

A M E R I C A N S T A N D A R D

Graphical Symbols for Process Flow Diagrams

ASA Y32.11-1961

UDC 003.62:532.5:66

in the PETROLEUM AND
CHEMICAL INDUSTRIES

Sponsors

American Institute of Electrical Engineers
The American Society of Mechanical Engineers

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Foreword

THE development of these symbols under the American Standards Association procedure has been sponsored by The American Society of Mechanical Engineers and the American Institute of Electrical Engineers.

The cooperation of the American Petroleum Institute, American Institute of Chemical Engineers, Instrument Society of America, and the National Electrical Manufacturers Association is hereby acknowledged together with the response received from over 60 individual companies who submitted their drawing symbols for review and consideration by the Task Group.

Following approval by the Sectional Committee and the sponsors, this Standard was approved by the American Standards Association and received its designation on September 11, 1961.

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CONTENTS

| | Page |
|---|---------|
| 1. SCOPE | 5 |
| 2. BASIC PRINCIPLES | 5 |
| 3. GENERAL | 5 |
| 4. SYMBOL CODE NUMBERS AND ITEMS | |
| 1 - 4 Lines | 6 |
| 5 - 8 Valves | 6 |
| 9 - 13 Process Quantities | 7 |
| 14 - 18 Furnaces & Boilers | 7 |
| 19 - 27 Heat Transfer | 8 |
| 28 - 32 Pumps & Compressors | 9 |
| 33 - 36 Drivers | 9 |
| 37 - 41 Process Pressure Vessels | 10 |
| 42 - 46 Dryers | 10 |
| 47 - 53 Material Handling Equipment | 11 |
| 54 - 57 Size Reducing Equipment | 12 |
| 58 - 66 Processing Equipment | 12 - 13 |
| 67 - 73 Separators | 13 - 14 |
| 74 - 79 Storage Vessels | 14 |

AMERICAN STANDARD

Graphical Symbols for Process Flow Diagrams

1. SCOPE

This preliminary set of standard symbols has been developed for use on the basic process flow diagrams in order to represent the major items of equipment used by the petroleum and chemical industries.

A process flow diagram is the first drawing made to show the basic items of major equipment and their relation to one another in the process scheme. The more important flow lines are indicated as connecting these pieces of equipment and help to describe how the process operates.

2. BASIC PRINCIPLES

Simplicity of outline form were considered as paramount in the development of these symbols. The main idea is to preserve the general physical appearance of the equipment, with the minimum strokes to a draftsman.

No scale is applied to a process flow diagram, but the relative size of the symbols should be selected in keeping with the overall size of the

completed drawing. The symbols should be arranged on the drawing in logical sequence of flow, from the charge material to the main product, with a minimum of cross-over lines.



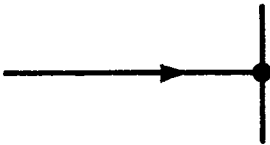
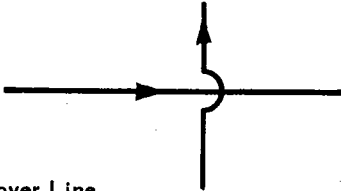
It is suggested that the equipment outlines be drawn by heavy lines, and that the connecting piping be shown as lighter lines. For the purpose of most process flow diagrams it is not considered necessary to indicate any instrumentation or electrical symbols.

3. GENERAL





The following 79 symbols are by no means all that were suggested or that may be required; however, by adopting these as a standard the majority of present processes may be adequately represented.

In the preparation of final drawings for the detailed design, erection or operation of a unit, the process flow diagram must be supplemented by the more detailed engineering flow sheets and the final piping layout drawings.

