

# List of Products

## I Plant and equipment for joining, surfacing and cutting processes

### 1 Plant and equipment, including automation, mechanization and industrial robots, for welding of metal, ceramic and composite materials

300	butt seam welding with rotary transformer
320	butt seam welding with sliding contacts
170	capacitor discharge welding
150	cold pressure welding
40	diffusion welding
60	electron beam welding
50	electrogas welding
70	electroslag welding
160	enclosed resistance fusion welding
310	explosive welding
350	firecracker welding
100	flux cored arc welding
10	flash welding
280	friction welding
281	friction stir welding
110	gas pressure welding
120	gas welding
140	induction welding
180	laser welding
210	light beam welding
330	magnetically impelled arc butt (MIAB) welding
220	magnetic pulse welding
190	manual metal arc welding
240	micro welding
230	MIG-/MAG (GMA) welding
221	multiple-wire welding
80	narrow gap welding
250	plasma/TIG welding
260	plasma welding
30	projection welding
200	pulsed arc welding
270	resistance butt welding
380	resistance spot welding
370	roll butt seam welding
290	seam welding
20	stud welding
360	submerged arc welding
331	tandem welding
130	thermit welding
390	TIG (GTA) welding
90	tubular wire welding
340	ultrasonic welding

### 2 Plant and equipment, including automation, mechanization and industrial robots, for weld surfacing and cladding

400	electroslag surfacing
440	explosive and roll cladding
430	friction surfacing
450	gas shielded arc surfacing
410	laser surfacing
420	plasma surfacing
460	submerged arc surfacing

### 3 Plant and equipment, including automation, mechanization and industrial robots, for brazing and soldering

540	arc brazing
560	bath, wave and drag brazing and soldering
520	bit soldering, block brazing, roller tinning
490	debrazing, desoldering
620	dip brazing and soldering
480	electron beam brazing and soldering
500	flame brazing and soldering
590	friction brazing
580	furnace brazing and soldering
510	high temperature brazing
640	hot gas soldering
511	induction soldering

530	laser brazing and soldering
550	light beam brazing and soldering
570	microbrazing and soldering
660	reflow soldering
650	resistance brazing and soldering
600	salt bath brazing and soldering
471	strap brazing
470	surfacing by brazing and soldering
630	ultrasonic brazing and soldering
610	wave soldering

### 4 Plant and equipment, including automation, mechanization and industrial robots, for thermal spraying and other coating processes

#### 4.1 Thermal spraying processes

700	arc spraying
690	capacitor discharge spraying
670	flame and detonation spraying
680	induction spraying
720	molten metal spraying
710	plasma spraying

#### 4.2 Other coating methods

730	aluminizing
740	anodizing
750	CVD (chemical vapour deposition)
830	dip coating
760	electrolytic oxidation
770	enameling
790	flame cleaning and phosphatizing
810	metallizing
780	painting, varnishing
800	plastic coating
820	PVD (physical vapour deposition)
840	tin, zinc, nickel, copper and chromium plating

### 5 Plant and equipment, including automation, mechanization and industrial robots, for thermal cutting and erosion

930	air arc gouging
940	arc-oxygen cutting
910	carbon arc cutting
850	oxy-fuel gas cutting
860	oxygen lancing
950	flame and fusion cutting with metal or mineral powder
900	flame cleaning
880	flame gouging
870	flame scarfing
920	laser beam cutting and drilling, electron beam lancing
970	plasma cutting
960	plasma scarfing
890	spark erosion and chemical machining
980	water jet cutting, water abrasive jet cutting

### 6 Plant and equipment, including automation, mechanization and industrial robots, for welding of plastics

990	extrusion welding
1030	friction welding of plastics
1000	heated tool welding
1010	high frequency welding of plastics
1060	hot gas welding of plastics
1020	light beam welding of plastics
1040	ultrasonic welding of plastics
1050	vibration welding of plastics

