Symbol	Typ	Titel
F	**Sektion**	**SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING**
F28	**Klasse**	**HEAT EXCHANGE IN GENERAL (heat-transfer, heat-exchange or heat-storage materials C09K 5/00; arrangement or mounting of heat-exchangers in air-conditioning, air-humidification or ventilation F24F 13/30)**
F28F	**Unterklasse**	**DETAILS OF HEAT-EXCHANGE OR HEAT-TRANSFER APPARATUS, OF GENERAL APPLICATION (water or air traps, air venting F16)**
F28F 1/00	**Hauptgruppe**	**Tubular elements; Assemblies of tubular elements (specially adapted for movement F28F 5/00)**
F28F 1/02	1-Punkt Untergruppe	. Tubular elements of cross-section which is non-circular (F28F 1/08, F28F 1/10 take precedence)
F28F 1/04	2-Punkt Untergruppe	. . polygonal, e.g. rectangular
F28F 1/06	2-Punkt Untergruppe	. . crimped or corrugated in cross-section
F28F 1/08	1-Punkt Untergruppe	. Tubular elements crimped or corrugated in longitudinal section
F28F 1/10	1-Punkt Untergruppe	. Tubular elements or assemblies thereof with means for increasing heat-transfer area, e.g. with fins, with projections, with recesses (crimped or corrugated elements F28F 1/06, F28F 1/08)
F28F 1/12	2-Punkt Untergruppe	. . the means being only outside the tubular element
F28F 1/14	3-Punkt Untergruppe	. . . and extending longitudinally (F28F 1/38 takes precedence)
F28F 1/16	4-Punkt Untergruppe	. . . . the means being integral with the element, e.g. formed by extrusion (F28F 1/22 takes precedence)
F28F 1/18	5-Punkt Untergruppe	. . . . . the element being built-up from finned sections
F28F 1/20	4-Punkt Untergruppe	. . . . the means being attachable to the element (F28F 1/22 takes precedence)
F28F 1/22	4-Punkt Untergruppe	. . . . the means having portions engaging further tubular elements
F28F 1/24	3-Punkt Untergruppe	. . . and extending transversely (F28F 1/38 takes precedence)
F28F 1/26	4-Punkt Untergruppe	. . . . the means being integral with the element (F28F 1/32 takes precedence)
F28F 1/28	5-Punkt Untergruppe	. . . . . the element being built-up from finned sections
F28F 1/30	4-Punkt Untergruppe	. . . . the means being attachable to the element (F28F 1/32 takes precedence)
F28F 1/32	4-Punkt Untergruppe	. . . . the means having portions engaging further tubular elements
F28F 1/34	3-Punkt Untergruppe	. . . and extending obliquely (F28F 1/38 takes precedence)
F28F 1/36	4-Punkt Untergruppe	. . . . the means being helically-wound fins or wire spirals
F28F 1/38	3-Punkt Untergruppe	. . . and being staggered to form tortuous fluid passages
F28F 1/40	2-Punkt Untergruppe	. . the means being only inside the tubular element
F28F 1/42	2-Punkt Untergruppe	. . the means being both outside and inside the tubular element
F28F 1/44	3-Punkt Untergruppe	. . . and being formed of wire mesh
F28F 3/00	**Hauptgruppe**	**Plate-like or laminated elements; Assemblies of plate-like or laminated elements (specially adapted for movement F28F 5/00)**
F28F 3/02	1-Punkt Untergruppe	. Elements or assemblies thereof with means for increasing heat-transfer area, e.g. with fins, with recesses, with corrugations (F28F 3/08 takes precedence)

Symbol	Typ	Titel
F28F 3/04	2-Punkt Untergruppe	. . the means being integral with the element
F28F 3/06	2-Punkt Untergruppe	. . the means being attachable to the element
