbing layers on the workpiece, e.g. for marking or protecting purposes

**Definition statement**

*This place covers:*

Marking by way of material removal.

Feeding welding wire.

Elements for intercepting radiations at the end of boring a hole, even if not applied to the surface.

**References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Observing devices provided with laser radiation protection devices	<a href="#">B23K 26/03</a>
using masks on the workpiece for shaping the laser beam	<a href="#">B23K 26/0661</a>
Interposition of material for facilitating bonding	<a href="#">B23K 26/211</a>
Reactive-ion etching	<a href="#">H01L 21/3065</a>
Laser anti-reflection devices, e.g. optical isolators	<a href="#">H01S 3/0064</a>

**B23K 26/20**

**Bonding (soldering by means of radiant energy [B23K 1/005](#); joining of preformed plastics parts by heating using laser beam [B29C 65/16](#))**

**Definition statement**

*This place covers:*

Localised welding with special shaped welded area, e.g. button shaped.

**References****Limiting references**

*This place does not cover:*

Soldering by means of radiant energy	<a href="#">B23K 1/005</a>
Joining of preformed plastics by heating using laser beam	<a href="#">B29C 65/16</a>
Welding light guides	<a href="#">G02B 6/4237</a>

**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Joining of semiconductor bodies for junction formation by direct bonding	<a href="#">H01L 21/185</a>
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**B23K 26/211**

**with interposition of special material to facilitate connection of the parts**

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

with interposition of solder	<a href="#">B23K 1/0056</a>
with interposition of adhesive being heated by laser	<a href="#">C09J 5/06</a>

**B23K 26/32**

**taking account of the properties of the material involved**

**Special rules of classification**

In this group, the involved material should be identified by allocating the appropriate indexing codes as foreseen in [B23K 2203/00](#) and subgroups

**B23K 26/322**

involving coated metal parts (using absorbing layers on the workpiece  
[B23K 26/18](#))

**References****Limiting references**

*This place does not cover:*

Using absorbing layers on the workpiece	<a href="#">B23K 26/18</a>
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**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Coated articles, e.g. plated or painted or surface treated articles made by soldering, welding or cutting	<a href="#">B23K 2201/34</a>
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**B23K 26/324**

involving non-metallic parts

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Devices or method using laser on the body	<a href="#">A61B 18/20</a>
Dental laser	<a href="#">A61C 1/0046</a>
Eye laser surgery	<a href="#">A61F 9/008</a>
Joining glass to glass by fusing with laser	<a href="#">C03B 23/20</a>
Joining glass to glass by processes other than by fusing using laser	<a href="#">C03C 27/06</a>
Joining ceramics	<a href="#">C04B 37/00</a>
Treatment of microorganisms with electric or wave energy	<a href="#">C12N 13/00</a>

**B23K 26/34**

Laser welding for purposes other than joining

**Definition statement**

*This place covers:*

Laser Cladding.

**References****Limiting references**

*This place does not cover:*

Diffusion treatment of metallic material (e.g. surface alloying); coating of metallic or coating material with metallic material by chemical coating or vacuum evaporation, e.g. sputtering	<a href="#">C23C 14/00</a>
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### Informative references

Attention is drawn to the following places, which may be of interest for search:

Shaped metal deposition (SMD)	<a href="#">B22F 3/1055</a>
Sintering Glass	<a href="#">C03B 19/06</a>
Sintering ceramics	<a href="#">C04B 7/4461</a>
Manufacturing by laser welding of machines or engines other than non-positive-displacement machines or engines, wind motors, non-positive displacement pumps	<a href="#">F05B 2230/234</a>

### Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Laser net shape manufacturing	Laser net shape manufacturing refers to laser cladding or laser consolidation. In laser cladding as well as laser consolidation, a laser beam creates a molten pool on a substrate into which powder is deposited in a beam/powder interaction zone. Concurrently, the substrate on which the deposition is occurring is moving with respect to the beam/powder interaction zone to fabricate the desired cross-sectional geometry. Consecutive layers may be additively deposited, thereby producing a three-dimensional part. Laser cladding is applied to enhance the surface properties of machine parts locally with powder or wires melted via a laser beam. Laser consolidation involves the manufacturing of parts through depositing multiple layers of material
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## B23K 26/36

Removing material ([B23K 26/55](#), [B23K 26/57](#) take precedence)

### Definition statement

*This place covers:*

Removing material e.g. ablating, without cutting or boring.

