

Universal Decimal Classification —

UDC 621.1 Heat engines in general —
Steam power — Steam engines —
Boilers —

UDC 621.22 Water power —
Hydraulic energy

UDC 025.45:621.1/.22

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Documentation Standards Committee (DOS/-) to Technical Committee DOS/3 upon which the following bodies were represented:

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The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Compressed Air Society
- British Internal Combustion Engine Manufacturers' Association
- British Non-ferrous Metals Federation
- Institute of Environmental Science and Technology
- Institute of Marine Engineers
- Institute of Refrigeration
- Institution of Mining and Metallurgy
- Welding Institute

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Foreword

The English version of the Universal Decimal Classification (UDC) is being prepared and published as BS 1000 by the British Standards Institution (BSI) at the original joint request of the British Society for International Bibliography (BSIB) and the Association of Special Libraries and Information Bureaux (ASLIB), now amalgamated as Aslib. It has the approval of the Lake Placid Education Foundation, New York, proprietors of the Dewey Decimal Classification, from which the UDC derives. The English full edition of the UDC is authorized by the International Federation for Documentation (FID), PO Box 90402, 2509 LK, The Hague, Netherlands.

This section is part of the English full edition. It should be used in conjunction with the Abridged English Edition, BS 1000A, which refers to many other subjects of interest not listed in this schedule, and provides a conspectus of the whole scheme, together with an introduction to its use. For further practical information about the principles, application and utilization of the scheme, users should refer to BS 1000C.

This edition of BS 1000[621.1/.22], which supersedes the 1979 edition, includes modifications authorized in *Extensions and Corrections to the UDC* (FID publication no. 248) up to and including Series 11, No. 3, dated July 1983. Subsequent issues of *Extensions and Corrections to the UDC* should be consulted to keep the schedule up to date. British Standards related to this part of BS 1000 are listed on the inside back cover.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Scope

Under 621.1 is classed information about the generation and technical applications of steam, and also about heat engines in general, matters common to 621.1, 621.4 and 621.5 being classed under 621.1.

Under 621.22 is classed information about the technical applications of hydraulic energy and water power.

Related subjects

- | | |
|------------|--|
| 532 | Mechanics of fluids in general.
Mechanics of liquids |
| 533 | Mechanics of gases. Aeromechanics.
Plasma physics |
| 62–81 | Steam-driven machinery, apparatus
and installations |
| 62–82 | Hydraulically driven machinery,
apparatus and installations |
| 620.9 | Economics of energy in general |
| 621.311.21 | Hydroelectric power stations |
| 621.311.22 | Power stations using steam plant |
| 621.4 | Heat engines (other than steam
engines) |
| 621.5 | Pneumatic energy, machinery and
tools.

Refrigeration and liquefaction
techniques and plant |
| 621.6 | Fluids handling, storage and
distribution plant and equipment |
| 621.8 | Mechanical power transmission.
Machine elements. Gearing. Materials
handling.

Mechanical attachments, fixings,
fasteners.

Lubrication |
| 627.8 | Dams. Hydraulic power plant works |
| 629.12 | Water transport. Water craft.
Shipbuilding.

Boatbuilding |
| 629.4 | Rail vehicle engineering. Locomotives.

Rolling stock. Railway yards.
Installations and services concerned
with rolling stock |
| 66.0 | Chemical engineering, production and
processing, operations and plant |
| 662.9 | Furnace and combustion engineering |
| 696.3 | Steam installations — Building |

- | | |
|-----|---|
| 697 | Heating, ventilating and air
conditioning of buildings |
|-----|---|

Auxiliary signs and subdivisions

Full information about the common and special auxiliary signs and subdivisions (often abbreviated to “common and special auxiliaries” will be found in BS 1000A and BS 1000C.

Colon sign of relation. For the classification of information for the public, as in abstracts and bibliographies, maximum use of colon combination rather than of common or special auxiliaries is recommended. The use of the colon sign of relation is preferable for multiple entry systems, as it will help prevent the concealment of information. This usually results in longer notation, however, and for information for more restricted use the application of auxiliaries, where available, may be simpler and more convenient provided that there is an adequate alphabetical subject index.

Common auxiliaries. The common auxiliaries of language = . . . , form (0 . . .), place (1/9), race and nationality (= . . .), time “. . . ”, point of view. 00 . . . , materials –03 . . . and persons –05 . . . are applicable throughout the UDC. However, they should be used mainly to express concepts not otherwise provided for in the schedules.