F28F 3/08	1-Punkt Untergruppe	. Elements constructed for building-up into stacks, e.g. capable of being taken apart for cleaning
F28F 3/10	2-Punkt Untergruppe	. . Arrangement for sealing the margins
F28F 3/12	1-Punkt Untergruppe	. Elements constructed in the shape of a hollow panel, e.g. with channels
F28F 3/14	2-Punkt Untergruppe	. . by separating portions of a pair of joined sheets to form channels, e.g. by inflation (manufacture thereof B23P)
F28F 5/00	**Hauptgruppe**	**Elements specially adapted for movement (arrangements for moving the elements, see the appropriate subclass for the apparatus concerned)**
F28F 5/02	1-Punkt Untergruppe	. Rotary drums or rollers
F28F 5/04	1-Punkt Untergruppe	. Hollow impellers, e.g. stirring vane
F28F 5/06	1-Punkt Untergruppe	. Hollow screw conveyers
F28F 7/00	**Hauptgruppe**	**Elements not covered by group F28F 1/00, F28F 3/00, or F28F 5/00**
F28F 7/02	1-Punkt Untergruppe	. Blocks traversed by passages for heat-exchange media
F28F 9/00	**Hauptgruppe**	**Casings; Header boxes; Auxiliary supports for elements; Auxiliary members within casings**
F28F 9/007	1-Punkt Untergruppe	. Auxiliary supports for elements [6]
F28F 9/013	2-Punkt Untergruppe	. . for tubes or tube-assemblies [6]
F28F 9/02	1-Punkt Untergruppe	. Header boxes; End plates
F28F 9/04	2-Punkt Untergruppe	. . Arrangements for sealing elements into header boxes or end plates (joining pipes to walls in general F16L 41/00)
F28F 9/06	3-Punkt Untergruppe	. . . by dismountable joints
F28F 9/08	4-Punkt Untergruppe	. . . . by wedge-type connections, e.g. taper ferrule
F28F 9/10	4-Punkt Untergruppe	. . . . by screw-type connections, e.g. gland
F28F 9/12	4-Punkt Untergruppe	. . . . by flange-type connections
F28F 9/14	4-Punkt Untergruppe	. . . . by force-joining
F28F 9/16	3-Punkt Untergruppe	. . . by permanent joints, e.g. by rolling (metal-working procedures in general B21, B23, particularly B21D 39/06, B23K)
F28F 9/18	4-Punkt Untergruppe	. . . . by welding
F28F 9/20	1-Punkt Untergruppe	. Arrangements of heat reflectors, e.g. separately-insertible reflecting walls
F28F 9/22	1-Punkt Untergruppe	. Arrangements for directing heat-exchange media into successive compartments, e.g. arrangements of guide plates
F28F 9/24	1-Punkt Untergruppe	. Arrangements for promoting turbulent flow of heat-exchange media, e.g. by plates (F28F 1/38 takes precedence; in general F15D)
F28F 9/26	1-Punkt Untergruppe	. Arrangements for connecting different sections of heat-exchange elements, e.g. of radiators (connecting different sections in water heaters F24H 9/14)
F28F 11/00	**Hauptgruppe**	**Arrangements for sealing leaky tubes or conduits (stopping flow from or in pipes in general F16L 55/10)**

Symbol	Typ	Titel
F28F 11/02	1-Punkt Untergruppe	. using obturating elements, e.g. washers, inserted and operated independently of each other (F28F 11/06 takes precedence)
F28F 11/04	1-Punkt Untergruppe	. using pairs of obturating elements, e.g. washers, mounted upon central operating rods (F28F 11/06 takes precedence)
F28F 11/06	1-Punkt Untergruppe	. using automatic tube-obturating appliances
F28F 13/00	**Hauptgruppe**	**Arrangements for modifying heat transfer, e.g. increasing, decreasing (F28F 1/00-F28F 11/00 take precedence)**
F28F 13/02	1-Punkt Untergruppe	. by influencing fluid boundary (boundary-layer control in general F15D)