### References

#### Limiting references

*This place does not cover:*

for creating voids inside the workpiece, e.g. for forming flow passages of flow patterns	<a href="#">B23K 26/55</a>
with laser beam entering a face of the workpiece from which it is transmitted through the workpiece material to work on a different workpiece face	<a href="#">B23K 26/57</a>
Cleaning by laser treatment	<a href="#">B08B 7/0042</a>
Laser assisted chemical etching	<a href="#">C23F 1/00</a>
Severing conductive links on memory integrated circuits	<a href="#">H01L 23/5258</a>
Laser wire stripping	<a href="#">H02G 1/128</a>



**Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Processing photosensitive materials by stripping	<a href="#">G03F 7/42</a>
Ablation for laser recording	<a href="#">G11B 7/00</a>
Laser etching of printed circuit substrate	<a href="#">H05K 3/0026</a>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Laser removal of surface material for decorative purpose	<a href="#">B44C 1/228</a>
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**Glossary of terms**

In this place, the following terms or expressions are used with the meaning indicated:

Engraving	Incising a design on to a hard, usually flat surface, by cutting grooves into it
Etching	Cutting superficially or partially through the workpiece, e.g. engraving
Scribing	Cutting deep grooves by laser light on workpieces to separate them mechanically; e.g. perforating semiconductor wafers or ceramic substrates by laser processing, and subsequently dividing them into separate elements to manufacture integrated circuits

**B23K 26/40**

**taking account of the properties of the material involved**

**Special rules of classification**

In this group, the involved material should be identified by allocating the appropriate indexing codes as foreseen in [B23K 2203/00](#) and subgroups.

**B23K 26/402**

**involving non-metallic material, e.g. isolators**

**References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Devices or method using laser on the body	<a href="#">A61B 18/20</a>
Dental laser	<a href="#">A61C 1/0046</a>
Eye laser surgery	<a href="#">A61F 9/008</a>
Working or preserving wood or similar material	<a href="#">B27B</a> - <a href="#">B27M</a>
Severing glass using laser	<a href="#">C03B 33/0222</a> , <a href="#">C03B 33/091</a>

Joining ceramics	<a href="#">C04B 37/00</a>
Treatment of microorganisms with electric or wave energy	<a href="#">C12N 13/00</a>
Introduction of foreign genetic material into plant cells by physical or non-biological means	<a href="#">C12N 15/8206</a>
Clicking, perforating, or cutting leather	<a href="#">C14B 5/00</a>

## B23K 26/705

{Beam measuring device}

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Beam monitoring per se	<a href="#">G01J 1/4257</a>
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## B23K 26/706

{Protective screens}

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Goggles or eye-masks for welders carried on the body or in the hand	<a href="#">A61F 9/02</a> , <a href="#">A61F 9/06</a>
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## B23K 28/00

**Welding or cutting not covered by any of the preceding groups, e.g. electrolytic welding**

### Definition statement

*This place covers:*

Welding in a furnace.

Welding by means of an electrolyte.

Combined welding or cutting procedures or apparatus.

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Arc sustained laser working	<a href="#">B23K 26/1423</a>
Cutting by means of an electrolyte	<a href="#">B23H</a>

## B23K 31/00

Processes relevant to this subclass, specially adapted for particular articles or purposes, but not covered by only one of the preceding main groups (making tubes or profiled bars involving operations other than soldering or welding [B21C 37/04](#), [B21C 37/08](#))

### Definition statement

*This place covers:*

Making of profiled bars.