AMERICAN STANDARD






| Code No. | SUBJECT: LINES |
|----------|--|
| 1 |  <p>Feed Stock (Identify by Name)</p> |
| 2 |  <p>Products (Identify by Name)</p> |
| 3 |  <p>Connecting Lines</p> |
| 4 |  <p>Crossover Line (Break all vertical lines and show loop)</p> |
| | |

REMARKS:

| Code No. | SUBJECT: VALVES |
|----------|---|
| 5 |  <p>Gate</p> |
| 6 |  <p>Globe</p> |
| 7 |  <p>Plug (Cock)</p> |
| 8 |  <p>Check</p> |
| | |

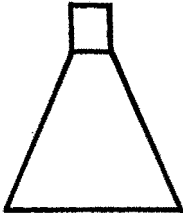
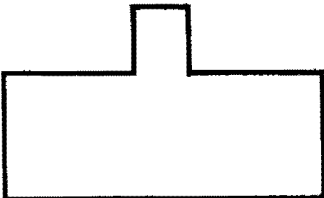
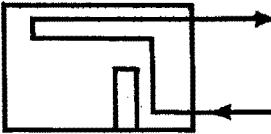
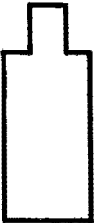
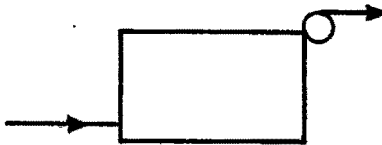
REMARKS: Show valves only where necessary to clarify Process Flow.
See: ASA Z32.2.3-1949
If valve is closed during normal operation write "CLOSED" directly above the valve.

GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS

| Code No. | SUBJECT: PROCESS QUANTITIES |
|----------|--|
| 9 |  Liquid Flow |
| 10 |  Weight Flow |
| 11 |  Gas Flow |
| 12 |  Pressure |
| 13 |  Temperature |

REMARKS:

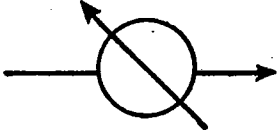
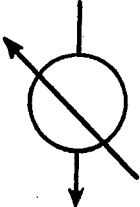
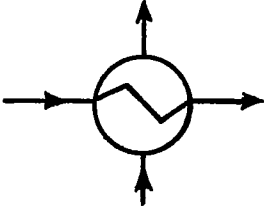
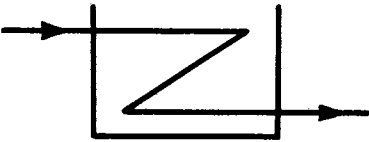

Indicate in drawing legend the values assigned to all units.
Place numerical quantities specified within symbol.

| Code No. | SUBJECT: FURNACES & BOILERS |
|----------|---|
| 14 |  "A" Frame |
| 15 |  Box Type |
| 16 |  Radiant Type (Single Coil) |
| 17 |  Vertical |
| 18 |  Boiler Fired or Waste Heat |

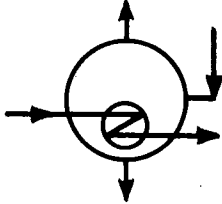
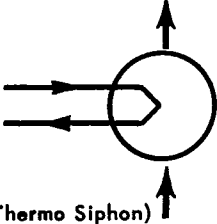
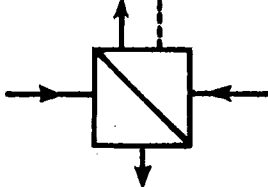
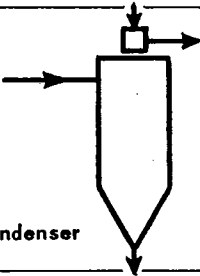
REMARKS:

Indicate approximate position of inlet and outlet.
If dual coil indicate path of both streams.
Do not indicate type of fuel or firing position.

