

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

LIGHTING; HEATING

F27 FURNACES; KILNS; OVENS; RETORTS (NOTES omitted)

F27B FURNACES, KILNS, OVENS, OR RETORTS IN GENERAL; OPEN SINTERING OR LIKE APPARATUS

NOTE

Attention is drawn to the references and notes following the title of class [F27](#) and the note (par. III) following the Contents of Section [H](#).

WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

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| F27B 1/09 | covered by | F27B 1/08 |
| F27B 5/05 | covered by | F27B 5/04 |
| F27B 14/16 , F27B 14/18 | covered by | F27B 14/0806 |
| F27B 21/08 - F27B 21/14 | covered by | F27D 3/00 , F27D 21/00 |
- In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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| 1/00 | Shaft or like vertical or substantially vertical furnaces (for preheating, burning, calcining or cooling lime, magnesia or dolomite C04B 2/12) | 3/005 | . . {Port construction} |
| | | 3/007 | . . . {Removable burner head} |
| 1/005 | . {wherein no smelting of the charge occurs, e.g. calcining or sintering furnaces} | 3/02 | . of single-chamber fixed-hearth type |
| 1/02 | . with two or more shafts or chambers, e.g. multi-storey | 3/04 | . of multiple-hearth type; of multiple-chamber type; Combinations of hearth-type furnaces |
| 1/025 | . . {with fore-hearth} | 3/045 | . . {Multiple chambers, e.g. one of which is used for charging} |
| 1/04 | . . Combinations or arrangements of shafts | 3/06 | . with movable working chambers or hearths, e.g. tiltable {, oscillating or describing a composed movement} |
| 1/06 | . of other than up-draught type | 3/065 | . . {tiltable} |
| 1/08 | . heated otherwise than by solid fuel mixed with charge | 3/08 | . heated electrically, with or without any other source of heat |
| 1/10 | . Details, accessories, or equipment peculiar to furnaces of these types | 3/085 | . . {Arc furnaces} |
| 1/12 | . . Shells or casings; Supports therefor | 3/10 | . Details, accessories, or equipment peculiar to hearth-type furnaces |
| 1/14 | . . . Arrangements of linings (linings in general F27D 1/00) | 3/105 | . . {Slag chamber} |
| 1/16 | . . Arrangements of tuyeres | 3/12 | . . Working chambers or casings; Supports therefor |
| 1/18 | . . Arrangements of dust collectors | 2003/125 | . . . {Hearths} |
| 1/20 | . . Arrangements of devices for charging | 3/14 | . . . Arrangements of linings |
| 1/21 | . . Arrangements of devices for discharging | 3/16 | . . . Walls; Roofs |
| 1/22 | . . Arrangements of heat-exchange apparatus (heat-exchangers in general F28C , F28D) | 2003/165 | {Roofs} |
| 1/24 | . . Cooling arrangements | 3/18 | . . Arrangements of devices for charging |
| 1/26 | . . Arrangements of controlling devices | 3/183 | . . . {Charging of arc furnaces vertically through the roof, e.g. in three points} |
| 1/28 | . . Arrangements of monitoring devices, of indicators, of alarm devices | 3/186 | {Charging in a vertical chamber adjacent to the melting chamber} |
| 3/00 | Hearth-type furnaces, e.g. of reverberatory type (F27B 9/00, F27B 11/00, F27B 13/00, F27B 14/00, F27B 15/00, F27B 21/00 take precedence); Tank furnaces | 3/19 | . . Arrangements of devices for discharging |
| | | 3/20 | . . Arrangements of heating devices |
| 3/002 | . {Siemens-Martin type furnaces} | 3/205 | . . . {Burners} |
| | | 3/22 | . . Arrangements of air or gas supply devices |
| | | 3/225 | . . . {Oxygen blowing} |
| | | 3/24 | . . Cooling arrangements |