### 7 Plant and equipment, including automation, mechanization and industrial robots, for adhesive bonding for metallic and non-metallic materials

1067	adhesive applications
1080	adhesive bonding of glass and ceramics
1090	adhesive bonding of plastics
1100	adhesive bonding of leather and textiles
1110	adhesive bonding of metals
1066	bonding in construction and joining technology
1068	combination of adhesive bonding with other joining processes
1065	dosing devices
1070	inductive adhesive curing
1120	micro adhesive bonding
1069	structural bonding

### 8 Plant and equipment and joining elements, including automation, mechanization and industrial robots, for positive and non-positive joining

1130	flanging
1160	hanging, expanding, clamping, wedging, extending
1170	seaming
1210	joining by compression or squeezing
1180	joining by extrusion or drawing
1190	joining by forming
1200	joining by lockforming (lockseaming)
1220	joining by widening or tightening (rolling in of tubes, botting, beading)
1230	joining by winding
1280	joining elements (rivets, tubular rivets, tap rivets, pop rivets, blind rivet nuts, bolts, screws)
1260	pressure joining (press-fitting, shrink-fitting, expansion-fitting)
1250	riveting
1270	screwing
1240	stapeling (using by wirestaples)
1150	tamp joining
1140	wire netting, wire weaving

### 9 Plant and equipment, including automation, mechanization and industrial robots, for special applications

1330	orbital welding equipment
1320	production equipment and production lines
1350	repair welding
1340	stack cutting
1310	systems for feeding, positioning, tipping or conveying (e.g. nut feeding systems)
1300	torch cleaning, automatic torch cleaning systems
1360	underwater cutting
1370	underwater welding
1380	welding, brazing, soldering and thermal cutting and surfacing in space

## II Plant and equipment for heat treatment and other production processes (excluding thermal joining, coating and cutting)

### 1 Plant and equipment, including automation, mechanization and industrial robots, for heat treatment

1400	diffusion annealing
1420	flame straightening
1430	flame heating
1410	flame stress relieving

1470 furnace heating  
1440 hardening, tempering, annealing  
1450 induction heating  
1460 normalizing  
1500 resistance heating  
1490 soft annealing  
1480 stress relief annealing

2 Plant and equipment, including automation, mechanization and industrial robots, for other production processes (excluding thermal joining, coating, cutting and heat treatment)

1600 bending, pipe bending  
1720 blasting  
1640 casting  
1670 cold dressing  
1710 cutting (e.g. plate shearing), slamping, nibbling  
1610 drilling  
1630 edge preparation (e.g. plate and pipe chamfering machines)  
1700 grinding  
1650 surface preparation and finishing  
1660 polishing  
1740 pumps  
1601 rolling, upsetting, drawing  
1680 sawing  
1690 sintering and hot isostatic pressing  
1620 turning, milling, planing  
1730 vibratory stress relieving  
1711 welding conditioning

III General productions equipment, systems for computer aided manufacture, data processing, manual and automatic control engineering, automation

1900 CAD-, CAM-, CAQ-, CIM- and CAP systems  
1930 camera systems for monitoring design and production processes  
1910 capture, checking and processing of process and production parameters  
1960 computers and other hardware (mini and micro computers, PC's, main-frames, process computers, printers, plotters, processors, etc.)  
1980 control engineering (pressure switches, solenoid and plasma valves, etc.)  
1920 industrial plant  
1970 mass production, flexible production facilities and welding lines  
1941 optics for laser welding and/or cutting  
1950 programs (software)  
1940 seam tracking and welding head guidance systems

IV Plant for production of filler materials and consumables

2000 acetylene generators and filling stations  
2030 brazing filler and solder production plants  
2010 conveying systems  
2020 gas manufacturing and liquefying plants  
2050 welding electrode and flux cored wire production plants  
2060 welding flux production plants  
2040 welding wire production plants