F28F 13/04	1-Punkt Untergruppe	. by preventing the formation of continuous films of condensate on heat-exchange surfaces, e.g. by promoting droplet formation
F28F 13/06	1-Punkt Untergruppe	. by affecting the pattern of flow of the heat-exchange media
F28F 13/08	2-Punkt Untergruppe	. . by varying the cross-section of the flow channels
F28F 13/10	2-Punkt Untergruppe	. . by imparting a pulsating motion to the flow, e.g. by sonic vibration
F28F 13/12	2-Punkt Untergruppe	. . by creating turbulence, e.g. by stirring, by increasing the force of circulation (F28F 13/08 takes precedence)
F28F 13/14	1-Punkt Untergruppe	. by endowing the walls of conduits with zones of different degrees of conduction of heat
F28F 13/16	1-Punkt Untergruppe	. by applying an electrostatic field to the body of the heat-exchange medium
F28F 13/18	1-Punkt Untergruppe	. by applying coatings, e.g. radiation-absorbing, radiation-reflecting; by surface treatment, e.g. polishing
F28F 17/00	**Hauptgruppe**	**Removing ice or water from heat-exchange apparatus**
F28F 19/00	**Hauptgruppe**	**Preventing the formation of deposits or corrosion, e.g. by using filters**
F28F 19/01	1-Punkt Untergruppe	. by using means for separating solid materials from heat-exchange fluids, e.g. filters [6]
F28F 19/02	1-Punkt Untergruppe	. by using coatings, e.g. vitreous or enamel coatings
F28F 19/04	2-Punkt Untergruppe	. . of rubber; of plastics material; of varnish
F28F 19/06	2-Punkt Untergruppe	. . of metal
F28F 21/00	**Hauptgruppe**	**Constructions of heat-exchange apparatus characterised by the selection of particular materials**
F28F 21/02	1-Punkt Untergruppe	. of carbon, e.g. graphite
F28F 21/04	1-Punkt Untergruppe	. of ceramic; of concrete; of natural stone
F28F 21/06	1-Punkt Untergruppe	. of plastics material
F28F 21/08	1-Punkt Untergruppe	. of metal
F28F 23/00	**Hauptgruppe**	**Features relating to the use of intermediate heat-exchange materials, e.g. selection of compositions (heat-transfer, heat-exchange or heat-storage materials C09K 5/00)**
F28F 23/02	1-Punkt Untergruppe	. Arrangements for obtaining or maintaining same in a liquid state
F28F 25/00	**Hauptgruppe**	**Component parts of trickle coolers (arrangements for increasing heat transfer F28F 13/00; controlling arrangements F28F 27/00)**
F28F 25/02	1-Punkt Untergruppe	. for distributing, circulating, or accumulating liquid (spraying or atomising in general B05B, B05D)
F28F 25/04	2-Punkt Untergruppe	. . Distributing or accumulator troughs
F28F 25/06	2-Punkt Untergruppe	. . Spray nozzles or spray pipes

Symbol	Typ	Titel
F28F 25/08	2-Punkt Untergruppe	. . Splashing boards or grids, e.g. for converting liquid sprays into liquid films; Elements or beds for increasing the area of the contact surface (packing elements in general B01J 19/30, B01J 19/32)
F28F 25/10	1-Punkt Untergruppe	. for feeding gas or vapour
F28F 25/12	2-Punkt Untergruppe	. . Ducts; Guide vanes, e.g. for carrying currents to distinct zones
F28F 27/00	**Hauptgruppe**	**Control arrangements specially adapted for heat-exchange or heat-transfer apparatus**
F28F 27/02	1-Punkt Untergruppe	. for controlling the distribution of heat-exchange media between different channels (arrangements of guide plates or guide vanes F28F 9/22, F28F 25/12)
F28F 99/00	***Hauptgruppe***	***Subject matter not provided for in other groups of this subclass [2006.01]***