

| Date (mm-dd-yyyy) | Issued For                           | Rev. |
|-------------------|--------------------------------------|------|
| 09-21-2007        | TITLE 1 60% REVIEW                   | A    |
| 10-24-2007        | TITLE 1 100% COMPLETE                | B    |
| 12-07-2007        | TITLE II DESIGN 30% REVIEW SUBMITTAL | C    |
| 03-28-2008        | TITLE II DESIGN 60% REVIEW SUBMITTAL | D    |
| 07-31-2008        | TITLE II DESIGN 90% REVIEW SUBMITTAL | E    |
| 08-25-2008        | TITLE II DESIGN 100% OWNER REVIEW    | F    |
| 02-19-2009        | TITLE II CONSTRUCTION BID ISSUE      | G    |

MECHANICAL SYMBOLS

HVAC-DUCTWORK

- EXISTING DUCTWORK
- FUTURE DUCTWORK
- NEW DUCTWORK
- EXISTING DUCTWORK TO BE DEMOLISHED UNTO BE ABANDONED
- DUCT DESIGNATION (RECTANGULAR) SUPPLY AIR/MAKE-UP AIR
- DUCT DESIGNATION (RECTANGULAR) RETURN AIR/EXHAUST AIR
- DUCTWORK UP (ROUND) (RECTANGULAR)
- DUCTWORK DOWN (ROUND) (RECTANGULAR)
- DUCTWORK BRANCH UP (ROUND) (RECTANGULAR)
- DUCTWORK BRANCH DOWN (ROUND) (RECTANGULAR)
- DUCTWORK AT 45° DROP - LABEL DIRECTION OF SLOPE (UP/DN)
- DUCT BREAK
- DUCT END
- SUPPLY DIFFUSER
- EXHAUST OR RETURN REGISTER OR GRILLE
- SIDEWALL SUPPLY OR RETURN REGISTER
- TURNING VANES
- GRAVITY DAMPER (HORIZ BLADE SHOWN IN ELEVATION)
- MANUAL DAMPER (HORIZ BLADE SHOWN IN ELEVATION)
- MOTOR OPERATED DAMPER (HORIZ BLADE SHOWN IN ELEVATION)
- DAMPER (SHOWN IN PLAN)
- VOLUME DAMPER
- VERTICAL FIRE DAMPER
- HORIZONTAL FIRE DAMPER
- VERTICAL SMOKE DAMPER
- HORIZONTAL SMOKE DAMPER
- VERTICAL FIRE & SMOKE DAMPER (HORIZONTAL AIR FLOW)
- HORIZONTAL FIRE & SMOKE DAMPER (VERTICAL AIR FLOW)
- FLEXIBLE CONNECTION @ EQUIPMENT
- FLEXIBLE DUCT (MAX LENGTH 5'-0")
- BRANCH CONNECTION
- SPIN-IN CONNECTION WITH VOLUME DAMPER
- VAV, CAV OR FAN POWERED BOX
- VAV, CAV OR FAN POWERED BOX (W/REHEAT COIL)
- UNIT HEATER
- SUPPLY AIR-FLOW ARROW
- EXHAUST OR RETURN AIR-FLOW ARROW
- HUMIDISTAT
- THERMOSTAT
- CENTRIFUGAL FAN
- PROPELLER FAN