Connecting cutting edges or the like to tools.

Attaching reinforcements to workpieces, e.g. wear-resisting zones to tableware.

Making tubes with soldering or welding.

Processes specially adapted for particular articles or purposes relating to cutting or desurfacing.

Investigating the properties, e.g. the weldability of materials.

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Making tubes or profiled bars involving operations other than soldering or welding	<a href="#">B21C 37/04</a> , <a href="#">B21C 37/08</a>
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## B23K 33/00

Specially-profiled edge portions of workpieces for making soldering or welding connections; Filling the seams formed thereby {([B23K 11/14](#) takes precedence)}

### Definition statement

*This place covers:*

Filling of continuous seams of cylindrical workpieces.

Filling of continuous seams for automotive applications.

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Edge treatment flanging	<a href="#">B21D 19/00</a>
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## B23K 35/00

### Rods, electrodes, materials, or media, for use in soldering, welding, or cutting

#### Definition statement

*This place covers:*

Interlayers, electrodes, rods, wires, welding studs for metallurgical bonding of workpieces, for soldering, brazing, welding techniques, characterised by their mechanical features, composition, media

#### Relationships with other classification places

[B22F](#) provides for processes of making and working metallic powders. [B23K](#) provides for processes of soldering or unsoldering, welding, cladding or plating by soldering or welding, cutting by applying heat locally e.g. flame cutting, working by laser beam. When the method is intended for providing a particular use/product then the use/ product is classified as well (see informative references for some of them). When the composition of the alloy is disclosed, either in claims or description, this one is classified in [C22C](#).

#### References

##### Limiting references

*This place does not cover:*

Methods of soldering or unsoldering, welding, brazing, cladding or plating by soldering or welding, cutting	<a href="#">B23K 1/00</a> - <a href="#">B23K 33/00</a> , <a href="#">B23K 37/00</a>
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##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Processes of soldering or unsoldering, welding, cladding or plating by soldering or welding, cutting by applying heat locally	<a href="#">B23K</a>
Catalysts	<a href="#">B01J</a>
Manufacture of metal sheets, wire, rods, tubes or profiles, otherwise than by rolling	<a href="#">B21C</a>
Working metallic powder, powder Metallurgical apparatus or processes	<a href="#">B22F</a> , <a href="#">C22C 1/04</a>
Layered products	<a href="#">B32B</a>
Vehicle, vehicle fitting, vehicle parts	<a href="#">B60R</a> , <a href="#">B62D</a>
Ceramics, refractories	<a href="#">C04B</a>
Acyclic or carbocyclic compounds	<a href="#">C07C</a>
Macromolecular compounds	<a href="#">C08F</a> , <a href="#">C08G</a> , <a href="#">C08K</a> , <a href="#">C09D</a>
Heat treatments of welded joints	<a href="#">C21D 9/50</a>
Alloys	<a href="#">C22C</a>
Heat exchangers	<a href="#">F28F</a>
Electrical wires	<a href="#">H01B</a>
Contacts	<a href="#">H01H</a>
Bonding wires, semiconductor devices/details	<a href="#">H01L</a>
Electrical connectors	<a href="#">H01R</a>

Electronic components	<a href="#">H05K</a>
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### Special rules of classification

The IPC groups **B23K35/04** - **B23K35/20** are not used and instead covered by [B23K 35/0205](#) - [B23K 35/0294](#) , while IPC group **B23K35/363** is covered by [B23K 35/3601](#) - [B23K 35/3618](#) . Under [B23K 35/00](#) the last place rule is followed (classification in the last appropriate place) combined with multiple classifications for classifying a 100% disclosed alloy composition. When classifying under [B23K 35/00](#) all essential features disclosed should be classified as invention information while all other special features disclosed in claims, description, examples and figures/diagrams should be classified as additional information.

### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Soldering	process in which two or more metal items are joined together by melting and flowing a filler metal (solder) into the joint, the filler metal having a lower melting point than the workpiece;
Brazing	metal-joining process whereby a filler metal is heated above and distributed between two or more close-fitting parts by capillary action. The filler metal is brought slightly above its melting (liquidus) temperature while protected by a suitable atmosphere, usually a flux. It then flows over the base metal (known as wetting) and is then cooled to join the workpieces together; similar to soldering except using higher temperatures to melt the filler.
Welding	metal-joining process causing coalescence, usually by melting the workpieces and adding a filler material to form a pool of molten material (the weld pool) that cools to become a strong joint, with pressure sometimes used in conjunction with heat, or by itself, to produce the weld
Flux.	a chemical cleaning agent; fluxes facilitate soldering, brazing, and welding by removing oxidation from the metals to be joined
Welding electrode	Electrical conductor used to conduct current through a workpiece to fuse two pieces together
Consumable electrodes	Electrodes used in gas metal arc welding or shielded metal
Non-consumable electrodes	Electrodes used in gas tungsten arc welding

## B23K 35/001

### {Interlayers, transition pieces for metallurgical bonding of workpieces}

#### Definition statement

*This place covers:*

Transition pieces for metallurgical bonding of workpieces

#### Special rules of classification

If a composition is given it should also be classified in the relevant groups under [C22C](#). For example, a process for producing composite body consisting of soldering at least a part of a high-temperature-resistant, metallic or nonmetallic component and at least a part of a high-temperature-resistant, nonmetallic component, where prior to soldering, a metallic barrier layer, which is impervious to the solder melt, of one or more elements selected from the group consisting of V, Nb, Ta, Cr, Mo, W,

Ti, Zr, Hf and alloys thereof, is deposited on that surface of each nonmetallic component which is to be soldered will be classified in [B23K 35/005](#), [B23K 35/001](#). Documents should also be considered for classification in the following fields: soldering methods [B23K 1/19](#); layered products [B32B 7/04](#), [B32B 18/00](#); ceramics [C04B 37/003](#), [C04B 37/026](#) alloys [C22C 14/00](#), [C22C 16/00](#).

## B23K 35/02

**characterised by mechanical features, e.g. shape**

### Definition statement

*This place covers:*

Rods, electrodes, materials for use in soldering, welding, or cutting characterized by mechanical feature

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Powder metallurgy	<a href="#">B22F</a>
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### Special rules of classification

If a composition is given it should also be classified in the relevant groups under [C22C](#). For example, a bonding wire for semiconductor, comprising a core and an outer peripheral part formed of a conductive metal and the alloy thereof formed mainly of the same type of elements, respectively, and a diffusion layer and/or an intermetallic compound layer formed of the elements forming the core and the outer peripheral part disposed between the core and the outer peripheral part or comprising a core formed of a first metal having a conductivity or an alloy formed mainly of the first metal, an outer peripheral part formed of a second metal having a conductivity different from that of the first metal of the core or an alloy formed mainly of the second metal, and a diffusion layer and/or an intermetallic compound layer disposed between the core and the outer peripheral part (metals, alloy disclosed) will be classified in [B23K 35/0272](#). Documents should also be considered for classification in the following fields: manufacture of wires otherwise than by rolling [B21C 37/042](#); layered products [B32B 15/018](#); semiconductors [H01L 24/43](#), [H01L 24/45](#); and the relevant groups for alloys in [C22C](#).

## B23K 35/22

**characterised by the composition or nature of the material**

### Definition statement

*This place covers:*

Rods, electrodes, materials for use in soldering, welding, or cutting characterized by the composition or nature of the material, composition of soldering/brazing/welding materials

### Relationships with other classification places

Macromolecular compounds classified in [C08E](#), [C08G](#), [C09D](#).