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| 3/26 | . . Arrangements of heat-exchange apparatus | 7/08 | . externally heated |
| 3/263 | . . . {Regenerators} | 7/10 | . internally heated, e.g. by means of passages in the wall |
| 3/266 | {Exhaust gases reversing flow devices} | 7/12 | . tiltable |
| 3/28 | . . Arrangement of controlling, monitoring, alarm or the like devices | 7/14 | . with means for agitating or moving the charge |
| 5/00 | Muffle furnaces; Retort furnaces; Other furnaces in which the charge is held completely isolated (F27B 9/00 takes precedence) | 7/16 | . . the means being fixed relatively to the drum, {e.g. composite means} (F27B 7/04 takes precedence) |
| 5/02 | . of multiple-chamber type | 7/161 | . . . {the means comprising projections jutting out from the wall} |
| 5/04 | . adapted for treating the charge in vacuum or special atmosphere | 7/162 | {the projections consisting of separate lifting elements, e.g. lifting shovels} |
| 5/06 | . Details, accessories, or equipment peculiar to furnaces of these types | 2007/163 | {using only a ring of lifting elements to lift the charge} |
| 2005/062 | . . {Cooling elements} | 2007/165 | {forming a helical lifting projection} |
| 2005/064 | . . . {disposed in the furnace, around the chamber, e.g. coils} | 7/166 | . . . {the means comprising chains} |
| 2005/066 | . . . {disposed around the fan} | 7/167 | . . . {the means comprising partitions} |
| 2005/068 | . . . {for external cooling} | 2007/168 | {Annular partition} |
| 5/08 | . . Arrangements of linings | 7/18 | . . the means being movable within the drum |
| 5/10 | . . Muffles | 7/20 | . Details, accessories, or equipment peculiar to rotary-drum furnaces |
| 5/12 | . . Arrangement of devices for charging | 2007/2008 | . . {Devices for reintroducing dust in the drum} |
| 5/13 | . . Arrangement of devices for discharging | 7/2016 | . . {Arrangements of preheating devices for the charge} |
| 5/14 | . . Arrangements of heating devices | 7/2025 | . . . {consisting of a single string of cyclones} |
| 2005/143 | . . . {Heating rods disposed in the chamber} | 7/2033 | {with means for precalcining the raw material} |
| 2005/146 | {the heating rods being in the tubes which conduct the heating gases} | 7/2041 | . . . {consisting of at least two strings of cyclones with two different admissions of raw material} |
| 5/16 | . . Arrangements of air or gas supply devices | 7/205 | {with precalcining means on the string supplied with exhaust gases from the cooler} |
| 2005/161 | . . . {Gas inflow or outflow} | 7/2058 | {with precalcining means on each string} |
| 2005/162 | {through closable or non-closable openings of the chamber walls} | 7/2066 | . . . {comprising a band transporter} |