V Workshop and workplace equipment, safety equipment, health and safety

1 Workshop and workplace equipment, safety equipment

2160 at-source welding fume extraction systems (stationary, mobile)  
2220 exhaust and ventilation systems  
2120 heat recovery systems  
2130 load turning devices  
2270 other protective and safety devices (e.g. signs warning against possible hazards, fire extinguishers, fire blankets)  
2183 protective screens  
2200 protection devices against fires and explosions  
2210 protection equipment against high energy radiation (e.g. X-rays, laser)  
2180 safety device for industrial robots (e.g. door locking systems, control boards, visual supervision systems)  
2100 slinging gear, cranes and elevators (crane systems, lifting forks and beams, slewing cranes, lifting magnets, electric chain hoists)  
2150 soldering fume filters  
2170 sound absorbing materials, sound-proof chambers  
2211 stationary vacuum cleaners for industrial use  
2260 tools  
2140 transparent/opaque screens  
2190 weld fume filters and filtration systems  
2181 welding booths  
2182 welding curtains  
2230 work benches, workshop lockers  
2240 workshop stools, aids to stability  
2250 workshop trolleys, cylinder trolleys  
2110 work tables (e.g. welding and cutting tables)

2 Health and safety (personal protective equipment)

2320 ear protection (wadding, ear plugs, ear muffs)  
2310 first aid equipment, medicines  
2330 laser protection  
2360 other protective equipment  
2340 protective clothing (helmets, aprons, garments, shoes, gloves)  
2300 respiratory protection (filters-, insulating devices)  
2350 welder's head screens and shields, protective goggles, eye protective filters

VI Accessories

1 General accessories

2570 assembly systems, assembling and positioning devices (clamps, roller blocks, line-up clamps) (see also 2670)  
2590 chipping hammers and wire brushes  
2670 clamping systems, clamping elements  
2540 clamps (terminals, earthing, workpiece) and polarity testers  
2430 controlled feeding devices (e.g. for adhesives, solders and powders)  
2560 cooling systems  
2680 drying cabinets (electrodes and fluxes), heated quivers, baking ovens  
2500 electrode holders  
2510 electrode grinding devices  
2400 equalizing systems (e.g. for spot welding guns)  
2620 filler, wire spools  
2520 gas lighters  
2530 globoidal drive

2610 hose press  
2600 hoses, hose couplings, hose connections, hose package  
2550 magnets for welding, magnetic handling equipment  
2551 magnetic valves  
2700 other accessories, pumps and other auxiliary equipment  
2571 plasma valves  
2460 pressure cylinders for pressure and resistance welding  
2480 resistance welding electrodes  
2581 robot holding bracket  
2660 secondary cables for resistance welding  
2580 spot welding guns  
2671 steels-wire brushes and hand brushes for welds  
2490 TIG (GTA) welding electrodes  
2691 tool changing systems  
2695 tools for joint preparation  
2420 torch and welding head manipulation systems  
2411 torch-neck changing systems  
2450 turnables and tilt-turn positioners, lift tables  
2552 water-, oil-, air chillers  
2410 weld backings and adhesive tapes (for one sided welding)  
2630 welding flux feeding and recovery devices  
2650 welding leads and connectors  
2640 welding mirrors  
2611 welding-sets, diesel or gasoline driven  
2440 wire feeders  
2431 wire-guide spiral  
2690 workpiece handling systems (lift and shift systems, dial tables)  
2470 workpiece storage equipment (belts, pallets, stores)

2 Gas supply accessories

2720 central switching, pressure regulating and safety units, gas mixing units and valves for supply pipe work (switching, pressure regulating and safety devices, valves, gas filters, gas flow and pressure meters)  
2730 equipment for gas take-off stations (stop valves, pressure regulators, gas mixers, safety devices, take-off boards)  
2710 gas sources/tanks with pipework and valves (storage tanks, tankers, containers, cylinder racks and batteries, individual cylinders)  
2740 individual cylinders (pressure reducers and anti-flashback and backflow devices)  
2750 special equipment and general accessories (automatic switching and pressure control systems, gas analyzers, pipe identification stickers, clamps etc.)