PIPING - PLUMBING

- EXISTING PIPING
- FUTURE PIPING
- NEW PIPING
- EXISTING PIPING TO BE DEMOLISHED UNTO BE ABANDONED
- PNEUMATIC SIGNAL
- ELECTRICAL SIGNAL / CONTROL SIGNAL
- PIPE SYSTEM (EMBEDDED IN LINE) SEE ABBREVIATIONS FOR SYSTEM
- PIPE UP
- PIPE DOWN
- PIPE BRANCH UP
- PIPE BRANCH DOWN
- PIPE AT 45° DROP
- PIPE BREAK
- PIPE BREAK (DOUBLE LINE)
- DIRECTION OF FLOW
- ANCHOR ON PIPE RUN
- HANGER / SUPPORT ON PIPE RUN
- GUIDE ON PIPE RUN
- SPRING HANGER
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- END CAP (THREADED)
- END CAP (WELDED)
- END CAP (WELDED) (DOUBLE LINE)
- BLIND FLANGE
- BLIND FLANGE (DOUBLE LINE)
- ORIFICE FLANGES WITH PLATE/ORIFICE UNION
- UNION
- HOSE ADAPTER
- P-TRAP
- RUNNING TRAP
- RUNNING TRAP WITH CLEAN OUT
- HORIZONTAL CLEAN OUT
- CLEAN OUT UP THRU FLOOR
- FLOOR DRAIN OR ROOF SUMP
- HUB OUTLET
- FUNNEL DRAIN / OPEN DRAIN
- AUTO AIR VENT TO DRAIN
- MANUAL AIR VENT TO DRAIN
- BACKFLOW PREVENTOR W/AIR GAP
- DRAIN WITH THREADED CAP
- Y-STRAINER
- Y-STRAINER WITH BLOWDOWN
- FLEX CONNECTOR (DOUBLE LINE PIPE)
- FLEXIBLE CONNECTOR
- HEAT TRACE
- EMERGENCY EYE WASH OR EMERGENCY SHOWER OR EMERGENCY EYE WASH & SHOWER
- STEAM OR COMPRESSED AIR TRAP

- PUMP
- FILTER OR BASKET STRAINER
- TEMPERATURE INDICATOR (W/THERMOWELL)
- STEM THERMOMETER (W/THERMOWELL)
- TEMPERATURE TRANSMITTER (W/THERMOWELL BY I&C)
- TEST POINT THERMOWELL
- PRESSURE INDICATOR (W/BALL VALVE) FOR GASES, LIQUIDS & PLASTIC PIPING
- PRESSURE INDICATOR (W/NEEDLE VALVE) FOR LIQUIDS
- PRESSURE INDICATOR (W/GATE VALVE) FOR STEAM & CONDENSATE SYSTEMS
- PRESSURE INDICATOR (W/DIAPHRAGM SEAL & NEEDLE VALVE)
- PRESSURE TAP FOR TRANSMITTER
- COMPOUND GAUGE (W/ NEEDLE VALVE) FOR PRESSURE/VACUUM
- COMPOUND GAUGE (W/EXTERNAL SNUBBER & NEEDLE VALVE) FOR PRESURE/VACUUM
- FLOW OR LEVEL ELEMENT WITH 2-1/2" FULL PORT BALL VALVE
- FLOW METER (IN-LINE)

VALVES - OPEN

- BALANCING VALVE
- BALL VALVE
- BUTTERFLY VALVE
- DIAPHRAGM VALVE
- FLOW BALANCING DEVICE
- CHECK VALVE (SWING CHECK)
- NON-SLAM CHECK VALVE
- DIAPHRAGM VALVE
- GATE VALVE
- GLOBE VALVE
- REFRIGERANT VALVE
- NEEDLE VALVE
- PINCH VALVE
- PLUG VALVE
- BALL VALVE - 3 WAY
- ANGLE VALVE
- STEAM SAFETY VALVE WITH VENT DRAIN PAN ELBOW (ELEVATION)
- PRESSURE RELIEF VALVE (ELEVATION)
- PRESSURE RELIEF VALVE (PLAN)
- VALVE IN RISER (PLAN)
- PRESSURE REDUCING VALVE - SELF CONTAINED
- PRESSURE REDUCING VALVE - SELF CONTAINED
- BACK PRESSURE VALVE - SELF CONTAINED
- PRESSURE REDUCING VALVE - SELF CONTAINED PILOT OPERATED
- SAFETY SHUT-OFF VALVE