| 2005/163 | {Controlled openings, e.g. orientable} | 7/2075 | . . {Removing incrustations} |
| 2005/164 | {Air supply through a set of tubes with openings} | 7/2083 | . . {Arrangements for the melting of metals or the treatment of molten metals} |
| 2005/165 | {Controlled tubes, e.g. orientable or with closable openings} | 2007/2091 | . . {Means for eliminating compounds from gases by condensation, e.g. alkali metals} |
| 2005/166 | . . . {Means to circulate the atmosphere} | 7/22 | . . Rotary drums; Supports therefor |
| 2005/167 | {the atmosphere being recirculated through the treatment chamber by a turbine} | 7/2206 | . . . {Bearing rings} |
| 2005/168 | {by more than one turbine} | 2007/2213 | {mounted floatingly on the drum} |
| 2005/169 | {the atmosphere being continuously renewed by exterior means} | 2007/222 | {the mounting comprising radially resilient elements, e.g. springs} |
| 5/18 | . . Arrangement of controlling, monitoring, alarm or like devices | 2007/2226 | {the mounting comprising elements to maintain the ring between series of abutments} |
| 7/00 | Rotary-drum furnaces, i.e. horizontal or slightly inclined | 2007/2233 | {the ring being fixed to the drum, e.g. welded} |
| 2007/005 | . {for the treatment of slurries or wet materials} | 7/224 | . . . {Discharge ends} |
| 7/02 | . of multiple-chamber or multiple-drum type | 2007/2246 | . . . {Support rollers} |
| 2007/022 | . . {the drum having a non-uniform section along its length} | 2007/2253 | {mounted movable, e.g. resiliently on the ground} |
| 2007/025 | . . {with different chambers, e.g. treatment zones} | 2007/226 | {constituted of series of two rollers mounted on tiltable support along the drum} |
| 2007/027 | . . {with more than one drum} | 2007/2266 | {the mounting allowing a movement of the rollers support in a horizontal plane} |
| 7/04 | . . with longitudinal divisions | 2007/2273 | {with arrangements, e.g. rollers, to maintain the drum against longitudinal movement} |
| 2007/041 | . . . {Longitudinal tubes} | 2007/228 | {comprising rollable bodies} |
| 2007/043 | . . . {the partition being a cylinder, coaxial to the rotary drum, defining two chambers} | 2007/2286 | {supporting the drum directly, without the use of a bearing ring} |
| 2007/045 | {the charge going in one direction in one chamber, then after a turn coming back in the other direction in the other chamber} | 2007/2293 | {the furnace being suspended} |
| 2007/046 | . . . {Radial partitions} | 7/24 | . . . Seals between rotary and stationary parts |
| 2007/048 | {defining an helical chamber} | | |
| 7/06 | . adapted for treating the charge in vacuum or special atmosphere | | |

