BOWEN ENGINEERING, Inc.

SPECIALISTS IN SPRAY DRYING EQUIPMENT SINCE 1926

NORTH BRANCH · NEW JERSEY
TEL. RANDOLPH 8-3232

February 11, 1964

E. I. duPont de Nemours & Company
Newport Pigments
Newport, Delaware

Attention: Mr. K. Schneider, Project Engineer

Reference: Bowen Spray Dryer for Red Pigment

Gentlemen:

In accordance with our recent conversation, we are pleased to submit for your consideration our attached proposal for a Bowen Spray Dryer for drying your red pigment.

The equipment proposed basically consists of a Bowen 7 ft. diameter spray dryer with a Mikro-Pulsaire bag collector. The air volume through the system has been fixed by the recommended air to cloth ratio for this type material. At an air to cloth ratio of 5 to 1, which is the maximum recommended for this type product, the equipment proposed will have a production rate of 350 lbs/hr based on the results of the test work performed in the Bowen Pilot Plant. If the main fan is dampered back to maintain an air to cloth ratio of 4 to 1 the production rate will be approximately 270 lbs/hr. Therefore, in the equipment proposed there is sufficient flexibility to allow operating on a wide range of air volumes and still maintain very respectable production rates on this product.

Another factor that affects the production rate for a given air volume is the per cent solids in the feed. The above capacities for this product are based on a feed containing 30% solids. If the per cent solids can be increased and the material can be pumped to the spray machine, your production rate would be affected inversely. For example, when the per cent solids is increased to 35% your production rate would be increased to approximately 435 lbs/hr. This holds true because the evaporative capacity of the dryer is the fixed value. Operating under the conditions of a 700°F inlet and a 200°F outlet the dryer would evaporate 815 pounds of water per hour.

The drawing that we have submitted for this application is preliminary from a standpoint that we have not attempted to fix the dryer in a given position since the interconnecting duct work will be furnished by duPont. The drawing basically represents the

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dimensions of the chamber and you can position this unit in the building as you wish. The only restriction is the concrete beam in the ceiling of the room that affects the location of the burner. In our drawing we have shown the chamber 4 feet from each wall in the corner to allow general access all around the dryer, however, there is no reason why the chamber cannot be moved closer to the corner should you so desire. By moving the dryer into the corner, it is possible that the duct work adjoining the burner to the chamber can be shortened to tie the system somewhat closer together. Regarding the burner support, we have not included structural steel to support the burner from the ground as it appears that this can best be supported from the main beam through the ceiling.

We suggest that you position the chamber in the location that is best suited to your needs and mark up one of the enclosed drawings and return it to us, then when the order for this equipment is placed we will have a general assembly drawing that will show the equipment exactly as you wish it to be supplied.

In our previous conversations we have indicated that delivery on this equipment would be from 12 to 14 weeks. Please note that the delivery time is quoted at 4 to 5 months. This would be the maximum delivery time for this equipment. At the time the equipment is purchased we will be able to give you a firm and accurate delivery date.

We are confident that the equipment proposed offers you the most flexible and best design for handling your materials and trust that we will have the pleasure of furnishing you with this equipment. Should you have any questions on the details of our proposal or desire additional information, please do not hesitate to contact us directly or our representative in your area, T. E. Grimac Company, 302 Marlton Pike, P. O. Box 7, Cherry Hill, New Jersey; Telephone NO 3-4900.

Very truly yours,

BOWEN ENGINEERING, INC.

R. W. Bayliss
Sales Department

RWB/ek

A P R O P O S A L

F O R

E. I. du PONT de NEMOURS & COMPANY
NEWPORT PIGMENTS PLANT
NEWPORT, DELAWARE

NO. 64-1053

F O R

ONE (1) BOWEN ENGINEERING, INC.
7 FOOT DIAMETER SPRAY DRYER

FEBRUARY 11, 1964

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I N D E X

BOWEN 7 FOOT DIAMETER SPRAY DRYER

DUP050054447

BOWEN ENGINEERING, Inc.

SPECIALISTS IN SPRAY DRYING EQUIPMENT SINCE 1926

NORTH BRANCH • NEW JERSEY
TEL. RANDOLPH 5-3232

February 11, 1964
Quotation No. 64-1053

E. I. du Pont de Nemours & Company
Newport Pigments Plant
Newport, Delaware

Attention: Mr. Ken Schnieder

Gentlemen:

We are pleased to present our quotation for Bowen spray drying equipment to produce your red pigment material at a rate of 350 pounds per hour of product from a feed of 30% solids by weight.