AMERICAN STANDARD

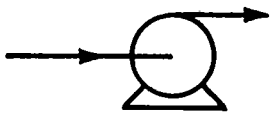
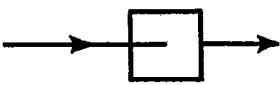
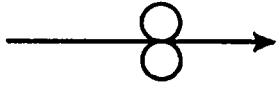

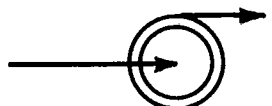
| Code No. | SUBJECT: HEAT TRANSFER |
|----------|--|
| 19 |  <p>Water Cooled Exchanger</p> |
| 20 |  <p>Water Cooled Condenser</p> |
| 21 |  <p>Shell & Tube Exchanger</p> |
| 22 |  <p>Box Cooler (Single Coil)</p> |
| 23 |  <p>Cooling Tower</p> |

REMARKS: Ref. ASA Z32.2.6-1950

| Code No. | SUBJECT: HEAT TRANSFER (Cont'd) |
|----------|---|
| 24 |  <p>Reboiler (Kettle Type)</p> |
| 25 |  <p>Reboiler (Thermo Siphon)</p> |
| 26 |  <p>Superheater or Reheater</p> |
| 27 |  <p>Barometric Condenser</p> |

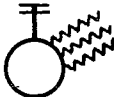




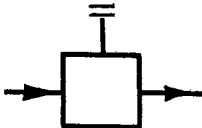
REMARKS: Side view of equipment may be shown for exchangers or reboilers

GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS

| Code No. | SUBJECT: PUMPS & COMPRESSORS |
|----------|--|
| 28 |  Centrifugal |
| 29 |  Reciprocating |
| 30 |  Rotary |
| 31 |  Proportioning |
| 32 |  Blower or Fan (Centrifugal) |

REMARKS:


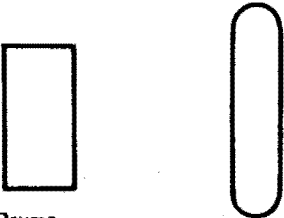

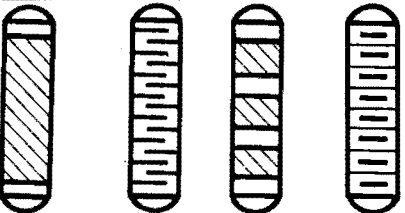
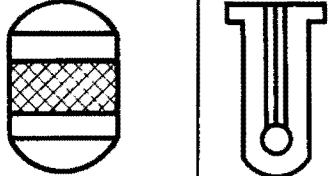
Suggested Changes from
ASA Z32.2.6-1950

| Code No. | SUBJECT: DRIVERS | | |
|----------|---|---|---|
| 33 |  Motor | | |
| 34 |  Engine |  Single Drive |  Dual Drive |
| 35 |  Turbine | | |
| 36 |  Steam Piston | | |
| | | | |


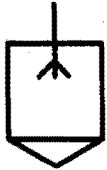
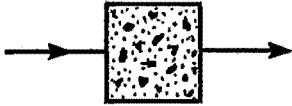
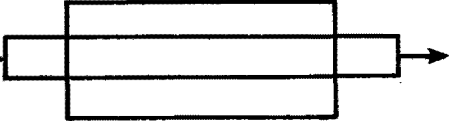
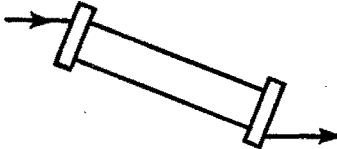
REMARKS:

Drivers may be shown, if desired,
attached to prime mover.
See: ASA Y32.2 for specific
types of motors.

AMERICAN STANDARD

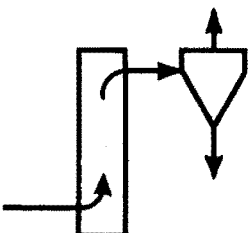
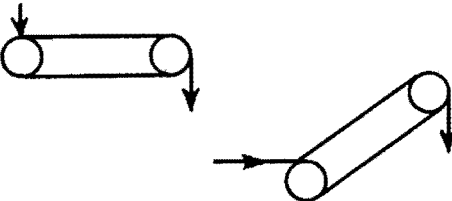
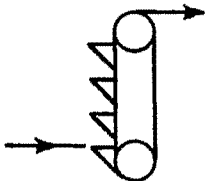

| Code No. | SUBJECT: PROCESS PRESSURE VESSELS |
|----------|---|
| 37 |  <p>Horizontal Drums</p> |
| 38 |  <p>Vertical Drums</p> |
| 39 |  <p>Jacketed Vessel (Partial)</p> |
| 40 |  <p>Packed Columns (Towers) Plate Sectioned Disk & Donut</p> |
| 41 |  <p>Reactor (Catalytic) Reactor (Nuclear)</p> |

