

TITLE

BILLS OF MATERIAL

I. ASSIGNMENT:

- A. The Contractor shall make a complete Bill of Material for each phase of the work.
- B. The Owner shall make a Bill of Material showing all major pieces of equipment, including vessels, major instruments, pumps, transformers, switchgear, etc. In addition, this Bill will include the following internals and attachments:
 1. Trays, Baffles, Packing Supports
 2. Packing for Vessels
 3. Sight Glasses
 4. Rupture Discs (But Not Covers)
 5. Pressure Gauges
 6. Thermometers
 7. Thermowells
 8. Orifice Plates

II. COVERAGE:

- A. Each Bill of Material shall list all material required for the job unless otherwise excepted. The description shall be complete so that the Bill can be used for a purchase order.
- B. It shall not be necessary to list the following on a Bill of Material:
 1. Piping:
 - a. Asbestos gaskets
 - b. Threaded nipples
 - c. Bolts, nuts and washers
 - d. Expendable supplies
 2. Electrical:
 - a. Insulating tapes (Splicing and terminating kits should be specified for voltages above 2.3 KV.)
 - b. Bolts, nuts and washers up to and including $\frac{1}{4}$ " with lengths not exceeding $1\frac{1}{2}$ ".
 - c. Expendable supplies

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II. COVERAGE: (Cont'd.)

3. Instrumentation:

- a. Insulating tapes
- b. Bolts, nuts and washers
- c. U-bolts
- d. Asbestos gaskets
- e. Expendable supplies

- C. It shall not be necessary to itemize individual pieces of material that will be purchased or installed directly from a drawing such as concrete, fabricated structural steel, and reinforcing steel.

III. ARRANGEMENT:

A. Piping

A bill of material shall be made for each area. This bill will list all of the material necessary for each line in the area and shall be arranged as follows:

1. Separate page shall be made for each line number, listing all the material required for that line in the following sequence:

- a. Valves, arranged by "V" number and size
- b. Strainers
- c. Traps
- d. Gaskets (other than asbestos)
- e. Flanges
- f. Ells
- g. Tees
- h. Reducers
- j. Unions
- k. Couplings
- l. Other fittings
- m. Pipe

2. Pages of the Bill shall be arranged in numerical sequence by line number.

3. A recapitulation shall be made of each Bill for all like material in the following sequence:

- a. Valves, arranged by "V" number and size
- b. Strainers
- c. Traps
- d. Gaskets
- e. Carbon steel flanges, ells, etc., as above
- f. Alloy flanges, ells, etc.
- g. Plastic flanges, ells, etc.

TITLE

ARCHITECTURAL MATERIAL DESIGN SPECIFICATIONS

VI. WINDOWS:

- A. Air conditioned buildings to have industrial steel fixed windows. Glass shall be Pittsburgh Plate Glass wire reinforced glass.
- B. Gravity ventilated buildings should have industrial steel awning windows. Glass to be Pittsburgh Plate Glass wire reinforced glass.

VII. ASBESTOS ROOFING AND SIDING:

- A. Asbestos roofing and siding to be 3/8" thick corrugated asbestos and cement.
- B. Roofing and siding to be attached to supporting steel by means of self-tapping stainless steel screws with Neoprene washers.
- C. Color of asbestos roofing and siding will be specified by the Owner.

VIII. PLASTIC ROOFING AND SIDING:

- A. Plastic roofing and siding panels are to be fire retardant with underwriters label.
- B. Color of panels will be specified by Owner.

IX. FINISH AND PAINTING:

Color and type of finish will be specified by the Owner.

TITLE

INSTRUMENT SPECIFICATIONS: MATERIAL

II. ELECTRICAL INSTRUMENTATION: (Cont'd.)

2. Extension Wire Specifications

To secure the advantages of automatic reference junction compensation, the extension wires connecting couples to instruments must be of the same materials as the couples, or of materials having essentially the same temperature-EMF relationship. Several different types of insulation materials are available, but the following specified material should cover all present applications. If special insulation is required consult Engineering.

a. Two Conductor

Two conductor extension wire shall be twisted conductors, Dekoron type MX or equal. Engineering will specify type of extension wire required if electrostatic and electromagnetic noise rejection is required.

COPPER-CONSTANTAN EXTENSION LEAD WIRE

<u>Wire Size</u>	<u>Insulation</u>	<u>Temp. Limits</u>	<u>MH</u>	<u>IAN</u>	<u>Dekoron</u>
#1 16 Ga.	Polyvinyl over Polyvinyl	200° F. Max.	AW2P4	NA	MX
#2 16 Ga.	Weatherproof braid over heat resistant rubber	175° F. Max.	NA	16-56-1	

IRON-CONSTANTAN EXTENSION LEAD WIRE

<u>Wire Size</u>	<u>Insulation</u>	<u>Temp. Limits</u>	<u>MH</u>	<u>IAN</u>	<u>Dekoron</u>
#1 16 Ga.	Polyvinyl over Polyvinyl	220° F. Max.	3W2P4	NA	MX
#2 16 Ga.	Weatherproof braid over Polyvinyl	220° F. Max.	3W2A14	16-51-7	
#3 16 Ga.	Weatherproof braid over heat resistant rubber	175° F. Max.	NA	16-51-1	
#4 16 Ga.	Asbestos over enameled wire	400° F. Max.	3W2B4	16-51-2	

TYPE

INSTRUMENT SPECIFICATIONS: MATERIAL

II. ELECTRICAL INSTRUMENTATION: (Cont'd.)

CEROMEL-ALUMEL EXTENSION LEAD WIRE

Wire Size	Insulation	Temp. Limit	MH	LFW	Dekoron
#1 16 Ga.	Polyvinyl over Polyvinyl	220° F.	5W2P14	NA	MX
#2 16 Ga.	Weatherproof braid over Polyvinyl	220° F.	NA	16-59-10	
#3 16 Ga.	Weatherproof braid over heat resistant rubber	175° F.	NA	16-59-1	
#4 16 Ga.	Asbestos over enameled wire	400° F.	5W2B14	16-59-2	

b. Multi-Conductor Extension Wire Cable

Multi-conductor extension wire cable should be Dekoron type A or equal. Conductors should be 20 gauge with each pair twisted.

Engineering will specify type of multi-conductor extension wire cable required if rejection of extraneous noise is required.

C. pH Lead Wire

Beckman #43404

D. Electronic Control System Multi-Conductor Cable

Okonite Co. or equal

16 Ga., 7 stranded copper, .020" Okolene, .010 Okoseal #500, solid color coded, twisted pairs, cabled, nylon tape, .080" Okoseal jacket, 600 V.

E. Electronic Control System Two Conductor Cable

Belden #8790

F. Thermocouple multi-conductor extension cable and electronic control cable trays

P-W Industries or equal tray system, 3" high channel sides, mesh bottom.

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