The equipment selection is based on test P63-755 made in the Bowen Laboratory. Special arrangement of the equipment is shown on drawing 64-D-79.

For this application, we are pleased to offer the following spray drying equipment and services for your acceptance:

One (1) Bowen 7 foot diameter Spray Dryer in accordance with the attached specifications, consisting generally of the following component parts:

Inlet air filters, direct gas fired air heater, drying chamber with top central hot air inlet and steep cone bottom, bag collector, rotary air lock, main fan and motor, centrifugal atomization system, automatic dryer operating and safety controls and dryer supporting structural steel. The equipment will be fabricated of Type 304 stainless steel at all product contact points. Startup of the equipment by a Bowen Field Engineer is included. All motors are included and are of totally enclosed construction.

PRICE

Thirty Seven Thousand Four Hundred Fifty ($37,450.00) Dollars, F.O.B. Points of Fabrication.

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E. I. du Pont de Nemours & Company February 11, 1964
Quotation No. 64-1053

SHIPMENT

Approximately four (4) to five (5) months. All shipments are quoted from the time of your approval of a preliminary assembly drawing and furnishing of necessary information, acceptance by Bowen Engineering, Inc. of your purchase order and are based on the present situation with regard to obtaining material and purchased items required for the equipment proposed. All shipments are based on our expectations but we assume no liability for damages on account of delays in fabrication or shipment.

TERMS

Net cash thirty (30) days from shipment of the equipment. Partial shipments will be allowed with proportionate billing at time of shipment.

In the event shipment is delayed at Customer's request, the amount due upon shipment will become payable upon written notification by Bowen Engineering, Inc. that the equipment is ready for shipment.

All applicable, Federal, State and Local sales, use and excise taxes are in addition to the above sales price and are to be paid by the Purchaser directly to the taxing authority.

Any order placed for equipment offered in this quotation shall be addressed to Bowen Engineering, Inc., North Branch, New Jersey.

ACCEPTANCE

This proposal is offered for acceptance within thirty (30) days unless continuation is given in writing by Bowen Engineering, Inc. All prices are quoted subject to confirming test.

CONDITIONS OF SALE

This proposal is made in accordance with the attached conditions of sale which are part of this proposal.

DUP050054449

E. I. du Pont de Nemours & Company

February 11, 1964
Quotation No. 64-1053

Should you have any questions regarding the foregoing quotation, please do not hesitate to contact our Mr. R. W. Bayliss at this office directly, or our representative in your area, T. E. Grimac Company, 302 Marlton Pike, P. O. Box 7, Cherry Hill, New Jersey, Telephone NO-3-4900.

Respectfully submitted,

BOWEN ENGINEERING, INC.

T. R. Richardson

TRR:dm
Encl.
Drawing No. 64-D-79

T. R. Richardson, Manager
Quotation Section
Sales Engineering

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GENERAL SPECIFICATIONS

AIR FILTERS

Disposable air filters to filter all the drying air prior to heating, complete with mounting frame and weather hood.

AIR HEATER

Direct fired air heater for heating the drying air to 800°F maximum, assuming 0°F minimum entering air temperature, using natural gas at 2 psig minimum pressure, complete with accessories as follows:

a) Main burner assembly.

b) Gas pilot burner and spark ignited automatic ignition.

c) Combustion safeguard equipment.

d) Factory Mutual approved safety shutoff valve.

e) Over-temperature limit switch, gas pressure switch and fan suction switch.

f) Air fuel mixer with 3/4 HP motor.

The heater shell is constructed of Type 304 stainless steel. Controls included are of weather proof construction arranged to meet duPont safety standards.

DRYING CHAMBER

Bowen conical type drying chamber with cylindrical portion seven (7) feet in diameter, with 70° cone bottom, provided with top central hot air inlet, access door, explosion door, observation port and operating deck. Lighting for the chamber interior is provided. The product leaves the chamber through the tip of the lower conical section and is conveyed by the drying air to the collector. The chamber shall be constructed of Type 304 stainless steel except for external bracing and flanges which will be carbon steel.

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GENERAL SPECIFICATIONS

BAG COLLECTOR

One (1) bag collector, constructed with product contact parts of Type 304 stainless steel, complete with single hopper bottom housing, two (2) access doors, and explosion door, 10" manometer for observing differential pressures and a complete set of explosion-proof solenoid valves with timing switch and fittings. The collector is selected for a 5:1 filter ratio.

ROTARY AIR LOCK

One (1) rotary air lock, constructed of Ni-Resist housing, complete with stainless steel rotor and Delrin blades with 1/4 HP motor and drive.

DUCT WORK

Air Filter to Air Heater	Galvanized steel.
Air Heater to Chamber	Type 304 stainless steel.