REMARKS:

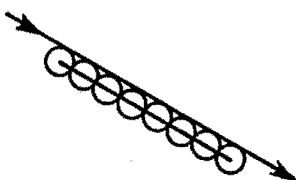
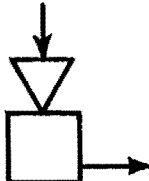

| Code No. | SUBJECT: DRYERS |
|----------|--|
| 42 |  <p>Batch Trays</p> |
| 43 |  <p>Spray</p> |
| 44 |  <p>Desiccant</p> |
| 45 |  <p>Continuous Tunnel</p> |
| 46 |  <p>Rotary Drum Dryer or Kiln</p> |

REMARKS:

GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS



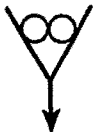
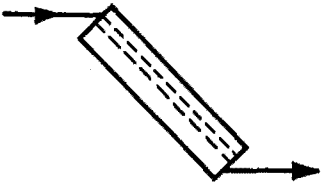
| Code No. | SUBJECT: MATERIAL HANDLING EQUIPMENT |
|----------|---|
| 47 |  <p>Air Lift</p> |
| 48 |  <p>Belt or Shaker</p> |
| 49 |  <p>Bucket or Flight Conveyor</p> |
| 50 |  <p>Screw Conveyor</p> |
| | |

REMARKS:

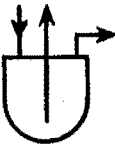

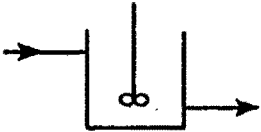

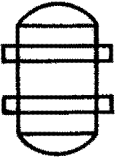
| Code No. | SUBJECT: MATERIAL HANDLING EQUIPMENT (Cont'd) |
|----------|--|
| 51 |  <p>Roller Conveyor</p> |
| 52 |  <p>Feeder & Hopper</p> |
| 53 |  <p>Rotary Feeder</p> |
| | |

REMARKS:

AMERICAN STANDARD




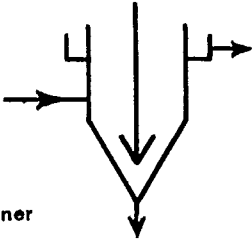
| Code No. | SUBJECT: SIZE REDUCING EQUIPMENT |
|----------|--|
| 54 |  <p>Ball Mill</p> |
| 55 |  <p>Grinder</p> |
| 56 |  <p>Roller Crusher</p> |
| 57 |  <p>Screener</p> |
| | |

REMARKS:

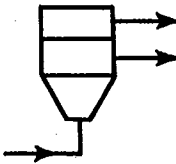
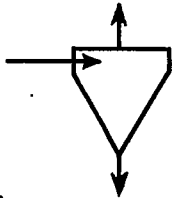
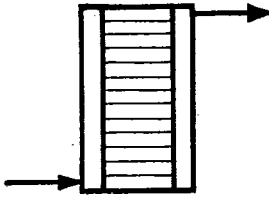
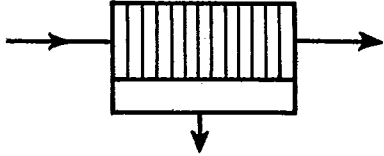
| Code No. | SUBJECT: PROCESSING EQUIPMENT |
|----------|--|
| 58 |  <p>Blowing Egg</p> |
| 59 |  <p>Extractor</p> |
| 60 |  <p>Mixer</p> |
| 61 |  <p>Settler</p> |
| 62 |  <p>Autoclave</p> |