VII Filler materials

1 Filler materials for welding and thermal cutting

1.1 Fillers and materials for welding and coating specific materials (classified by material groups)

2810 welding fillers for alloy cast steels  
2800 welding fillers for high alloy steels  
2830 welding fillers for non-ferrous metals and alloys  
2870 welding fillers for other materials  
2820 welding fillers for plastics  
2850 welding fillers for unalloyed and low alloy cast steels  
2840 welding fillers for unalloyed and low alloy steels  
2860 welding fillers for wear and corrosion resisting deposits

# List of Products

## 1.2 Fillers and materials for welding, cutting and coating (classified by types)

2990	covered electrodes (manual metal arc welding)
3000	filler materials for laser welding
2910	flux cored wires and strips
2940	gas welding rods
2960	gouging and thermal cutting electrodes
2980	thermit welding materials
2950	TIG (GTA) welding rods
2920	tubular stick electrodes
2970	underwater welding and cutting electrodes
2930	welding fluxes
2900	wire electrodes for gas metal-arc welding
2890	wires and strips for micro welding
2880	wires, strips and plates for submerged arc and electroslag welding

## 2 Filler material for thermal spraying

### 2.1 Filler materials for thermal spraying (classified by composition)

3010	carbide powders
3020	ceramic powders (metal oxides/nitrides)
3030	metal powders and wires
3040	powder mixtures
3050	thermoplastics

### 2.2 Filler materials for thermal spraying classified by process and type of spray material)

3070	filler materials for arc spraying (wires)
3060	filler materials for flame spraying (wires, rods powders)
3090	filler materials for molten metal spraying
3080	filler materials for plasma spraying (powders)

## 3 Filler materials for brazing and soldering

### 3.1 Solders (classified by composition)

3100	lead-in solders
3130	other solders
3110	solders for aluminium
3120	tin-lead solders with or without Cu, Ag, P additions

### 3.2 Brazing fillers (classified by composition)

3140	aluminium brazing fillers
3150	gold containing brazing fillers
3160	copper/brass brazing fillers
3170	nickel base brazing fillers
3230	other brazing fillers
3180	palladium containing brazing fillers
3190	phosphorus containing brazing fillers
3200	platinum containing brazing fillers
3210	silver brazing fillers
3220	special brazing fillers (cobalt, titanium, zirconium base)

### 3.3 Forms of solders and brazing fillers

3280	brazing and soldering pastes
3300	brazing and soldering powders
3260	brazing and soldering wires, rods and strips
3290	filler precoated plates
3250	flux coated rods
3240	flux cored rods
3270	preforms and foils
3310	stranded rods

## 4 Adhesives

3340	adhesives ceramic/ceramic
3350	adhesives ceramic/metal

3370	adhesives for metals
3360	adhesives for plastics
3320	all-purpose adhesives
3330	high-temperature adhesives

## VIII Consumables other than filler materials

### 1 Gases

3460	carbon dioxide
3420	compressed air
3410	doping and test gas
3400	fuel gases (acetylen, butane, natural gas, methane)
3462	gas for laser welding and cutting processes
3470	gas mixtures
3500	hydrogen
3440	hydrogen-nitrogen mixture
3450	inert gases (argon, neon, helium)
3461	lasing gas
3430	liquid gas
3490	nitrogen
3480	oxygen

### 2 Other consumables

3760	abrasives
3660	anti-rust compounds
3550	anti-spatter compounds
3750	anti-spatter sprays
3510	asbestos substitutes
3580	auxiliary materials for thermit welding
3570	brazing and soldering fluxes
3530	calcium carbide
3610	ceramic powders
3600	ceramic preforms
3720	chalk
3640	cleaning agents
3761	cutting and snagging wheels
3710	cutting powders for concrete, cast iron and other materials
3690	explosives
3590	heat protection equipment for welding work
3541	impregnating compounds
3540	leak-test-materials
3700	lubricants
3680	marking paints
3520	pickling products: e.g. pickling pastes
3670	oxygen and powder lances
3560	paints and varnishes
3650	raw materials for electrode coatings
3630	solder masks and resists
3620	solvents
3740	weld cleaning
3730	weld primers