Special auxiliaries. The –2/–8 special auxiliaries listed under 62 and the –9 special auxiliaries listed under 66 are applicable throughout the schedule (a number of examples of the use of –1/–9 are given under 621.224).

The .01 special auxiliaries listed under 621.1 and 621.22 may be detached and applied to any subdivision of the number under which they are listed if the result forms a meaningful combination. The .0 special auxiliaries listed under 621.18 are applicable only within that section.

Typographic presentation

Small type is used for cancelled numbers and text. The arrow → means either “see” or “see also” according to the context. The symbol $\cong$ “subdivide as” means that the number preceding it may be subdivided in the same way as, and with meanings analogous to the subdivisions of, the number which follows it.

621.1 Heat engines in general. Generation, distribution and use of steam. Steam engines. Boilers

Special auxiliary subdivisions

621.1—1/—9	HEAT ENGINE MACHINERY DETAILS 621.1—1/—9 $\cong$ 62—1/—9	621.1.016.7	Thermodynamic matters →536.7 Thermodynamics. Energetics
621.1.01	THEORY	.018	Efficiency. Power. Performance tests
.011	Mechanical aspects	.2	Mechanical efficiency
.013	Matters relating to the theory of gases and vapours. Saturation. Superheating. Expansion. Condensation	.4	Thermodynamic efficiency
.1	Saturated steam	.5	Thermodynamic output
.2	Supersaturated steam	.52	Low output. Average output
.3	Superheated steam	.54	High output
.016	Matters relating to the theory of heat	.7	Power
.4	Temperature of machines and plant. Heat transfer. Heat losses →536.24 Heat transfer. Heat exchange from one medium to another. Heat transmission <i>The type of heat loss may be denoted by colon combination with the subdivisions of 662.614, e.g.</i> 621.1.016.4:662.614.422 Heat loss from flue gases (e.g. in boilers)	.71	Power units
		.72	Brake horsepower (BHP)
		.76	Indicated horsepower (IHP)
		.78	High power output
		.8	Installations for determination of performance characteristics, e.g. efficiency, power output →531.78 Measurement of work, force and pressure
		.82	Brake dynamometers. Dynamometric brakes
		.86	Indicators
		.87	Reducing gear for indicators

Principal divisions

621.311	STEAM ENGINES FOR STEAM PLANT <i>Only comprehensive works without regard to the final form in which the output is presented are classed here</i> →621.311.22 Power stations using steam plant	621.132.61	[cancelled]→629.421.3
		.614	[cancelled]→629.421.3, 629.422.7
		.616	[cancelled]→629.421.3, 629.463.3
		.62	[cancelled]→629.421.2
		.63	[cancelled]→629.421.4
		.65	[cancelled]→629.421.1
621.12	MARINE STEAM ENGINES <i>Only general works on marine steam engines are classed here</i> <i>For propulsion and machinery in general</i> →629.12 <i>For ships' boilers use 621.181:629.12</i> <i>For further details of steam engines, steam boilers etc.→621.161.18</i>	.67	[cancelled]→629.421.6
		.69	[cancelled]→629.421.9
		.7	[cancelled]→629.421.9, 629.422.1
		.72/.726	[cancelled]→629.421.7
		.75	[cancelled]→629.421.9, 629.422.1
		.8	[cancelled]→629.422.1
		.81	[cancelled]→629.421.8
		.83	[cancelled]→629.422.2
.121	Generalities. Origins of marine engine building (Papin, Perier, Fulton etc.)	.88/.89	[cancelled]→629.421.9, 629.422.1
.122	Steam engines for paddle-driven vessels	.133/.133.88	[cancelled]→621.18, 629.422
.124	Steam engines for screw-driven vessels	.134	[cancelled]→621.13
.125	Marine steam turbines	621.134.1	Driving gear
		.12	Driving gear for reciprocating steam engines
		.13	Driving gear for steam turbine engines
621.13	STEAM ENGINES FOR RAILWAY LOCOMOTIVES →621.33 Electric traction and locomotion 622.625.28 Mine locomotives 629.42 Kinds of traction. Motive power units — Rail vehicle engineering	.16	Driving gear for other types of engine
		.5	Steam turbines →621.165 Steam turbines <i>Further particulars of individual systems may be denoted by the —151—158 special auxiliaries listed under 62</i>
.132	[cancelled]→629.421, 629.422.1/.2	.8	Condensation →621.175 Condensation. Condensers. Coolers
.1	[cancelled]→629.422.1		
.3	[cancelled]→629.421.9, 629.422.1		
.6	[cancelled]→629.421	.135/.135.74	[cancelled] use 629.422.027

