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मानक



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[MED 17: Chemical Engineering Plants and Related Equipment]



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IS : 8245 - 1976

Indian Standard
GRAPHICAL SYMBOLS FOR
VACUUM TECHNOLOGY

UDC 621.52 : 003.62



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Indian Standard

GRAPHICAL SYMBOLS FOR VACUUM TECHNOLOGY

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Indian Standard

GRAPHICAL SYMBOLS FOR VACUUM TECHNOLOGY

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 27 October 1976, after the draft finalized by the Chemical Engineering Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 The graphical symbols have been grouped in seven sections as given below:

Section 1 Vacuum pumps

Section 2 Baffles

Section 3 Traps (condensers)

Section 4 Pressure measuring apparatus

Section 5 Flowlines and connections

Section 6 Valves

Section 7 Vacuum chambers

0.3 This standard is based on Doc : ISO/TC 10/SC 2 (Secretariat-19) 47 E/F 'Graphical symbols for vacuum technology' issued by International Organization for Standardization (ISO).

1. SCOPE

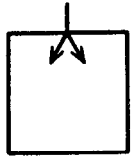
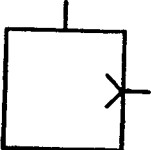
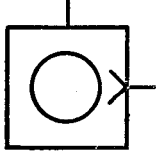
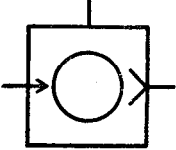
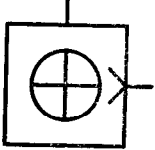
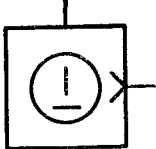
1.1 This standard lays down graphical symbols for vacuum technology.

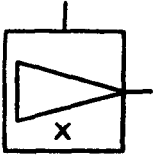
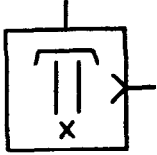
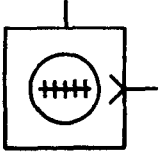
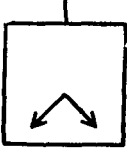
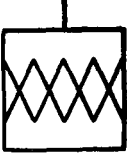
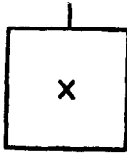
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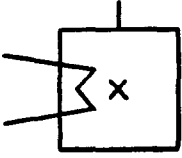

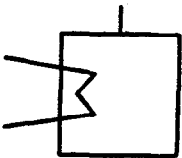
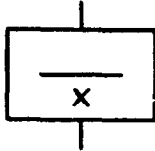
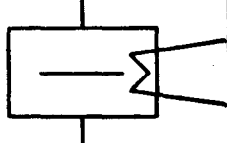
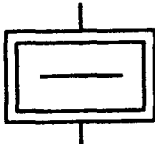
2.1 The recommended positioning of inlets and outlets to devices may be changed for convenience on drawings, provided this carries no confusion with the basic symbol.

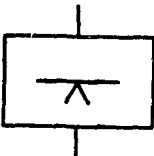
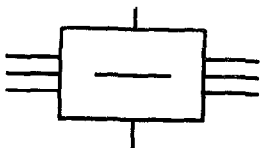
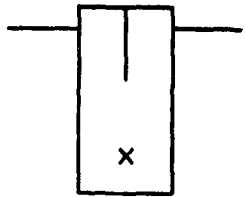
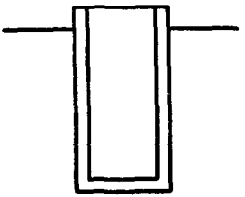

2.2 The relative size of symbols in combination shall correspond approximately to those given in Appendix A.








3. GRAPHICAL SYMBOLS



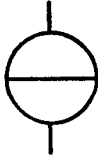
Sl No.	Designation	Symbol
Section I Vacuum Pumps		
1	Vacuum pump (type unspecified) NOTE — The arrows are optional and should be omitted when no confusion is possible with another symbol.	
2	Gas transfer pump (type unspecified)	
3	Single stage rotary pump (with vanes, multiple vanes or a rotating piston) NOTE — One circle indicates single stage; two circles indicate multistage.	
4	Gas ballast pump	
5	Liquid ring pump NOTE — One circle indicates one stage; two circles indicate multistage.	
6	Single stage roots pump NOTE — One vertical and one horizontal line indicate one stage; two vertical and two horizontal lines indicate multistage.	