### 3 Primers and bonding agents for adhesive technology

3770	bonding agents
3780	primers

## IX Measurement and testing technology (equipment and/or services)

### 1 Decives for measurement and sensor technology

3880	calculation systems
3870	calibration
3890	capacitance and inductance measurement
3800	chemical analysis
4060	coat-thickness, wall-thickness and crack-depth measurement
4070	current and voltage measurement
3810	elongation, path and angle measurement

3830	ferrite-content measuring devices
3900	force measuring systems
3910	gauges and weld gauges
3860	holography
4120	hydrogen determination
3940	manual and miscellaneous measuring devices for arc welding (current, voltage, wire-feed rate, gas-feed rate, welding speed and energy per unit length)
3930	mass, density, force, torque and pressure measurement
3990	measuring and monitoring devices for the electrode-penetration depth in resistance welding
3960	measuring devices for gases, fumes and dusts
3970	measuring devicices for sound/noise
3980	measuring devices for radiation
3950	measuring devices for resistance welding (pulses, periods, current and voltage) and Rogovski belts
4000	metallography
4010	microscopy
4150	miscellaneous measurement technology and measuring devices
4100	monitoring devices for arc welding
4110	monitoring devices for resistance welding
4050	photoelasticity
3840	photography and cinematography
3920	power measurement
4130	resistance and insulation measurement
4040	sensor technology
4030	specimen-preparation installations
4051	spectrometers
3850	speed and rotational-speed measurement
4020	surface quality (cut-surface quality)
4080	temperature measurement (optical, electrical, chemical and mechanical)
4090	thermography
3820	throughput and flow-rate measurement
4140	time, event-number and frequency measurement

## 2 Decives and processes testing technology

### 2.1 Non-destructive testing

4160	betatron and linear accelerators
4170	leak testing
4180	radiographic testing
4190	dye-penetration testing
4200	resources, automation and computer assistance for non-destructive testing
4201	ultraviolet lamps
4210	laser-beam testing
4220	magnetic testing
4230	neutron-beam testing
4240	acoustic-emission analysis
4250	ultrasonic testing
4260	eddy-current testing
4270	other non-destructive testing processes

### 2.1 Destructive testing

4280	dynamic fracture testing (Battelle, drop-weight, double-torsion, explosion-bulge, Esso notched-bar bend impact, notched-bar tensileimpact, Niblink and Robertson tests)
4290	hardness testing
4300	resources, automation and computer assistance for destructive testing
4310	K <sub>IC</sub> -test and crack-opening displacement (COD) test
4320	corrosion testing
4330	weldability testing (cold-cracking and hot-cracking testing and others)
4340	static fracture testing (longitudinal-weld bend, bursting, deep-notch, bend, notched-bar bend, notched-bar tensile and wide-plate tests)

List of Products

4350	universal testing facilities
4360	creep rupture and fatigue-endurance strength testing and vibration-fatigue testing installations
4370	tensile, pressure, torsion and bend testing
4380	miscellaneous and mechanical-technological tests

X Quality assurance, construction, consultancy (services)

4500	certification of welding personnel, quality management systems and products
4430	consultancy and planning of fabrication and application of materials, energy and processes
4450	design and analysis of weldet structures
4410	determination and testing of products, joining processes and fabrication operations
4420	determination of weldability, spraybility, solderbility, brazeability and/or cuttability
4440	factory qualification
4470	failure investigation and analysis
4490	maintenance, servicing, repair of equipment
4460	quality management systems
4480	supervision of welding and fabrication operations, on site and in-plant

XI Sub-contracting (services)

