

CPC COOPERATIVE PATENT CLASSIFICATION

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

LIGHTING; HEATING

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

F27D DETAILS OR ACCESSORIES OF FURNACES, KILNS, OVENS OR RETORTS, IN SO FAR AS THEY ARE OF KINDS OCCURRING IN MORE THAN ONE KIND OF FURNACE

NOTE

Attention is drawn to the Notes following the title of class [F27](#).

1/00	Casings; Linings; Walls; Roofs		
1/0003	. {Linings or walls}	2001/0079	. {Means to assemble at least two parts of a furnace or of any device or accessory associated to its use}
	NOTE	2001/0083	. . {Means to assemble a moving part to a fixed one}
	not used, see subgroups	2001/0086	. . . {the moving part being in rotation}
1/0006	. . {Linings or walls formed from bricks or layers with a particular composition or specific characteristics}	2001/0089	. . . {the moving part being in translation}
1/0009	. . . {Comprising ceramic fibre elements}	2001/0093	. . . {the moving part being hinged to the fixed one}
1/0013	. . . . {the fibre elements being in the form of a folded blanket or a juxtaposition of folded blankets}	2001/0096	. . . {the moving part staying in the same plane}
1/0016	. . . . . {Interleaved multiple folded blankets}	1/02	. Crowns; Roofs
1/002	. . . . {the fibre elements being composed of adjacent separate strips}	1/021	. . {Suspended roofs}
1/0023	. . {Linings or walls comprising expansion joints or means to restrain expansion due to thermic flows}	1/022	. . . {Parts thereof, e.g. noses, arches}
1/0026	. . . {the expansion joint being a resilient element, e.g. a metallic plate between two bricks}	1/024	. . . {having an anchored layer of lining}
1/003	. . {Linings or walls comprising porous bricks}	1/025	. . {Roofs supported around their periphery, e.g. arched roofs}
1/0033	. . {Linings or walls comprising heat shields, e.g. heat shields}	1/027	. . . {Skew backs}
1/0036	. . {Linings or walls comprising means for supporting electric resistances in the furnace}	1/028	. . . {Means to prevent deformation of the arch}
1/004	. . {Linings or walls comprising means for securing bricks}	1/04	. characterised by the form {, e.g. shape} of the bricks or blocks used
1/0043	. {Floors, hearths}	1/042	. . {Bricks shaped for use in regenerators}
2001/0046	. {Means to facilitate repair or replacement or prevent quick wearing}	1/045	. . {Bricks for lining cylindrical bodies, e.g. skids, tubes}
2001/005	. . {Removable part or structure with replaceable elements}	2001/047	. . . {Lining of cylindrical vessels}
2001/0053	. . {Furnace constructed in modules}	1/06	. . Composite bricks or blocks {, e.g. panels, modules}
2001/0056	. . {Aspects of construction intended to prevent wear}	1/063	. . . {Individual composite bricks or blocks}
2001/0059	. {Construction elements of a furnace}	1/066	. . . . {Individual composite bricks or blocks made from hollow bricks filled up with another material}
2001/0063	. . {Means to strengthen a part}	1/08	. . . Bricks or blocks with internal reinforcement or metal backing
2001/0066	. . {Movable or removable parts}	1/10	. Monolithic linings; Supports therefor
2001/0069	. . {Means to prevent heat conduction}	NOTE	
2001/0073	. . . {Surrounding protection around the furnace, e.g. covers, circulation of gas}		{supports are classified in F27D 1/14 }
2001/0076	. . {comprising a corrugated sheet}	1/12	. incorporating cooling arrangements
		1/14	. Supports for linings (supports for monolithic linings F27D 1/10)
		1/141	. . {Anchors therefor}
		1/142	. . . {Anchors made from ceramic material}
		1/144	. . {Supports for ceramic fibre materials}
		1/145	. . {Assembling elements}
		1/147	. . . {for bricks}