.621.136/.136.4	<i>[cancelled]</i> →629.422.7	621.166.22	With cut-off valves in the cylinder wall
.137/.137.3	<i>[cancelled]</i> use 629.422.05/.07	(cont'd)	
.138/.138.5	<i>[cancelled]</i> →629.47, 629.422.004.5, 629.482.2	.225	With one or several rectilinear slide valves
621.14	STEAM ENGINES FOR STEAM LOCOMOTIVES FOR USE ON ROADS OR THE LAND	.227	With one or several rotary slide valves
.142	Steam traction engines	.24	With cut-off valves in the drum
.143	Traction engines for use as power plants, e.g. for ploughing and other agricultural uses	.245	With one or several rectilinear slide valves
.144	Roller traction engines. Steamrollers	.247	With one or several rotary slide valves
621.15	MOVABLE STEAM ENGINES (NOT SELF-PROPELLED)	.26	With eccentric motion of the rotor
.152	Travelling steam engines	.3	With intermittent, irregular rotation
.153	Semi-portable steam engines	.32	With rotors alternately rotating and stationary
.154	Special-purpose movable steam engines, e.g. steam-powered fire engines	.33	With rotors of varying angular velocity
.155	Special steam engines, e.g. for excavating, dredging	.4	With intermeshing toothed rotors
621.16	TYPES OF STEAM ENGINE, ESPECIALLY STATIONARY STEAM ENGINES	.42	With two engagements per revolution
621.161	RECIPROCATING STEAM ENGINES	.44	With four engagements per revolution
.3	With fixed expansion (invariable admission or cut-off) and throttle governing	.46	With more than two rotors
.4	With variable admission or cut-off controlled by valve movement (without trip gear)	.5	With helical rotors
.5	With variable admission or cut-off controlled by valves actuated by trip gear mechanism	.52	With one helical rotor
.6	With valves indirectly actuated by oil pressure, e.g. Meyer-Mattern-Proell gear	.54	With several helical rotors
621.165	STEAM TURBINES	.6	With oscillating rotors
	<i>For marine steam turbines</i> →621.125	.61	With one single-acting piston or vane
	<i>For locomotive steam turbines</i> →621.134.5	.62	With one double-acting piston or vane
	<i>Further particulars may be denoted by special auxiliaries, e.g.</i>	.63	With two or more pistons or vanes
	621.165–155 Radial flow steam turbines	621.17	OPERATION OF STEAM ENGINES. CONDENSATION
.1	Impulse (velocity) turbines		<i>Further particulars may be denoted by special auxiliaries, e.g.</i>
.2	Reaction turbines		621.17.013 Steam as a source of power.
.3	Combined impulse and reaction turbines		Saturated steam. Superheated steam etc.
.4	Friction turbines. Helical turbines	621.175	CONDENSATION. CONDENSERS. COOLERS
.5	Steam turbines according to the state of the steam		→66.045 Heat transfer. Heat exchange.
.51	Wet steam turbines		Cooling and coolers etc.
.52	Dry steam turbines		<i>Applications of condensation may be denoted by adding the digit 8 to the subdivisions of 621.175, and further subdividing as 621.175.8, e.g.</i>
.53	Superheated steam turbines		621.175.182 Surface condensers in marine steam engines
.58	Mixed steam turbines	.1	Surface condensers. Fitting of tubes.
.6	Exhaust steam turbines. Bled steam turbines.		Maintenance
	Low-pressure steam turbines	.2	Direct-contact condensers. Jet condensers
.7	Steam turbines according to general construction	.22	Water jet condensers
.73	Disc turbines	.23	Steam jet condensers
.74	According to the design of the drum	.3	Cooling of cooling water
.742	With cylindrical, tapered or stepped drum	.4	Other condensers
.745	Reaction turbines with adjustable blades	.42	Combined types of condenser
.76	Single-stage turbines. Multi-stage turbines	.43	Multi-stage condensers
	<i>Further particulars may be denoted by special auxiliaries, e.g.</i>	.44	Evaporative surface condensers
	621.165.76–146.1 Single-stage turbines	.45	Rotary condensers. Centrifugal condensers
	–146.2 Multi-stage turbines	.46	Spiral condensers
621.166	ROTARY PISTON STEAM ENGINES	.49	Other types
.2	With continuous rotation	.6	Condensers according to application
		.63	High vacuum condensers for dry steam turbines
		.65	Condensers for cold steam engines
		.8	Applications of condensation
		.81	Generalities. Centralized condensing installations
		.82	For marine installations
		.83	For land vehicles
		.831	For road vehicles
		.832	For rail vehicles. Rail condensers