REMARKS:

GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS

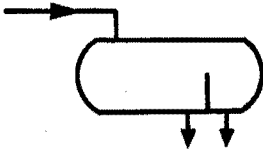
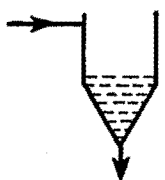
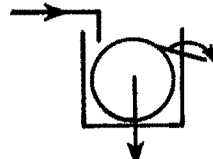
| Code No. | SUBJECT: PROCESSING EQUIPMENT (Cont'd) |
|----------|--|
| 63 |  <p>Kettle-Jacketed</p> |
| 64 |  <p>Rotary Film Dryer or Flaker</p> |
| 65 |  <p>Jet Mixer Injector, Ejector, Eductor</p> |
| 66 |  <p>Thickener</p> |
| | |

REMARKS:


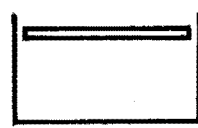

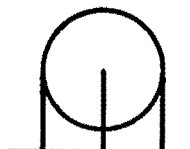


| Code No. | SUBJECT: SEPARATORS |
|----------|---|
| 67 |  <p>Centrifuge</p> |
| 68 |  <p>Cyclone</p> |
| 69 |  <p>Electrical Precipitator</p> |
| 70 |  <p>Filter Press</p> |
| | |

REMARKS:

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| Code No. | SUBJECT: SEPARATORS (Cont'd) |
|----------|--|
| 71 |  <p>Drum Settler</p> |
| 72 |  <p>Open Settling Tank</p> |
| 73 |  <p>Rotary Vacuum Filter</p> |
| | |
| | |

REMARKS:

| Code No. | SUBJECT: STORAGE VESSELS |
|----------|---|
| 74 |  <p>Atmospheric (Cone Roof) Tank</p> |
| 75 |  <p>Floating Roof Tank</p> |
| 76 |  <p>Gas Holder</p> |
| 77 |  <p>Pressure Storage (Sphere or Spheroid)</p> |
| 78 |  <p>Cone Bottom Bin (Bulk Storage)</p> |
| 79 |  <p>Open Top Closed Top Bulk Storage (Non-pressure)</p> |

GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS

ASA Y32.11-1961

Work Sheet No. 1

This page is provided for your use in recording any changes or adding new symbols which you feel should be included in the next edition of the Standard.

Please detach page and return to the ASME.

| Code No. | SUBJECT: | | |
|----------|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Remarks: | TO: STANDARDS DEPARTMENT, ASME BY: TITLE: COMPANY: ADDRESS: LOCATION: | | |

American Standards of Particular Interest to Designers, Architects and Draftsmen

| TITLE OF STANDARD | PRICE |
|--|----------------|
| Graphical Symbols for: | |
| Process Flow Diagrams, Y32.11-1961 | \$1.50 |
| Welding, Y32.3-1959 | 3.00 |
| Plumbing, Y32.4-1955 | 1.00 |
| Pipe Fittings, Valves and Piping, Z32.2.3-1949 (Reaffirmed 1953) | 1.00 |
| Heating, Ventilating, and Air Conditioning, Z32.2.4-1949 | 1.50 |
| Use on Railroad Maps and Profiles, Y32.7-1957 | 1.50 |
| Heat-Power Apparatus, Z32.2.6-1950 (Reaffirmed 1956) | 1.00 |
| Fluid Power Diagrams, Y32.10-1958 | 1.50 |
| Metallizing Symbols, Y32.12-1960 | 1.50 |
| Letter Symbols for: | |
| Acoustics, Y10.11-1953 (Reaffirmed 1959) | 1.00 |
| Aeronautical Sciences, Y10.7-1954 | 2.00 |
| Chemical Engineering, Y10.12-1955 (Reaffirmed 1961) | 1.50 |
| Heat and Thermodynamics, Y10.4-1957 | 1.50 |
| Hydraulics, Y10.2-1958 | 1.00 |
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