- 1/148 {Means to suspend bricks}
- 1/16 . Making or repairing linings {; Increasing the durability of linings; Breaking away linings}
- 2001/1605 . . {Repairing linings}
- 2001/161 . . . {Hot repair}
- 2001/1615 . . . {through a hole in the casing, e.g. injecting refractory from outside the vessel}
- 1/1621 . . {Making linings by using shaped elements, e.g. bricks}
- 1/1626 . . {Making linings by compacting a refractory mass in the space defined by a backing mould or pattern and the furnace wall}
- 2001/1631 . . . {using an expandable core}
- 1/1636 . . {Repairing linings by projecting or spraying refractory materials on the lining}
- 1/1642 . . . {using a gunning apparatus}
- 1/1647 {the projected materials being partly melted, e.g. by exothermic reactions of metals (Al, Si) with oxygen}
- 1/1652 {Flame guniting; Use of a fuel}
- 2001/1657 {Solid fuel}
- 2001/1663 {Fluid fuel, e.g. gas}
- 1/1668 {Plasma guniting}
- 1/1673 . . . {applied centrifugally}
- 1/1678 . . {Increasing the durability of linings; Means for protecting}
- 1/1684 . . . {by a special coating applied to the lining}
- 2001/1689 {obtained from materials added to the melt}
- 1/1694 . . {Breaking away the lining or removing parts thereof}
- 1/18 . Door frames; Doors, lids or removable covers
- 1/1808 . . {Removable covers}
- 1/1816 . . . {Removable covers specially adapted for arc furnaces}
- 2001/1825 . . . {Means for moving the cover}
- 2001/1833 {comprising a screw mechanism}
- 2001/1841 {comprising means for rotating or moving the cover in a horizontal or quasi horizontal plane}
- 2001/185 {comprising means for tilting the cover}
- 1/1858 . . {Doors}
- 1/1866 . . . {Door-frames}
- 2001/1875 . . . {Hanging doors and walls}
- 2001/1883 {Hanging curtains}
- 2001/1891 . . . {Doors for separating two chambers in the furnace}
- 3/00 Charging; Discharging; Manipulation of charge**
- 2003/0001 . {Positioning the charge}
- 2003/0002 . . {involving positioning devices, e.g. buffers, buffer zones}
- 2003/0003 . . {involving a system for aligning the articles through a lateral guidance, e.g. funnel}
- 2003/0004 . . {involving devices for measuring the article, the stack of articles or the height of the furnace passage or for adjusting the height of the passage to the charge or for putting the articles in the same position}
- 2003/0006 . . {Particulate materials}
- 2003/0007 . . . {Circular distribution}
- 2003/0008 . . . {Longitudinal distribution}
- 2003/0009 . . . {Separation of different types of fines, e.g. by a blower}
- 2003/001 {Series of dispensers or separation in two or more parts}
- 2003/0012 . . {Working with piles}
- 2003/0013 . . . {Unstacking or making stacks}
- 2003/0014 . . {involving the use of magazines}
- 2003/0015 . . . {the magazine being vertical}
- 2003/0016 . . . {the magazine being a rotary device}
- 2003/0018 . . {comprising means to introduce or extract the charge in series of separate containers or zones}
- 2003/0019 . . . {simultaneously}
- 2003/002 . . {Transforming a single row in a multiple row}
- 3/0021 . {of ceramic ware}
- 3/0022 . . {Disposition of the charge}
- 3/0024 . {of metallic workpieces}
- 3/0025 . {Charging or loading melting furnaces with material in the solid state}
- 3/0026 . . {Introducing additives into the melt}
- 3/0027 . . {Charging vertically with corbs}
- 3/0028 . . . {Corbs}
- 3/003 . . {Charging laterally, e.g. with a charging box}
- 3/0031 . . {Charging with tiltable dumpers}
- 3/0032 . . {using an air-lock}
- 3/0033 . {charging of particulate material}
- 2003/0034 . {Means for moving, conveying, transporting the charge in the furnace or in the charging facilities}
- 2003/0036 . . {comprising inflatable or extendable parts}
- 2003/0037 . . {comprising friction surfaces}
- 2003/0038 . . {comprising shakers}
- 2003/0039 . . {comprising magnetic means}
- 2003/004 . . . {Magnetic lifters}
- 2003/0042 . . {comprising roller trains}
- 2003/0043 . . . {at least one of them being driven separately}
- 2003/0044 . . . {at least one of them being removable}
- 2003/0045 . . . {Use of rollable bodies, e.g. balls}
- 2003/0046 . . {comprising one or more movable arms, e.g. forks}
- 2003/0048 . . . {Walking beams}
- 2003/0049 {comprising eccentrics or lever arms}
- 2003/005 {comprising ramps}
- 2003/0051 . . {comprising means to pick up the charge and put it down}
- 2003/0053 . . {comprising a device for charging with the doors closed}
- 2003/0054 . . {Means to move molten metal, e.g. electromagnetic pump}
- 2003/0055 . . . {with flow regulation}
- 2003/0056 . . . {through a syphon in a vacuum chamber, e.g. involving aspiration or pressure on the bath}
- 2003/0057 . . {Fast-outlet or inlet means}
- 2003/0059 . . {comprising tracks, e.g. rails and wagon}
- 2003/006 . . . {with a return track}
- 2003/0061 . . . {with means for changing track}
- 2003/0062 . . {using devices for tilting or rocking the charge}
- 2003/0063 . . {comprising endless belts}
- 2003/0065 . . {Lifts, e.g. containing the bucket elevators}
- 2003/0066 . . {comprising scrapers or systems to pull out}
- 2003/0067 . . {comprising conveyors where the translation is communicated by friction from at least one rotating element, e.g. two opposed rotations combined}
- 2003/0068 . . {comprising clamps or tongs}
- 2003/0069 . . {the device being suspended, e.g. from a crane}