Sl No.	Designation	Symbol
7	Vapour ejector (booster) pump (using oil or mercury vapour) NOTE — The following symbols for the fluid may be inserted at X: Pump oil = CH, Mercury = Hg, and Steam = H ₂ O.	
8	Vapour diffusion pump using oil or mercury vapour NOTE — The following symbols for the fluid may be inserted at X: Pump oil = CH, and Mercury = Hg.	
9	Turbomolecular pump NOTE — The 5 vertical lines within the circle signify that the pump is multistage and the same 5 lines are always used, irrespective of the number of stages.	
10	Entrapment vacuum pump (type unspecified) NOTE — The arrows are optional and should be omitted when no confusion is possible with another symbol.	
11	Sorption pump, utilizing molecular sieve	
12	Getter sublimation pump NOTE — The chemical symbol for the sorbent concerned may be inserted at X.	

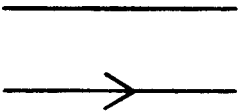

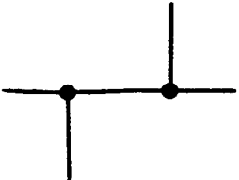
<i>Sl No.</i>	<i>Designation</i>	<i>Symbol</i>
13	Getter sublimation pump with cold walls NOTE — The chemical symbol for the sorbent concerned may be inserted at <i>X</i> . The temperature of the sorbent may be indicated on the left hand	
14	Sputter ion pump	
15	Cryopump	
Section 2 Baffles		
16	Baffle (type unspecified) NOTE — The temperature of the baffle may be inserted at <i>X</i> .	
17	Refrigerated baffle (by fluid circulation) NOTE — The temperature and the nature of the cooling fluid may be indicated on the left and on the right hand respectively.	
18	Reservoir type baffle	


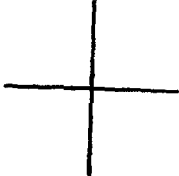

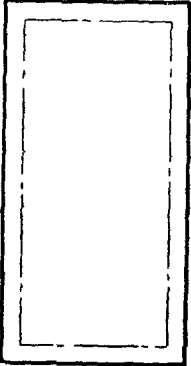
Sl No.	Designation	Symbol
19	Peltier type baffle	
20	Air cooled baffle	
Section 3 Traps (Condensers)		
21	Trap or condenser (type unspecified) NOTE — The temperature of the trap may be inserted at X.	
22	Trap reservoir type	
Section 4 Pressure Measuring Apparatus		
23	Pressure gauge (type unspecified)	




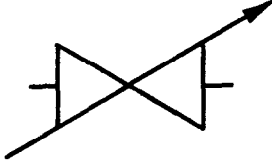
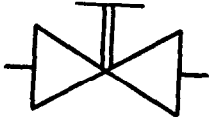
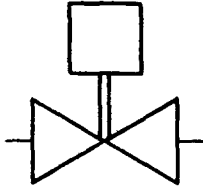
Sl No.	Designation	Symbol
24	Differential pressure gauge	
25	Partial pressure gauge	
26	Hot cathode ionization gauge	
27	Hot cathode ionization gauge, ultra high vacuum	
28	Cold cathode ionization gauge	
29	Thermal conductivity gauge	
30	Liquid level manometer	

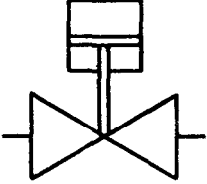
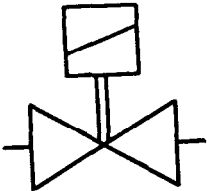
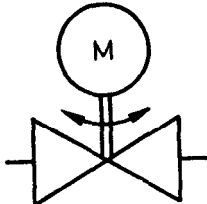


Sl No.	Designation	Symbol
31	Differential liquid level manometer	
32	McLeod manometers	
33	Differential membrane gauge	

Section 5 Flowlines and Connections

34	<p>Pipeline</p> <p>NOTE — The direction of flow may be indicated by an arrow.</p>	
35	Junction — Solid circle of diameter 5 times the thickness of the line	
36	Lines with junctions	