MAIN FAN

Heavy duty, ball-bearing type carbon steel fan, complete with outlet damper, access door and housing drain arranged for V-belt drive to a 10 HP motor.

SPRAY MACHINE

Bowen high speed Type AA spray machine, a completely self contained high frequency, vertial mounted electric motor enclosed in a water jacketed housing. The motor shaft is dynamically balanced and mounted in super precision ball bearings which are oil lubricated with excess oil being removed by vacuum. Liquid feed is introduced to the atomizer through a Type 316 stainless steel feed pipe to a feed distributor at the bottom of the housing. The atomizer is closely coupled to the machine at the feed distributor.

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GENERAL SPECIFICATIONS

ATOMIZER

Bowen Type CSE centrifugal atomizer, a precision wheel dynamically balanced, of an inverted saucer shaped disc of stainless steel. Feed material is introduced in a central annulus from the feed distributor of the machine and flows outward across the under surface of the disc to the point of atomization at the circumference.

FREQUENCY CONVERTER SET

Frequency converter, a wound rotor motor V-belt driven by a 15 HP squirrel cage motor, complete with common mounting base, V-belt drive and beltguard and rated to give 10 KW output at maximum drive speed. The V-belt drive furnished with produce a driven speed which will generate a frequency to operate the spray machine at 21,000 RPM. Other spray machine speeds may be obtained by altering the drive ratio.

TERMINAL BRACKET

A free standing steel panel located on the chamber operating deck for terminating plant service lines and connection of the flexible spray machine service lines. Included with the terminal bracket are forced feed lubricator, vacuum pump and bubbling bottles with 1/4 HP motor, flexible hoses, ammeter, voltmeter, water flow switch and thermometers. The ammeter, voltmeter, water flow switch and thermometers are connected in the Purchaser's service lines.

INSTRUMENTATION

In addition to the "Terminal Bracket" described, the following will be provided:

a) One (1) two-pen pneumatic temperature recorder-controller; one pen to record and control the dryer inlet air temperature, the other pen to record the dryer outlet air temperature. Instrument, complete with full proportional band, automatic reset and automatic-manual bypass. Spring wound chart drive for explosion-proof operation.

b) One (1) control valve for gas flow to the air heater with pneumatic operator and positioner.

DUP050054453

GENERAL SPECIFICATIONS

INSTRUMENTATION (Continued)

c) One (1) electronic flame safeguard unit incorporated into a safety system with a flame rod, safety shut-off valves, solenoid valve, pilot solenoid valve, gas pressure limit switches, high temperature limit switch, purge timer and ignition pushbutton.

d) Pressure gauge for static pressure measurements in the system.

e) One (1) ammeter for the main fan.

STRUCTURAL STEEL

The structural steel supports and framing for the support of the drying chamber specified above will be supplied by Bowen. Drawings will be provided showing weights and points of support. Footings and/or foundations will be provided by the Purchaser.

BOLTS AND GASKETS

All gaskets, nuts and bolts for flanged joints in the foregoing equipment will be provided.

ELECTRICAL EQUIPMENT

All electrical motors enumerated above will be provided in totally enclosed construction and for 220/440 volts, 3 phase, 60 cycle current.

Instrumentation will be provided for 110 volts, single phase, 60 cycle current.

Starting equipment and pushbutton stations will be provided by the Purchaser.

The frequency converter is only available in open-construction, therefore, the set will be provided in open-construction for 220/440 volts, 3 phase, 60 cycle current.

Equipment for other electrical characteristics can be provided with slight price modifications.

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GENERAL SPECIFICATIONS

DRAWINGS

Three (3) sets of detailed equipment specifications and books of instructions showing method of assembly, care and operation of the equipment, will be provided, unless otherwise requested at time of purchase. Installation drawings, including the drawings referred to under paragraph entitled "Structural Steel" will be provided as single reproducible prints with three (3) copies.

STARTUP SERVICE

The foregoing spray drying equipment is to be installed by the Purchaser in accordance with instructions which we provide. Within a reasonable time after notification by the Purchaser that such work is completed, Bowen will furnish the service of a Field Engineer to check out the installation, make adjustments if necessary, and supervise startup. It is estimated that not more than five (5) days will be required for this service. This service will be at no charge to the Purchaser up to the time the equipment is in operation.

The guarantees and warrantees of this quotation are valid only if the equipment is started up under the supervision of Bowen Engineering, Inc. Engineers.