- 2003/0071 . . {Use of a comminuting device, e.g. grinding mill}
 - 2003/0072 . . {Use of a pinion and a rack}
 - 2003/0073 . . {the charge floating on a liquid, e.g. water}
 - 2003/0074 . . . {floating on water}
 - 2003/0075 . . {Charging or discharging vertically, e.g. through a bottom opening}
 - 2003/0077 . . {Use of centrifugal devices}
 - 2003/0078 . . {comprising jacks, e.g. hydraulic jacks}
 - 2003/0079 . . {Use of cams}
 - 2003/008 . . {comprising cross-beams or gantry cranes}
 - 2003/0081 . . {Series of little rams}
 - 2003/0083 . . {Means for stirring the charge}
 - 3/0084 . {Charging; Manipulation of SC or SC wafers}
 - 2003/0085 . {Movement of the container or support of the charge in the furnace or in the charging facilities}
 - 2003/0086 . . {Up or down}
 - 2003/0087 . . {Rotation about a vertical axis}
 - 2003/0089 . . {Rotation about a horizontal or slightly inclined axis}
 - 2003/009 . . . {Oscillations about a horizontal axis; Rocking}
 - 2003/0091 . . {Horizontally}
 - 2003/0092 . . . {with a reciprocating movement}
 - 2003/0093 . . {Movement on a slope}
 - 2003/0095 . . {the advancement being step by step}
 - 2003/0096 . . {Advancement along the longitudinal axis of the workpiece}
 - 2003/0097 . . {Advancement along an axis perpendicular to the axis of the workpiece}
 - 2003/0098 . . . {Workpiece rolling on its support}
 - 3/02 . Skids or tracks for heavy objects
 - 3/022 . . {Skids}
 - 3/024 . . . {Details of skids, e.g. riders}
 - 3/026 . . {transport or conveyor rolls for furnaces; roller rails}
 - 3/028 . . . {Roller rails or succession of small sized rollers}
 - 3/04 . Ram or pusher apparatus
 - 2003/045 . . {used to pull the charge}
 - 3/06 . Charging or discharging machines on travelling carriages
 - 3/08 . Screw feeders; Screw dischargers
 - 3/10 . Charging directly from hoppers or shoots
 - 2003/105 . . {using shutters}
 - 3/12 . Travelling or movable supports or containers for the charge
 - 2003/121 . . {Band, belt or mesh}
 - 2003/122 . . . {Band made from longitudinal wires or bars}
 - 3/123 . . {Furnace cars}
 - 2003/124 . . {Sleds; Transport supports}
 - 2003/125 . . {Charging cars, lift trolleys}
 - 2003/126 . . . {with long arms, charging forks}
 - 2003/127 . . . {for carrying pots}
 - 2003/128 . . . {for carrying stacks of articles, e.g. bricks}
 - 3/14 . Charging or discharging liquid or molten material
 - 3/145 . . {Runners therefor}
 - 3/15 . Tapping equipment; Equipment for removing {or retaining} slag
 - 3/1509 . . {Tapping equipment}
 - 3/1518 . . . {Tapholes}