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| 7/26 | . . Drives | 2009/026 | . . {Two or more conveyors, e.g. mounted successively} |
| 2007/261 | . . . {working with a ring embracing the drum} | 2009/027 | . . . {working in parallel} |
| 2007/262 | {A gear ring combined with a dented wheel drive} | 9/028 | . . {Multi-chamber type furnaces, (F27B 9/029 takes precedence)} |
| 2007/263 | {A gear ring combined with a ram drive} | 9/029 | . . {Multicellular type furnaces constructed with add-on modules} |
| 2007/265 | {the ring being mounted floatingly} | 9/04 | . adapted for treating the charge in vacuum or special atmosphere |
| 2007/266 | {the ring being a bearing ring} | 9/042 | . . {Vacuum furnaces} |
| 2007/267 | {A gear ring combined with a chain drive} | 9/045 | . . {Furnaces with controlled atmosphere} |
| 2007/268 | {Details of the motor or the pinions} | 9/047 | . . . {the atmosphere consisting of protective gases} |
| 7/28 | . . Arrangements of linings | 9/06 | . heated without contact between combustion gases and charge; electrically heated |
| 7/30 | . . Arrangements of partitions | 9/061 | . . {with at least two longitudinal chambers carrying combustion gases, i.e. of the Dressler type} |
| 7/32 | . . Arrangement of devices for charging | 9/062 | . . {electrically heated} |
| 7/3205 | . . . {Charging} | 9/063 | . . . {Resistor heating, e.g. with resistors also emitting IR rays} |
| 2007/3211 | {at the open end of the drum} | 9/065 | {the resistance being transported by the conveyor} |
| 2007/3217 | {axially, optionally at some distance in the kiln} | 9/066 | . . . {heated by lamps} |
| 2007/3223 | {the charging device being movable axially, e.g. reciprocable} | 9/067 | . . . {heated by induction} |
| 2007/3229 | {via a centrifugal device} | 9/068 | . . {heated by radiant tubes, the tube being heated by a hot medium, e.g. hot gases} |
| 2007/3235 | {the introducing device comprising a spray or a lance} | 9/08 | . . heated through chamber walls |
| 2007/3241 | {in the flame of the burner} | 9/082 | . . . {Muffle furnaces} |
| 2007/3247 | {through a lateral opening in the drum} | 9/084 | {the muffle being fixed and in a single piece} |
| 2007/3252 | {with lifting scoops attached to the drum} | 9/086 | {with two or more fixed muffles} |
| 2007/3258 | {at the open end of the drum} | 9/088 | {Series of separate muffles conveyed through the furnace} |
| 2007/3264 | {using special discharge means located around the discharge end, e.g. lifting scoops or a transversal annular partition} | 9/10 | . . heated by hot air or gas |
| 2007/327 | {centrifugally through lateral openings in the drum} | 9/12 | . with special arrangements for preheating or cooling the charge |
| 2007/3276 | {with a collector means extending longitudinally into the drum} | 2009/122 | . . {Preheating} |
| 2007/3282 | {Details} | 2009/124 | . . {Cooling} |
| 2007/3288 | {Sieves or grading means} | 2009/126 | . . . {involving the circulation of cooling gases, e.g. air} |
| 2007/3294 | {Means to fluidise the charge in the air} | 2009/128 | {the gases being further utilised as oxidants in the burners} |
| 7/33 | . . Arrangement of devices for discharging | 9/14 | . characterised by the path of the charge during treatment; characterised by the means by which the charge is moved during treatment (F27B 9/28 takes precedence; travelling or movable supports or containers for the charge F27D 3/12) |
| 7/34 | . . Arrangements of heating devices | 9/142 | . . {the charge moving along a vertical axis} |
| 7/36 | . . Arrangements of air or gas supply devices | 9/145 | . . {the charge moving along a serpentine path} |
| 7/362 | . . . {Introducing gas into the drum axially or through the wall} | 9/147 | . . {the charge moving on an inclined floor} |
| 2007/365 | {longitudinally} | 9/16 | . . the charge moving in a circular or arcuate path |
| 2007/367 | {transversally through the wall of the drum} | 9/18 | . . . under the action of scrapers or pushers |
| 7/38 | . . Arrangements of cooling devices | 9/185 | {multiple hearth type furnaces} |
| 7/383 | . . . {Cooling devices for the charge} | 9/20 | . . the charge moving in a substantially straight path {tunnel furnace} |
| 7/386 | {Rotary-drum cooler} | 9/201 | . . . {walking beam furnace} |
| 7/40 | . . . Planetary coolers | 9/202 | {Conveyor mechanisms therefor} |
| 7/42 | . . Arrangement of controlling, monitoring, alarm or like devices | 9/203 | {having ramps (F27B 9/206 takes precedence)} |
| 9/00 | Furnaces through which the charge is moved mechanically, e.g. of tunnel type (F27B 7/14 takes precedence); Similar furnaces in which the charge moves by gravity | 9/205 | {having excentrics or lever arms (F27B 9/206 takes precedence)} |
| 9/02 | . of multiple-track type; of multiple-chamber type; Combinations of furnaces | 9/206 | {consisting of a single central beam} |
| 9/021 | . . {having two or more parallel tracks} | 9/207 | {consisting of two or more conveyors} |
| 9/022 | . . . {With two tracks moving in opposite directions} | | |
| 9/023 | {with a U turn at one end} | | |
| 9/024 | {with superimposed tracks} | | |
| 9/025 | . . . {having two or more superimposed tracks (F27B 9/024 takes precedence)} | | |