Charges for the services of our Field Engineer will be extra under the following conditions and will be at the rate of Seventy Five ($75.00) Dollars per day including travel time plus living and travel expenses:

a) When, because of delays in startup beyond our control, additional time or non-consecutive time requiring additional travel expense is spent at the job site. This would apply, for instance, when our Field Engineer has been summoned by the Purchaser before the installation is complete and before the equipment is ready for startup.

b) When, after completion of satisfactory startup, additional time of the Field Engineer is requested by the Purchaser.

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GENERAL SPECIFICATIONS

OTHER EQUIPMENT AND SERVICES REQUIRED

The foregoing equipment comprises the complete spray dryer offered herewith. All other items required to make this an operable unit shall be provided by the Purchaser, including the following:

a) Duct work - drying chamber to bag collector
bag collector to main fan.

b) Supply of natural gas at 2 psig minimum pressure at approximately 1700 cubic feet per hour maximum, (1230 cubic feet per hour normal).

c) Supply of operating water at approximately 40 psig and 2 gallons per minute to "Terminal Bracket". This is in addition to water for general hose and washdown purposes.

d) Supply of feed material, at constant rate, temperature, pressure, and percent solids, and free from foreign material or lumps to "Terminal Bracket".

e) Supply of 220 volt, 3 phase, 60 cycle electric power in required amount, complete with fusible disconnect or circuit breaker switches, starters and pushbuttons and all interconnecting electric wiring. It is estimated that the electrical power required will be as follows:

Connected Horsepower:	29
Demand Horsepower:	19

A small amount of power at 110 volts, single phase, 60 cycle, not exceeding that allowable from a 15 ampere circuit, will be required for controls.

f) Supply of compressed air at 7 cfm and 100 psi for bag collector. Supply of clean instrument air at 25 psig and approximately 2 cfm.

g) Packaging means at product outlet.

h) Fan stack of sufficient height to clear tops of surrounding buildings.

i) All footings and foundations for erection of equipment, depending on local conditions.

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GENERAL SPECIFICATIONS

OTHER EQUIPMENT AND SERVICES REQUIRED (Continued)

j) Erection of all equipment at job site, in accordance with instructions provided, and connection of all services enumerated above.

k) Insulation of the drying equipment, including ducts, collectors and chamber side walls, in accordance with usual local practice. Specific recommendations on type and thickness are provided.

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CONDITIONS OF SALE

PATENTS

Bowen Engineering, Inc. warrants that the equipment proposed will not infringe upon any U. S. Patent claim; but does not warrant infringement by reason of the use of the equipment in combination with other equipment or in the operation of any process. Bowen's liability is expressly limited to the total sum paid Bowen for the equipment offered in this proposal.

CANCELLATION

Accepted orders are not subject to cancellation without Bowen Engineering, Inc. being reimbursed for any and all expenses plus a profit commensurate with the state of the order at the time of cancellation.

DRAWINGS

All drawings and information issued as a result of a purchase order for the equipment proposed remain the property of Bowen Engineering, Inc. and are to be used only for the equipment and installation referred to in this proposal.

WARRANTY

Bowen Engineering, Inc. warrants equipment of its manufacture to be free of defects in material and workmanship if properly installed, cared for and operated under normal conditions and with competent supervision of Bowen Engineering, Inc. Engineers.

Parts of Bowen equipment proven defective in material or workmanship (effects of abrasion and corrosion excepted) within one (1) year from date of shipment will be replaced F.O.B. works. No claims for labor or damages will be allowed and no backcharges will be accepted unless authorized by Bowen in writing before any repair work is undertaken. Correction of such defects by replacement or repair will fulfill all obligations hereunder. Bowen will in no way be responsible for any consequential damages. If Bowen elects to repair such defects at Purchaser's plant, the Purchaser agrees to provide free access to the equipment at all reasonable times for Bowen representatives to make such repairs. Bowen warrants machinery and equipment not manufactured by it only to the extent that it can enforce liability against the manufacturer thereof.

The guarantees and warrantees of this quotation are valid only if the equipment is started up under the supervision of Bowen Engineering, Inc. Engineers.

DUP050054458

CONDITIONS OF SALE

GENERAL

The information in this quotation, including all attachments, is the property of Bowen Engineering, Inc. and is provided in good faith and intended only for use by the addressee for the particular application described herein. It is not to be reproduced or used by any other party or for any other purpose without the written consent of Bowen Engineering, Inc.

Bowen Engineering, Inc.'s failure to object to provisions contained in Customer's purchase orders or other communication shall not be deemed a waiver of the terms and conditions of this proposal nor acceptance of such provisions. No representations or guarantees other than those contained in this proposal shall be binding upon Bowen Engineering, Inc. unless made in writing and signed by an authorized official of Bowen Engineering, Inc.

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