 - 3/1527 . . . {Taphole forming equipment, e.g. boring machines, piercing tools}
 - 3/1536 . . . {Devices for plugging tap holes, e.g. plugs stoppers}
- NOTE**
- { the devices fixed permanently to the melt container are classified in [F27D 3/1509](#)}
- 3/1545 . . {Equipment for removing or retaining slag}
 - 3/1554 . . . {for removing the slag from the surface of the melt}
 - 3/1563 {by the use of scrapers}
 - 3/1572 {by suction}
 - 3/1581 {by the use of blowers}
 - 3/159 . . . {for retaining slag during the pouring of the metal or retaining metal during the pouring of the slag}
 - 3/16 . Introducing a fluid jet or current into the charge ([F27D 3/18](#) takes precedence)
 - 2003/161 . . {through a porous element}
 - 2003/162 . . {the fluid being an oxidant or a fuel}
 - 2003/163 . . . {the fluid being an oxidant}
 - 2003/164 {Oxygen}
 - 2003/165 . . . {the fluid being a fuel}
 - 2003/166 . . {the fluid being a treatment gas}
 - 2003/167 . . {the fluid being a neutral gas}
 - 2003/168 . . {through a lance}
 - 2003/169 . . . {Construction of the lance, e.g. lances for injecting particles}
 - 3/18 . Charging particulate material using a fluid carrier
 - 2003/185 . . {Conveying particles in a conduct using a fluid}
- 5/00 Supports, screens or the like for the charge within the furnace**
- 5/0006 . {Composite supporting structures}
 - 5/0012 . . {Modules of the sagger or setter type; Supports built up from them}
 - 5/0018 . . {Separating elements}
 - 5/0025 . . {assembled to present a three-point support}
 - 5/0031 . {Treatment baskets for ceramic articles}
 - 5/0037 . {Supports specially adapted for semi-conductors}
 - 5/0043 . {Supports specially adapted for dental prosthesis}
 - 5/005 . {Supports specially adapted for holding elongated articles in an upright position, e.g. sparking plugs}
 - 5/0056 . {Hangers}
 - 5/0062 . {Shields for the charge}
 - 5/0068 . {Containers}
 - 2005/0075 . . {Pots, e.g. slag pots, ladles}
 - 2005/0081 . {Details}
 - 2005/0087 . . {Means to prevent the adherence of the charge}
 - 2005/0093 . . {Means to maintain the form of the article}
- 7/00 Forming, maintaining or circulating atmospheres in heating chambers**
- 7/02 . Supplying steam, vapour, gases or liquids
 - 2007/023 . . {Conduits}
 - 2007/026 . . {Dampers}
 - 7/04 . Circulating atmospheres by mechanical means
 - 2007/045 . . {Fans}
 - 7/06 . Forming or maintaining special atmospheres or vacuum within heating chambers ([supplying steam, vapour, gases or liquids F27D 7/02](#))
 - 2007/063 . . {Special atmospheres, e.g. high pressure atmospheres}
 - 2007/066 . . {Vacuum}