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| 9/208 | {the workpieces being rotated during their advance} | 2009/3066 | . . {Cooling the under-structure of the kiln, e.g. under the cars} |
| 9/22 | . . . {on rails, e.g.} under the action of scrapers or pushers (F27B 9/26 takes precedence) | 2009/3072 | . . {Balancing the pressure between the upper part and the lower part of the kiln, above and under the track} |
| 9/222 | {the path comprising a section specially adapted for effecting equalisation of the temperature of the charge} | 9/3077 | . . {Arrangements for treating electronic components, e.g. semiconductors} |
| 9/225 | {the charge being subjected to an additional manipulation along the path} | 2009/3083 | . . {Arrangements to handle skid marks} |
| 9/227 | {with rotation of the charge (F27B 9/147 takes precedence)} | 2009/3088 | . . {Drying arrangements} |
| 9/24 | . . . being carried by a conveyor {(transport by conveyors in general B65G)} | 2009/3094 | . . {Means to store a part of the charge in the furnace} |
| 9/2407 | {the conveyor being constituted by rollers (roller hearth furnace)} | 9/32 | . . Casings |
| 9/2415 | {the charge rotating about an axis transversal to the axis of advancement of the charge} | 9/34 | . . . Arrangements of linings |
| 9/2423 | {the charge rotating about an axis parallel to the axis of advancement of the charge} | 9/36 | . . Arrangements of heating devices |
| 9/243 | {Endless-strand conveyor} | 2009/3607 | . . . {Heaters located above the track of the charge} |
| 2009/2438 | {with means to transfer the heat from the outcoming band to the incoming band} | 2009/3615 | {Burner in the ceiling directed vertically downwards} |
| 2009/2446 | {with means to control the tension of the band} | 2009/3623 | . . . {Heaters located under the track} |
| 9/2453 | {Vibrating conveyor (shaker hearth furnace)} | 2009/363 | {Burners in the hearth directed towards the ceiling} |
| 9/2461 | {the charge being suspended from the conveyor} | 2009/3638 | . . . {Heaters located above and under the track} |
| 9/2469 | {the conveyor being constituted by rollable bodies} | 2009/3646 | . . . {Heating the ceiling or the walls for a reverberatory effect} |
| 9/2476 | {the conveyor being constituted by air cushion} | 2009/3653 | . . . {Preheated fuel} |
| 2009/2484 | {the conveyor being a helical device} | 2009/3661 | {preheated with the exhaust gases} |
| 2009/2492 | {the conveyor being constituted by series of little rams or ratchets, moving the charge along} | 2009/3669 | {preheated with the gases of the cooling zone} |
| 9/26 | . . . on or in trucks, sleds, or containers | 2009/3676 | {preheated with the gases of the preheating zone} |
| 9/262 | {on or in trucks} | 2009/3684 | . . . {Combustion within a combustion chamber with outlets in the kiln chamber} |
| 2009/264 | {the truck carrying a partition} | 2009/3692 | . . . {The charge containing combustible materials} |
| 2009/266 | {the truck having conducts for guiding the oven atmosphere} | 9/38 | . . Arrangements of devices for charging |
| 2009/268 | {through the structure of the car and through the charge} | 2009/382 | . . . {Charging} |
| 9/28 | . for treating continuous lengths of work | 2009/384 | . . . {Discharging} |
| 9/30 | . Details, accessories, or equipment peculiar to furnaces of these types | 2009/386 | . . . {Lateral intake or outtake} |
| 9/3005 | . . {arrangements for circulating gases} | 2009/388 | {Centrally in the lateral wall} |
| 9/3011 | . . . {arrangements for circulating gases transversally} | 9/39 | . . Arrangements of devices for discharging |
| 2009/3016 | {with arrangements to circulate gases through the charge} | 9/40 | . . Arrangements of controlling or monitoring devices |
| 2009/3022 | {with arrangements to maintain oxidising reducing or neutral zones} | 11/00 | Bell-type furnaces (for treating metal strips or wire C21D 9/663) |
| 2009/3027 | . . . {Use of registers, partitions} | 13/00 | Furnaces with both stationary charge and progression of heating, e.g. of ring type, of type in which segmental kiln moves over stationary charge |
| 2009/3033 | . . . {Fumes circulating in the same direction as the charge} | 13/02 | . of multiple-chamber type with permanent partitions; Combinations of furnaces |
| 2009/3038 | . . . {Fumes or gases alternatively changing their longitudinal direction} | 13/04 | . of single-chamber type with temporary partitions |
| 9/3044 | . . {Furnace regenerators} | 13/06 | . Details, accessories, or equipment peculiar to furnaces of this type |
| 2009/305 | . . {Particular conformation of the furnace} | 13/08 | . . Casings |
| 2009/3055 | . . . {Non-uniform section through the length of the furnace} | 13/10 | . . . Arrangements of linings |
| 2009/3061 | . . . {Furnaces with longitudinal grooves} | 13/12 | . . Arrangements of heating devices |
| | | 13/14 | . . Arrangement of controlling, monitoring, alarm or like devices |
| | | 14/00 | Crucible or pot furnaces |
| | | 2014/002 | . {Smelting process, e.g. sequences to melt a specific material} |
| | | 2014/004 | . . {Process involving a smelting step, e.g. vaporisation} |
| | | 2014/006 | . . {involving a salt bath or help metal bath} |