### Special rules of classification

[B23K 35/34](#) takes precedence. If a composition is given it should also be classified in the relevant groups under [C22C](#). For example, a mixture for applying a polymer, non-corrosive, electroconductive coating which can be shaped in a low-abrasive manner, to a base, method for producing a non-corrosive, viscoplastic coating on a base, said coating containing polymer and inorganic particles, and to an electroconductive coating containing polymer and inorganic particles will be classified in

[B23K 35/226](#) . Documents should also be considered for classification in the following fields: inorganic substances /macromolecular as compounding ingredients [C08K 5/0008](#) , [C09D 5/082](#) , [C09D 5/084](#) , [C09D 5/10](#), [C09D 5/24](#); [H01B 1/22](#) (use as a cable/conductor). For example, a flux cored wire for welding duplex stainless steel consisting of, by mass% with respect to the mass of the wire as a whole, C: 0.001 to 0.1%, Si: 0.01 to 1.0%, Mn: 2.0 to 6.0%, Cr: 17.0 to 27.0%, Ni: 1.0 to 10.0%, Mo: 0.1 to 3.0%, Al: 0.002 to 0.05%, Mg: 0.0005 to 0.01%, Ti: 0.001 to 0.5%, and N: 0.10 to 0.30%, further limiting P to 0.03% or less and S to 0.01% or less, satisfying 0.73 Cr equivalents - Ni equivalents 4.0 and Ti(mass%) N(mass%) 0.0004, and having a balance of iron and unavoidable impurities will be classified in [B23K 35/0266](#) , [B23K 35/3086](#) , [B23K 35/3053](#) , [B23K 35/308](#) . Documents should be considered for classification in the following field: alloys [C22C 38/22](#), [C22C 38/38](#), [C22C 38/40](#). Similarly, a process of assembling two silicon carbide pieces by non-reactive, moderate refractory welding, comprises contacting the pieces with a non-reactive welding composition respectively a binary alloy formed, as mass percentages, from 56% to 70% silicon and 44% to 30% yttrium, and heating an assembly formed by the pieces and the composition to a sufficient temperature for melting the composition and to form a moderate refractory joint will be classified in [B23K 35/327](#) , [B23K 35/025](#) , [B23K 35/24](#). Documents should be considered for classification purposes in the following fields: welding techniques [B23K 1/19](#), [B23K 1/20](#), [B23K 1/0008](#) , alloys [C22C 28/00](#), ceramics [C04B 37/006](#) .

## B23K 35/36

**Selection of non-metallic compositions, e.g. coatings, fluxes ([B23K 35/34](#) takes precedence); Selection of soldering or welding materials, conjoint with selection of non-metallic compositions, both selections being of interest (selection of soldering or welding materials proper [B23K 35/24](#))**

### Definition statement

*This place covers:*

Coatings, fluxes compositions, as well as soldering/brazing/welding materials conjoint with non-metallic compositions

### Relationships with other classification places

Macromolecular compounds classified in [C08F](#), [C08G](#), [C08K](#), [C09D](#)

### References

#### Limiting references

*This place does not cover:*

selection of solderin or welding materials proper	<a href="#">B23K 35/24</a>
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### Special rules of classification

[B23K 35/34](#) takes precedence. If a composition is given it should also be classified in the relevant groups under [C22C](#). For example a cream solder comprising a nitrogen - containing base hydroborofluorate is included by  $1 \times 10^{-3}$  -  $7 \times 10^{-2}$  mol. to 100 gr. of flux for solder powder, the nitrogen-containing base being from e.g. propylamine, dipropylamine, allylamine, diallylamine, isobutyl-amine, sec-butylamine, tert-butylamine, etc and the cream solder being for Ag/Pd, Ag/Pt or Ag/Pd/Pt fired body or electrode and also includes a hydrofluorate, hydrochlorate, hydrobrcmate and/or hydroiodate will be classified in [B23K 35/3617](#) , [B23K 35/3612](#) , [B23K 35/025](#) , [B23K 35/22](#) and will be circulated to organic chemistry field [C08](#). Similarly, a stainless steel flux-cored welding wire for the welding of galvanized steel sheets where the sheath and the flux contain, as metal or alloying components and in a total amount based on the total mass of the wire, C: 0.01 to 0.05%, Si: 0.1 to 1.5%, Mn: 0.5 to 3%, Ni: 7 to 10% and Cr: 26 to 30% with the F value falling within the range of 30 to 50, that the flux contains, as slag formers, TiO<sub>2</sub>: 3.8 to 6.8%, SiO<sub>2</sub>: 1.8 to 3.2%, ZrO<sub>2</sub>: 1.3% or below, and Al<sub>2</sub>O<sub>3</sub>:

0.5% or below, that the total amount of these slag formers and the other slag formers is 7.5 to 10.5%, that TiO<sub>2</sub> accounts for 50 to 65% of the total amount of all the slag formers, and that the balance of the sheath and the flux consists of Fe and unavoidable impurities will be classified in [B23K 35/0266](#), [B23K 35/308](#), [B23K 35/362](#), [B23K 35/368](#). Documents should also be considered for classification in the following fields: Welding techniques [B23K 9/00](#); Alloys [C22C 38/02](#), [C22C 38/04](#) **C22C38/40A**, [C22C 18/04](#).

## B23K 35/38

**Selection of media, e.g. special atmospheres for surrounding the working area**

### Definition statement

*This place covers:*

Selection of media in soldering/welding

### Special rules of classification

If a composition is given it should also be classified in the relevant groups under [C22C](#). For example a perfluoro-heptaglyme, improved vapour-phase soldering fluid - prepares by perfluorination of heptaglyme and method of vapor-phase soldering employing perfluoroheptaglyme as vapor phase soldering fluid is classified in **B23K38/F**, [B23K 35/38](#).

## B23K 35/40

**Making wire or rods for soldering or welding (processes involving a single technical art, see the relevant subclasses, e.g. [B05D](#), [B21C](#))**

### Definition statement

*This place covers:*

Processes of making soldering/welding wire/rods/electrodes

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Applying liquids or other materials to surfaces	<a href="#">B05D</a>
Powder metallurgy	<a href="#">B22F</a>

### Special rules of classification

If a composition is given it should also be classified in the relevant groups under [C22C](#). For example a tungsten electrode (alloy composition disclosed) and its method of manufacture will be classified in [B23K 35/402](#), [C22C 1/04](#), [C22C 27/04](#), [B23K 9/24](#). Similarly, a seamless tube compound welding electrode made by filling of a pre-formed tube closed at the bottom with a mixt. consisting of several granulated materials such as flux, de-oxidisers, carbides, which are periodically compacted by means of a punch introduced from the top, following which the tube is size reduced by rolling and/or drawing, which also further compacts the filling will be classified in [B23K 35/406](#), [B23K 35/327](#), [B23K 35/0272](#), [B23K 35/302](#). Documents should be considered for classification purposes in the following fields: Manufacture of metal sheets, wire, rods, tubes or profiles, otherwise than by rolling [B21C](#).



## B23K 37/00

**Auxiliary devices or processes, not specially adapted to a procedure covered by only one of the preceding main groups (eye-shields for welders worn on the operator's body or carried in the hand [A61F 9/00](#) {, i.e. [A61F 9/02](#)}; applicable to metal-working machines other than soldering, welding, or flame-cutting machines [B23Q](#); {laser protective screens [B23K 26/706](#); } protective shields for other welding methods [F16P 1/06](#))**

### Definition statement

*This place covers:*

Cooling means for welding or cutting.

Safety devices for welding or cutting.

Carriages supporting the welding or cutting element.

Devices or processes for holding or positioning work.

Devices or processes for aligning cylindrical work; clamping devices therefore.

Devices or processes for positioning molten material, e.g. confining it to a desired area.

Devices or processes for flash removal.