9/00	Cooling of furnaces or of charges therein (casings, linings, walls or roofs incorporating cooling arrangements F27D 1/12)	13/00	Apparatus for preheating charges; Arrangements for preheating charges
2009/0002	. {Cooling of furnaces}	13/002	. {Preheating scrap}
2009/0005	. . {the cooling medium being a gas}	13/005	. {Drying of green clay prior to baking}
2009/0008	. . . {Ways to inject gases against surfaces}	2013/007	. {using a rotary furnace}
2009/001	. . {the cooling medium being a fluid other than a gas}	15/00	Handling or treating discharged material; Supports or receiving chambers therefor
2009/0013	. . . {the fluid being water}	15/02	. Cooling
2009/0016	. . . . {Water-spray}	15/0206	. . {with means to convey the charge}
2009/0018	. . {the cooling medium passing through a pattern of tubes}	15/0213	. . . {comprising a cooling grate}
2009/0021	. . . {with the parallel tube parts close to each other, e.g. a serpentine}	15/022	. . . . {grate plates}
2009/0024	. . . . {with contiguous tubes, which may be separately welded one to the other}	2015/0226	. . . . . {Support, fixation of the grate}
2009/0027	. . . . {linked by elements}	2015/0233	. . . . . {with gas, e.g. air, supply to the grate}
2009/0029	. . . . {fixed, e.g. welded to a supporting surface}	2015/024	. . . . {Multiple grates}
2009/0032	. . . {integrated with refractories in a panel}	2015/0246	. . . . {Combination of fixed and movable grates}
2009/0035	. . . {arranged for the covering of a cylindrical surface}	2015/0253	. . . . . {Gratin grates}
2009/0037	. . {the cooling medium passing a radiator}	2015/026	. . . . {Means to discharge the fines}
2009/004	. . {the cooling medium passing a waterbox}	15/0266	. . . {on an endless belt}
2009/0043	. . . {Insert type waterbox, e.g. cylindrical or flat type}	15/0273	. . . {on a rotary hearth}
2009/0045	. . {the cooling medium passing a block, e.g. metallic}	15/028	. . . {comprising a rotary drum}
2009/0048	. . . {incorporating conduits for the medium}	15/0286	. . {in a vertical, e.g. annular, shaft}
2009/0051	. . {comprising use of studs to transfer heat or retain the liner}	2015/0293	. . . {including rotating parts}
2009/0054	. . . {adapted to retain formed bricks}	17/00	Arrangements for using waste heat; Arrangements for using, or disposing of, waste gases
2009/0056	. . {Use of high thermoconductive elements}	WARNING	
2009/0059	. . . {made mostly from graphite}		Group F27D 17/00 is impacted by reclassification into groups F27D 17/20 , F27D 17/22 , F27D 17/25 and F27D 17/28 .
2009/0062	. . . {made from copper or copper alloy}		All groups listed in this Warning should be considered in order to perform a complete search.
2009/0064	. . {Cooling of furnace arches}	17/10	. Arrangements for using waste heat
2009/0067	. . {Cooling element inlet and outlet tubes}	WARNING	
2009/007	. {Cooling of charges therein}		Group F27D 17/10 is impacted by reclassification into groups F27D 17/12 , F27D 17/15 , F27D 17/17 and F27D 17/18 .
2009/0072	. . {the cooling medium being a gas}		All groups listed in this Warning should be considered in order to perform a complete search.
2009/0075	. . . {in direct contact with the charge}	17/102	. . {including pyrolysing the waste gases}
2009/0078	. . . {in indirect contact with the charge}	17/12	. . using heat storage
2009/0081	. . {the cooling medium being a fluid (other than a gas in direct or indirect contact with the charge)}	WARNING	
2009/0083	. . . {the fluid being water}		Group F27D 17/12 is incomplete pending reclassification of documents from group F27D 17/10 .
2009/0086	. . . . {applied in spray form}		Groups F27D 17/10 and F27D 17/12 should be considered in order to perform a complete search.
2009/0089	. . {Quenching}	17/13	. . . using regenerative heat exchangers
2009/0091	. . {in a fluidised bed of cooling elements}	17/15	. . using boilers
2009/0094	. . {making use of already cooled material, e.g. forming a layer}	WARNING	
2009/0097	. . . {the charge being used as a coolant}		Group F27D 17/15 is incomplete pending reclassification of documents from group F27D 17/10 .
11/00	Arrangement of elements for electric heating in or on furnaces		Groups F27D 17/10 and F27D 17/15 should be considered in order to perform a complete search.
11/02	. Ohmic resistance heating		
11/04	. . with direct passage of current through the material being heated		
11/06	. Induction heating, i.e. in which the material being heated, or its container or elements embodied therein, form the secondary of a transformer		
11/08	. Heating by electric discharge, e.g. arc discharge		
11/10	. . Disposition of electrodes		
11/12	. with electromagnetic fields acting directly on the material being heated		