1 Sub-contracting—processing of specific materials

4600	aluminium
4830	brass
4790	carbon
4870	cardboard, paper
4750	cast iron
4940	cast steel
4780	ceramics
4660	cermets
4670	chromium
4620	coated and plated materials
4890	compression moulding compounds (polymers)
4630	concrete
4640	concrete reinforcing bars
4800	copper
4680	duplex-steels
4700	elastomers
4710	fiber reinforced materials
4720	fine grained structural steels
4610	free machining steels
4740	glass
4760	high alloy steels
4770	high temperature materials
4810	laminates
4650	lead, bismuth, cobalt, cadmium
4820	leather
4850	low alloy steels
4821	magnesium
5040	new materials (high strength, light weight constructions and superhard materials, nanomaterials, light and electricity conducting materials, magnetic materials, implant materials, etc.)
4840	nickel
4860	niobium, manganese
4900	pipe steels
4880	platinum, gold, silver
4910	rail steels
4730	refractory materials
4920	shipbuilding steels
4930	sintered materials
4950	superalloys (hot isostatic pressure)
4690	termosets
4960	thermoplastics

5020	tin, zinc
4970	titanium
4990	tool steels
5010	tungsten, tantalum, molybdenum
4980	unalloyed steels
5000	weathering steels
5030	zirconium, vanadium, beryllium

2 Sub-contracting—processing of specific semi-finished products

5202	brass pipes
5160	castings
5230	circular blanks
5201	copper pipes
5280	extruded products
5150	foils, thin strip
5260	forgings
5250	hoses (metal)
5220	pipes and flanges
5170	plastic films, strips, sheets
5180	plastic pipes, flanges and other plastic semi-finished products
5200	plastic products
5190	plastic tubes and sleeving
5240	rails
5110	reinforcing bars and mesh
5210	sections (girders)
5120	sheet, plate, checker plate, perforated plate
5270	sintered parts
5140	springs
5100	strip and wide strip
5130	wires

3 Sub-contracting—application of joining and other manufacturing processes

5420	adhesive bonding of metals
5410	adhesive bonding of plastics
5470	brazing and soldering
5370	electron, laser- and ion beam welding
5380	electroslag welding
5580	firecracker, electrogas and/or submerged arc welding
5340	flame cleaning
5350	flame cutting blanks
5300	flash welding
5531	friction stir welding
5520	friction welding
5390	gas pressure welding
5540	gas shielded arc welding
5400	gas welding
5610	heat treating and/or quenching and tempering
5450	laser welding and/or cutting
5550	magnetically impelled arc butt (MIAB) welding
5620	maintenance, servicing, repair
5460	manual metal arc welding
5480	metallizing, dip coating and anodizing
5490	metal spraying
5500	oxidized ceramic spraying
5320	pickling, sand blasting, polishing, deburring and/or grinding
5440	plastic spraying
5510	resistance spot and/or projection
5521	robot welding TIG/MIG/MAG
5590	scrapping
5530	seam welding
5360	spark erosion
5330	stud welding
5310	surfacing
5560	thermal cutting
5570	ultrasonic welding
5600	vibratory stress relieving
5430	welding of plastics

4 Recycling

5625	waste containing precious metal
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XII Organizations, education and training, research, information transfer, technical literature and regulations

5640	acceptance, approval, examinaton and supervisory organizations
5630	accreditation and certification organizations
5710	codes of practice, standardization, patents (incl. organizations)
5690	consultants, experts
5650	education, continuing education and examination of specialist personnel
5700	information services (literature and factual database searches, expert systems, certification, literature appraisal, state of the art and trend analyses)
5680	joining researchand education
5660	supervisory bodies, chambers of trade, employers associations
5720	technical and scientific associations, industrial associations
5670	technical publishers, libraries (literature, codes of practice, educational films, soft ware, CD-ROM and diskette services, audiovisual media)

XIII Services

5730	leasing of welding plant and welding equipment
5625	waste containing precious metal