<i>Sl No.</i>	<i>Designation</i>	<i>Symbol</i>
37	Lines with cross-junction	
38	Crossing lines (not connected)	
39	<p>Indication of a series of elements mounted in one set</p> <p>NOTE — Where relevant, the pipelines may be omitted indicating a direct combination of the symbols.</p>	
40	Indication of a bakeable assembly	

<i>Sl No.</i>	<i>Designation</i>	<i>Symbol</i>
Section 6 Valves		
41	Valve (type unspecified) NOTE — This general symbol also shows a screw down stop valve.	
42	Gate valve	
43	Baffle valve	
44	Fine control valve	
45	Manually operated valve	
46	Remote control valve	

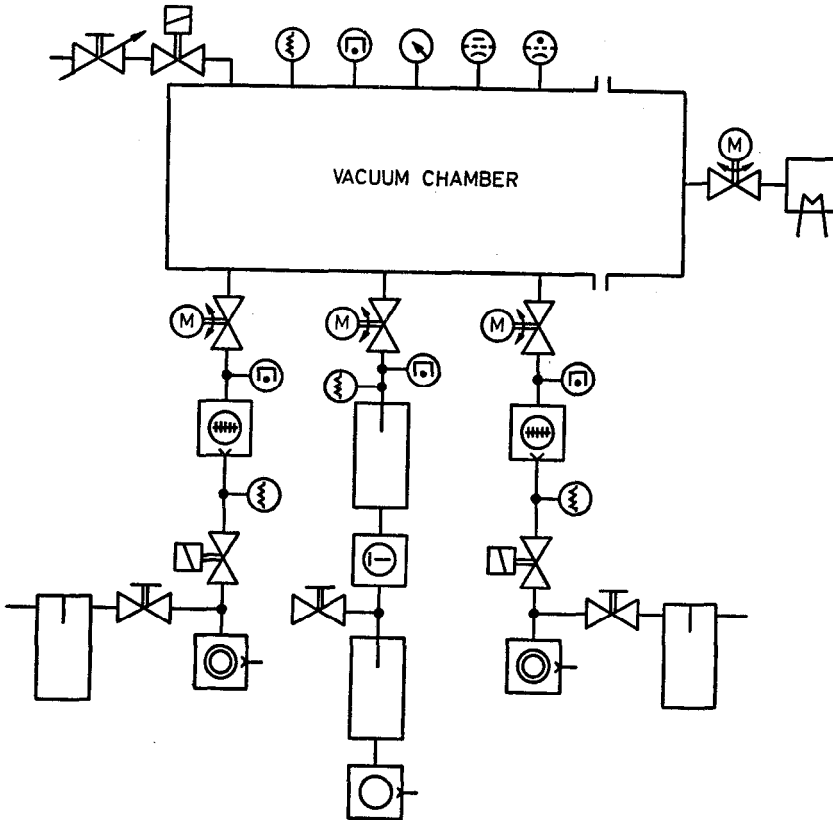
<i>Sl No.</i>	<i>Designation</i>	<i>Symbol</i>
47	Pneumatically or hydraulically operated valve	
48	Electromagnetically operated valve	
49	Valve with electrically motorized operation	
Section 7 Vacuum Chambers		
50	Vacuum chamber (type unspecified)	
51	Bell jar	

APPENDIX A

(Clause 2.2)

SYMBOLS IN COMBINATION

A-1. The use of various symbols in combination is illustrated by the following figure.



(Continued from page 2)

Panel for Standardization of Vacuum Equipment, EDC 57/P-2

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INDIAN STANDARDS

ON

CHEMICAL ENGINEERING

IS:

- 2843-1964 Recommendation on nominal capacities for process equipment
- 2844-1964 Recommendation on nominal diameters for process equipment
- 2845-1964 Recommendation on nominal pressures for process equipment
- 2846-1964 Recommendation on nominal temperatures for process equipment
- 3030-1965 Recommendations for letter symbols, signs and abbreviations used in chemical engineering
- 3132-1965 Recommendations for shaft diameters for chemical equipment
- 3133-1965 Manhole and inspection openings for chemical equipment
- 3223-1967 Graphical symbols for process measurement and control functions
- 3232-1965 Recommendations on graphical symbols for process flow diagrams
- 3233-1965 Glossary of terms for safety and relief valves and their parts
- 3612-1966 Classification and methods for measuring capacity of crushing and grinding equipment
- 4049-1971 Formed ends for tanks and pressure vessels (*first revision*)
- 4092-1967 Basket type centrifuges
- 4110-1967 Glossary of terms used in high vacuum technology
- 4179-1967 Sizes of process vessels and leading dimensions
- 4254-1967 Jaw crushers
- 4255-1967 Gyratory and cone crushers
- 4503-1967 Shell and tube type heat exchangers
- 4642-1968 Ball, pebble and tube mills
- 4682 (Part I)-1968 Code of practice for lining of vessels and equipment for chemical processes: Part I Rubber lining
- 4682 (Part II)-1968 Code of practice for lining of vessels and equipment for chemical processes: Part II Glass enamel lining
- 4682 (Part III)-1969 Code of practice for lining of vessels and equipment for chemical processes: Part III Lead lining
- 4682 (Part IV)-1969 Code of practice for lining of vessels and equipment for chemical processes: Part IV Plasticized PVC lining
- 4682 (Part V)-1970 Code of practice for lining of vessels and equipment for chemical processes: Part V Epoxide resin lining
- 4682 (Part VI)-1970 Code of practice for lining of vessels and equipment for chemical processes: Part VI Phenolic resin lining
- 4682 (Part VII)-1974 Code of practice for lining of vessels and equipment for chemical processes: Part VII Corrosion and heat resistant metals
- 4682 (Part VIII)-1974 Code of practice for lining of vessels and equipment for chemical processes: Part VIII Precious metal
- 4682 (Part IX)-1974 Code of practice for lining of vessels and equipment for chemical processes: Part IX Titanium
- 4682 (Part X)-1974 Code of practice for lining of vessels and equipment for chemical processes: Part X Brick and tile
- 4854 (Part I)-1969 Glossary of terms for valves and their parts: Part I Scfew down-stop, check and gate valves and their parts

- 4854 (Part II)-1968 Glossary of terms for valves and their parts: Part II Plug valves and cocks and their parts
- 4854 (Part III)-1974 Glossary of terms for valves and their parts: Part III Butterfly valves
- 4864-1968 }
to } Shell flanges for vessels and equipment
4870-1968 }
- 4864-1968 General requirements
- 4865-1968 Welded shell flanges for non-pressure service
- 4866-1968 Welded shell flanges for carbon steel pressure vessels and equipment
- 4867-1968 Welded neck shell flanges for carbon steel pressure vessels and equipment
- 4868-1968 Welded shell flanges for stainless steel pressure vessels and equipment
- 4869-1968 Welded shell flanges with hub for stainless steel pressure vessels and equipment
- 4870-1968 Flat gaskets for shell flanges
- 5036-1969 Filter presses recessed plate type, and plate and frame type
- 5428 (Part I)-1969 Gauge glasses for pressure vessels and boilers: Part I Gauge glasses
- 5428 (Part II)-1969 Gauge glasses for pressure vessels and boilers: Part II Protector glasses for tubular gauge glasses
- 5675-1971 Rotary-disk vacuum filters
- 6034-1971 Edge type vacuum filters
- 6076-1971 Dimensions for vacuum flanges
- 6088-1971 Oil-to-water heat exchangers for transformers
- 6157-1971 General rules for inspection of valves and cocks for fluid control purposes
- 6202-1971 Flat glass oil level gauges for oil storage tanks
- 6838-1973 Dimensions of 'O' rings for vacuum flanges and of grooves in vacuum flanges
- 6849 (Part I)-1973 Methods of measurement of the performance characteristics of positive-displacement vacuum pumps: Part I Measurement of the volume rate of flow (pumping speed)
- 6849 (Part II)-1973 Methods of measurement of the performance characteristics of positive-displacement vacuum pumps: Part II Measurement of the ultimate pressure
- 7366-1974 Edge type filters required for filtration of oils of straight mineral type

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Conversion
Force	newton	N	1 N = 1 kg·1 m/s ²
Energy	joule	J	1 J = 1 N·m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V·s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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