17/17 . . for preheating fluids, e.g. air or gases
WARNING
 Group [F27D 17/17](#) is incomplete pending reclassification of documents from group [F27D 17/10](#).
 Groups [F27D 17/10](#) and [F27D 17/17](#) should be considered in order to perform a complete search.

17/18 . . for preheating solid materials
WARNING
 Group [F27D 17/18](#) is incomplete pending reclassification of documents from group [F27D 17/10](#).
 Groups [F27D 17/10](#) and [F27D 17/18](#) should be considered in order to perform a complete search.

17/20 . Arrangements for treatment or cleaning of waste gases
WARNING
 Group [F27D 17/20](#) is incomplete pending reclassification of documents from group [F27D 17/00](#).
 Group [F27D 17/20](#) is also impacted by reclassification into groups [F27D 17/22](#), [F27D 17/25](#) and [F27D 17/28](#).
 All groups listed in this Warning should be considered in order to perform a complete search.

17/22 . . for removing solid constituents
WARNING
 Groups [F27D 17/22](#) and [F27D 17/25](#) are incomplete pending reclassification of documents from groups [F27D 17/00](#) and [F27D 17/20](#).
 All groups listed in this warning should be considered in order to perform a complete search.

17/25 . . . using cyclones
 17/28 . . for cooling waste gases

WARNING
 Group [F27D 17/28](#) is incomplete pending reclassification of documents from groups [F27D 17/00](#) and [F27D 17/20](#).
 Groups [F27D 17/00](#), [F27D 17/20](#) and [F27D 17/28](#) should be considered in order to perform a complete search.

17/30 . Arrangements for extraction or collection of waste gases; Hoods therefor
 17/302 . . {Constructional details of ancillary components, e.g. waste gas conduits or seals}
 17/304 . . {specially adapted for electric arc furnaces}

19/00 Arrangements of controlling devices

2019/0003 . {Monitoring the temperature or a characteristic of the charge and using it as a controlling value}

2019/0006 . {Monitoring the characteristics (composition, quantities, temperature, pressure) of at least one of the gases of the kiln atmosphere and using it as a controlling value}
 2019/0009 . . {Monitoring the pressure in an enclosure or kiln zone}
 2019/0012 . . {Monitoring the composition of the atmosphere or of one of their components}
 2019/0015 . . . {Monitoring the composition of the exhaust gases or of one of its components}
 2019/0018 . . {Monitoring the temperature of the atmosphere of the kiln}
 2019/0021 . . . {Monitoring the temperature of the exhaust gases}
 2019/0025 . . {Monitoring the temperature of a part or of an element of the furnace structure}
 2019/0028 . {Regulation}
 2019/0031 . . {through control of the flow of the exhaust gases}
 2019/0034 . . {through control of a heating quantity such as fuel, oxidant or intensity of current}
 2019/0037 . . . {Quantity of electric current}
 2019/004 . . . {Fuel quantity}
 2019/0043 {Amount of air or O₂ to the burner}
 2019/0046 {Amount of secondary air to the burner}
 2019/005 . . . {Amount of heat given to the charge via a controlled heat exchanger}
 2019/0053 {involving heating the charge in a fluid or fluidised medium}
 2019/0056 . . {Regulation involving cooling}
 2019/0059 . . {Regulation involving the control of the conveyor movement, e.g. speed or sequences}
 2019/0062 . . . {control of the workpiece stay in different zones}
 2019/0065 . . {Regulation involving controlled section modification}
 2019/0068 . . {Regulation involving a measured inflow of a particular gas in the enclosure}
 2019/0071 . . {Regulation using position sensors}
 2019/0075 . . {Regulation of the charge quantity}
 2019/0078 . . {Regulation of the speed of the gas through the charge}
 2019/0081 . {Controlling an air-lock chamber}
 2019/0084 . {Controlling closure systems, e.g. doors}
 2019/0087 . {Automatisation of the whole plant or activity}
 2019/009 . . {Use of codes, e.g. bar codes}
 2019/0093 . {Maintaining a temperature gradient}
 2019/0096 . {involving simulation means, e.g. of the treating or charging step}

21/00 Arrangement of monitoring devices; Arrangement of safety devices

2021/0007 . {Monitoring the pressure}
 21/0014 . {Devices for monitoring temperature}
 21/0021 . {Devices for monitoring linings for wear}
 21/0028 . {Devices for monitoring the level of the melt}
 21/0035 . {Devices for monitoring the weight of quantities added to the charge}
 2021/0042 . . {Monitoring the level of the solid charge}
 2021/005 . {Devices for monitoring thermal expansion}
 2021/0057 . {Security or safety devices, e.g. for protection against heat, noise, pollution or too much duress; Ergonomic aspects}
 2021/0064 . . {against noises}
 2021/0071 . . {against explosions}