621.17 (cont'd)	Countercurrent condensers	621.18 (cont'd)	—78 Protective devices and measures for personnel
.84	For stationary engines		—9 Process, operating characteristics and conditions
	621.175.84 $\cong$ 621.16, e.g.		—984 Low-pressure plant
	621.175.841 For reciprocating steam engines		—987 High-pressure plant
	.845 For steam turbines		
.87	For multi-stage evaporation installations with steam heating	Special auxiliary subdivisions for 621.18	
621.176	PUMPS. STEAM JET PUMPS. INJECTORS. EJECTORS. AIR SUCTION PUMPS. WET AIR PUMPS	621.18.01	Theory
	<i>Only condenser applications are classed here</i>	.018	Efficiency. Power. Performance tests
.2	Steam jet pumps	.52	Boilers, steam generators of low or average output
.5	Air pumps (for de-aeration)	.54	Boilers, steam generators of high output
621.177	STEAM DRIERS. STEAM PURIFIERS. STEAM SEPARATORS. OIL REMOVERS	.04	Boiler design
.1	Simple gravity types	.042	P-shaped boilers (double flue boilers)
.2	With baffle plates. With cascade and strainer devices	.043	T-shaped boilers
.3	With diversion of the steam flow	.044	U-shaped boilers
.4	Rotary and centrifugal separators	.045	Single flue boilers
.5	Separation by electroendosmosis, cataphoresis etc.	.046	Horizontal boilers
.6	Chemical and physicochemical separation. Adsorption separators	.047	Multi-tube boilers
.9	Other separators	.049	Other designs
621.178	ACCIDENTS. BREAKDOWNS. CYLINDER RUPTURE. BURSTING. FRACTURE. FLYWHEEL DISINTEGRATIONS AND OTHER FAILURES OF STEAM ENGINE PARTS	.05	Boilers according to the type of flue gas compression or steam pressure
	621.178 $\cong$ 621, e.g.		<i>Further particulars may be denoted by the —98 special auxiliaries listed under 62, e.g.</i>
	621.178.165 Steam turbine explosions	.052	621.18.05—984 Low-pressure boilers
	.175 Condenser explosions	.054	—987 High-pressure boilers
621.18	STEAM BOILERS. STEAM GENERATORS. STEAM PLANT IN GENERAL. LAYOUT OF BOILERS, THEIR MAIN COMPONENTS AND ELEMENTS	.06	Boilers with low-pressure firing
	<i>Site organization and construction methods may be denoted by colon combination with the subdivisions of 69, e.g.</i>	.062	Boilers with high-pressure firing
	621.18:69.057 Erection and assembly of steam plant	.06	Heating surfaces
	:69.058 Site tests on steam plant	.062	Heating surfaces
	<i>Further particulars may be denoted by the —1/—9 special auxiliaries listed under 62, e.g.</i>	.5	Radiant heating surfaces
	621.18—11 General construction details	.063	Semiradiant heating surfaces, e.g. bulkhead heating surfaces
	—182.2 Fixed. Stationary	.064	Contact heating surfaces
	.3 Moving. Mobile	.066	Combined radiant-contact heating surfaces
	—21 Fixed components. Casings, frames etc.	.2	Arrangement of the tubular heating surfaces
	—218 Foundations. Anchorages etc.	.3	Nests of offset tubes
	—4 Material state, shape and form	.4	Nests of flush tubes
	—5 Operation, regulation and control	.068	Nests of combined offset and flush tubes
	—6 Steam plant according to the heat source (fuel)		Heating surfaces according to the direction of movement of both media
	—7 Operation, servicing and maintenance	.2	Uniflow heating surfaces
	—72 Lubrication devices	.3	Counterflow heating surfaces
	—76 Protection of individual components, e.g. linings, seals	.4	Crossflow heating surfaces. Parallel flow heating surfaces
	—77 Maintenance, cleaning and identification (marking) devices	.7	Combined heating surfaces
		.08	Measurement methods. Design of measuring apparatus
			621.18.08 $\cong$ 53.08
		Principal divisions (continued)	
		621.181	BOILERS, STEAM GENERATORS ACCORDING TO DESIGN AND CONSTRUCTION
			<i>For boiler accessories and elements—</i>
			<i>621.183/.184</i>
		.1	Boilers with direct heating
		.12	Natural circulation boilers
		.122	Cylindrical boilers
		.123	Fire-tube boilers
		.124	Smoke-tube boilers
		.125	Inclined water-tube boilers
		.2	With headers
		621.181.125.4	Schuchoff boilers