- 2014/008 . {Continuous casting}
- 14/02 . with tilting or rocking arrangements ([F27B 14/04 takes precedence](#))
- 14/04 . adapted for treating the charge in vacuum or special atmosphere
- 2014/045 . . {Vacuum}
- 14/06 . heated electrically, e.g. induction crucible furnaces with or without any other source of heat ([F27B 14/04 takes precedence](#))
- 14/061 . . {Induction furnaces}
- 14/063 . . . {Skull melting type}
- 14/065 . . . {Channel type}
- 2014/066 . . . {Construction of the induction furnace}
- 2014/068 . . {with the use of an electrode producing a current in the melt}
- 14/08 . Details peculiar to crucible or pot furnaces
- 14/0806 . . {Charging or discharging devices}
- 2014/0812 . . . {Continuously charging}
- 2014/0818 . . . {Discharging}
- 2014/0825 . . {Crucible or pot support}
- 2014/0831 . . . {Support or means for the transport of crucibles}
- 2014/0837 . . {Cooling arrangements}
- 2014/0843 . . {Lining or casing}
- 2014/085 . . {Preheating of the charge}
- 2014/0856 . . . {Preheating of the crucible}
- 2014/0862 . . {Flux guides}
- 2014/0868 . . {Magnetic shields}
- 2014/0875 . . {Two zones or chambers, e.g. one used for charging}
- 2014/0881 . . {Two or more crucibles}
- 2014/0887 . . {Movement of the melt}
- 2014/0893 . . {Heat-conductive material disposed on the surface of the melt}
- 14/10 . . Crucibles
- 2014/102 . . . {Form of the crucibles}
- 2014/104 . . . {Crucible linings}
- 2014/106 . . . {Ladles}
- 2014/108 . . . {Cold crucibles (transparent to electromagnetic radiations)}
- 14/12 . . . Covers therefor
- 14/14 . . Arrangements of heating devices
- 14/143 . . . {Heating of the crucible by convection of combustion gases}
- 2014/146 . . . {Recuperation of lost heat, e.g. regenerators}
- 14/20 . . Arrangement of controlling, monitoring, alarm or like devices
- 15/00 Fluidised-bed furnaces; Other furnaces using or treating finely-divided materials in dispersion**
{(apparatus in general for carrying out chemical or physical processes in a fluidised bed reactor [B01J 8/24 - B01J 8/44](#))}
- 15/003 . {Cyclones or chain of cyclones}
- 15/006 . {Equipment for treating dispersed material falling under gravity with ascending gases}
- 15/02 . Details, accessories, or equipment peculiar to furnaces of these types
- 15/04 . . Casings; Supports therefor
- 15/06 . . . Arrangements of linings
- 15/08 . . Arrangements of devices for charging
- 15/09 . . Arrangements of devices for discharging
- 15/10 . . Arrangements of air or gas supply devices
- 15/12 . . Arrangements of dust collectors
- 15/14 . . Arrangements of heating devices
- 15/16 . . Arrangements of cooling devices
- 15/18 . . Arrangements of controlling devices
- 15/20 . . Arrangements of monitoring devices, of indicators, of alarm devices
- 17/00 Furnaces of a kind not covered by any preceding group (structural combinations of furnaces [F27B 19/02](#))**
- 17/0008 . {Open field furnace for burning bricks}
- 17/0016 . {Chamber type furnaces}
- 17/0025 . . {Especially adapted for treating semiconductor wafers}
- 17/0033 . . {the floor of the furnaces consisting of the support carrying the charge, e.g. car type furnaces}
- 17/0041 . . {specially adapted for burning bricks or pottery ([F27B 17/0033 takes precedence](#))}
- 17/005 . . . {with cylindrical chambers}
- 17/0058 {with superposed cylindrical chambers}
- 17/0066 . . . {arrangement of the charge, e.g. bricks}
- 17/0075 . . . {Heating devices therefor}
- 17/0083 . . {with means for circulating the atmosphere}
- 2017/0091 . . {Series of chambers, e.g. associated in their use}
- 17/02 . specially designed for laboratory use
- 17/025 . . {for dental workpieces}
- 19/00 Combinations of furnaces of kinds not covered by a single preceding main group**
- 19/02 . combined in one structure
- 19/04 . arranged for associated working
- 21/00 Open or uncovered sintering apparatus; Other heat-treatment apparatus of like construction**
- 21/02 . Sintering grates or tables
- 21/04 . Sintering pots or sintering pans
- 21/06 . Endless-strand sintering machines