- 2021/0078 . . {against the presence of an undesirable element in the atmosphere of the furnace}
- 2021/0085 . . {against molten metal, e.g. leakage or splashes}
- 2021/0092 . . {against a jam in the transport line or a production interruption}
 - 21/02 . Observation or illuminating devices
- 2021/023 . . {Closable inserting openings, e.g. for the introduction of lances, sensors or burners}
- 2021/026 . . {using a video installation}
 - 21/04 . Arrangement of indicators or alarms
- 25/00** **Devices {or methods} for removing incrustations {, e.g. slag, metal deposits, dust; Devices or methods for preventing the adherence of slag}**
- 25/001 . {comprising breaking tools, e.g. hammers, drills, scrapers}
 - 25/003 . . {used for punching tuyeres}
 - 25/005 . . {used for cleaning the channels of induction furnaces}
 - 25/006 . {using explosives}
 - 25/008 . {using fluids or gases, e.g. blowers, suction units}
- 27/00** **Stirring devices for molten material (charging or discharging liquid or molten material [F27D 3/14](#))**
- 2027/002 . {Gas stirring}
 - 27/005 . {Pumps}
 - 27/007 . . {Pulsating pumps}
- 99/00** **Subject matter not provided for in other groups of this subclass**
- 99/0001 . {Heating elements or systems}
 - 99/0003 . . {with particulate fuel, e.g. aspects relating to the feeding}
 - 99/0005 . . {Injecting liquid fuel}
 - 99/0006 . . {Electric heating elements or system}
- 2099/0008 . . . {Resistor heating}
 - 2099/001 {the container being the resistor}
 - 2099/0011 {The resistor heats a radiant tube or surface}
 - 2099/0013 {immersed in the charge}
 - 2099/0015 . . . {Induction heating}
 - 2099/0016 {Different magnetic fields, e.g. two coils, different characteristics of the same coil along its length or different parts of the same coil used}
- 2099/0018 {Relative movement of the coil and the charge during the heat treatment}
- 2099/002 {Core heating}
- 2099/0021 {Arc heating}
 - 2099/0023 {DC arc heating}
 - 2099/0025 {Currents through the charge}
 - 2099/0026 {with a generator of electromagnetic radiations}
 - 2099/0028 {Microwave heating}
 - 2099/003 {Bombardment heating, e.g. with ions or electrons}
 - 2099/0031 {Plasma-torch heating}
 - 99/0033 . . {using burners}
 - 99/0035 . . . {Heating indirectly through a radiant surface}
 - 2099/0036 {immersed in the charge}
 - 2099/0038 {removable}
 - 2099/004 {directed upon the charge, e.g. vertically}
 - 2099/0041 {with a small angle, e.g. almost tangentially}
 - 2099/0043 {Impulse burner}
 - 2099/0045 {Radiant burner}
- 2099/0046 {with incomplete combustion, e.g. reducing atmosphere}
 - 2099/0048 {Post- combustion}
 - 2099/005 {Catalytic burner}
 - 2099/0051 {Burning waste as a fuel}
 - 2099/0053 {Burner fed with preheated gases}
 - 2099/0055 {Fuel}
 - 2099/0056 {Oxidant}
 - 2099/0058 . . . {Means for heating the charge locally}
 - 2099/006 . . . {Auxiliary heating, e.g. in special conditions or at special times}
 - 2099/0061 . . . {Indirect heating}
 - 2099/0063 {Liquid}
 - 2099/0065 {Gas}
 - 2099/0066 {Particles or solid bodies, e.g. bed of particles}
 - 2099/0068 . . . {Heating directly by circulation of a fluid other than a gas or by particles}
 - 99/007 . {Partitions}
 - 2099/0071 . . {Partitions used as registers}
 - 99/0073 . {Seals}
 - 99/0075 . . {Gas curtain seals}
 - 99/0076 . . {Furnace car seals, i.e. seals used in continuous furnaces or kilns for preventing gas or heat exchange between heating chamber and the area comprising driving means}
- 2099/0078 . . . {Means to minimize the leakage of the furnace atmosphere during charging or discharging}
 - 2099/008 {Using an air-lock}
 - 2099/0081 . . . {Joint}
 - 2099/0083 . . {Drives; Auxiliary drives}
 - 2099/0085 . . {Accessories}
 - 2099/0086 . . . {Filters, e.g. for molten metals}
 - 2099/0088 . . . {Apparatus to cut metal, e.g. logs, in billets}
 - 2099/009 . . . {Bumpers}
 - 2099/0091 . . . {Means to grease or oil}
 - 2099/0093 . . . {Means to collect ashes or dust, e.g. vessels}
 - 2099/0095 . . . {Means to collect the slag or spilled metal, e.g. vessels}
 - 2099/0096 . . . {Presses}
 - 2099/0098 . . . {Means for moving the furnace}
- 2201/00** **Manipulation of furnace parts**
- NOTE**
- Indexing code [F27D 2201/00](#) can be followed by additional indexing codes preceded by a + sign. These additional indexing codes are chosen from codes of subclass [F27D](#) describing similar manipulations of furnace charges.
- Example: [F27D 2201/00](#) + [F27D 2003/0036](#)