CONTROL VALVE & DAMPER ACTUATORS

- PNEUMATIC DIAPHRAGM
- PNEUMATIC DIAPHRAGM WITH TOP MOUNTED OVERRIDE
- PNEUMATIC DIAPHRAGM WITH MANUAL OVERRIDE
- PNEUMATIC CYLINDER
- PNEUMATIC CYLINDER WITH MANUAL OVERRIDE
- MOTORIZED
- MOTORIZED WITH MANUAL OVERRIDE
- SOLENOID
- MANUAL (GEAR, LEVER OR CHAIN OPERATOR)

VALVES - CLOSED

- BALL VALVE
- BUTTERFLY VALVE
- DIAPHRAGM VALVE
- GATE VALVE
- GLOBE VALVE
- NEEDLE VALVE
- PINCH VALVE
- PLUG VALVE
- ANGLE VALVE

MISCELLANEOUS

- EQUIPMENT ABBREVIATION
- EQUIPMENT IDENTIFIER
- EQUIPMENT NUMBER PER SCHEDULE
- SECTION NUMBER
- SECTION MARKER AND ARROW
- SHEET NUMBER WHERE SECTION IS FOUND OR CUT FROM
- DETAIL NUMBER
- DETAIL MARKER
- SHEET NUMBER WHERE DETAIL IS FOUND OR REFERENCED FROM
- ENLARGED PLAN NUMBER
- ENLARGED PLAN MARKER
- SHEET NUMBER WHERE ENLARGED PLAN IS FOUND OR REFERENCED FROM
- POINT OF CONNECTION
- MATCH LINE

FIRE PROTECTION

- AUTOMATIC SPRINKLER RISER (ASR) - WET
- AUTOMATIC SPRINKLER RISER (ASR) - DRY
- AUTOMATIC SPRINKLER RISER (ASR) - DELUGE
- AUTOMATIC SPRINKLER RISER (ASR) - PREACTION
- SPRINKLER HEAD - UPRIGHT
- SPRINKLER HEAD - PENDENT
- SPRINKLER HEAD - DRY PENDENT
- SPRINKLER HEAD - FLUSH MOUNTED
- CEILING SPRINKLER HEAD - SIDE WALL MOUNTED
- SIAMESE CONNECTION
- SMOKE DETECTOR
- PULL STATION
- FLASHING STROBE
- ALARM BELL
- FIRE HOSE CABINET / HOSE REEL - SURFACE MOUNTED
- FIRE HOSE CABINET / HOSE REEL - RECESSED
- ROOF HOSE HOUSE
- ALARM CHECK VALVE

PROJECT SPECIFIC

This drawing has been prepared solely for the use of Brookhaven National Laboratory and there are no representations of any kind made by Giffels Partnership to any party with whom Giffels Partnership has not entered into a contract.

This drawing shall not be used for construction purposes until the seal and signature of the responsible registrant appears on the drawing and proper permit forms and related fees are transmitted by the Owner, Owner's Agent or Contractor to the Authority Having Jurisdiction.

| JOB NO.   | SHEET NO.              | REVISION         | DATE                             | DWG.     | APPR. | QA |
|---|------------------------|------------------|----------------------------------|----------|-------|----|
|   |                        |                  |                                  |          |       |    |
| UNDER CONTRACT WITH<br><b>UNITED STATES DEPARTMENT OF ENERGY</b><br>PLANT ENGINEERING DIVISION<br>UPTON, NEW YORK 11973 |                        |                  |                                  |          |       |    |
| JOB TITLE<br>CENTRAL CHILLED WATER FACILITY PHASE II  |                        |                  | DWG. TITLE<br>MECHANICAL SYMBOLS |          |       |    |
| UR/APPL/INH. NEW  | DATE                   | ACCT. NO.        | SHEET OF                         |          |       |    |
| SCALE<br>NO SCALE   | DWN. BY<br>EP          | REV'D BY<br>BN   | JOB NO.<br>11705                 | DWG. NO. |       |    |
| ES&H RISK LEVEL   | APP'D BY<br>W HARRISON | BLDG. NO.<br>600 | M-003                            |          |       |    |
| PATH:   |                        |                  |                                  |          |       |    |

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