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Trinity
Consultants

VIA E-MAIL: hasan@yrcaa.org

June 23, 2015

Dr. Hasan Tahat, Ph.D.
Engineering and Planning Division Supervisor
Yakima Regional Clean Air Agency
329 N 1st Street
Yakima, WA 98901

RE: New Source Review Application for Damrow Dryer Permit Revision, Darigold Sunnyside facility

Dear Dr. Tahat:

Yakima Regional Clean Air Agency (YRCAA), Darigold Inc. (Darigold) and Trinity Consultants (Trinity) held a meeting on April 24, 2015 to discuss various topics regarding the Darigold facility located in Sunnyside, Washington. YRCAA requested Darigold to submit a New Source Review (NSR) application for updates and clarification to the existing Damrow Dryer and associated packaging system, which was originally permitted under NOC_ATF_WFF_01. Trinity is submitting this application on behalf of Darigold as a request to revise NOC_ATF_WFF_01 for the Damrow Dryer and associated packaging system to further clarify the process equipment and emission units, and other administrative clean-up items of the permit.¹

PROCESS DESCRIPTION

The Damrow Dryer² is a filtermat dryer with a maximum production rate of 9,000 lbs of dried milk powder per hour. The Damrow Dryer (DRY1) is equipped with Maxon NP-I natural gas-fired burners, which have a capacity of 0.5 MMBtu per hour per foot. There are two primary burners (PBRN1 and PBRN2) and one secondary burner (SBRN1). The length of PBRN1 is 20 ft, the length of PBRN2 is 12 ft, and the length of SBRN1 is 7 ft. Therefore, the maximum heat input for the Damrow Dryer burners is 19.5 MMBtu/hr.³ NOC_ATF_WFF_01 identified the Damrow Dryer burners with a total maximum heat input of 34.5 MMBtu/hr. Therefore, this application serves to update the permit NOC_ATF_WFF_01 for the Damrow Dryer burners to 19.5 MMBtu/hr. ✓

Product feeding the dryer is dried in the dryer chamber and then is collected by the filtermat (FM1) at the bottom of the dryer. Product is further dried and then cooled at the filtermat. There are six cyclones (CYC 1 through 6) in parallel controlling the filtermat and moves collected product to three powder bins (BIN1 through 3) through a pneumatic conveyor (CNV1).⁴ Cooled product also could be filled to a tote bin (TBIN1) by a dryer

¹ Permit NOC_ATF_WFF_01 also identified the installation of two 800 horsepower boilers in 1994, and limited the No. 2 fuel oil usage of 110,400 gallons per year. This application includes the discussion to modify this limit.

² The Damrow Dryer was installed in 1992.

³ A copy of the Maxon NP-I burner specification is provided in Attachment 2.

⁴ NOC_ATF_WFF_01 also identified that the powder from the filtermat was milled before sent to the powder bins. The powder mill was removed and is no longer operated at the Sunnyside facility.

auger (AG1) on the end of the filtermat. The potential emissions from the dryer auger and the pneumatic conveyor are controlled by the Primary Receiver Baghouse (RBGH1), and when product is transferred into the tote bin there is a small amount of fugitive particulate matter emissions. Exhaust from the six cyclones (CYC1 through 6) is sent to a heat exchanger (HE1) for heat recovery, and then combined with the exhaust from the Primary Receiver Baghouse (RBGH1) to the common stack (DEP1) at the top of the Damrow Dryer building.

The three powder bins (BIN1 through 3) are shared by the Damrow Dryer system and Niro Dryer system. Each powder bin has a bin vent at the top which is equipped with polyester membrane filters. There is one common stack (DEP2) at the top of the building where the powder bins are exhausted. From the powder bins, the product is moved to a packager (PAK1) through a pneumatic conveyor (CNV2) and controlled by the Packaging Receiver Baghouse (RBGH2). Packaging Dust Collector (DCBGH1) controls the emissions from the Packaging Receiver Baghouse and the packager, and emits to a stack (DEP3) on top of the packaging warehouse.

EMISSION CALCULATIONS

Based on the process description above, the emissions associated with the Damrow Dryer and associated packaging system are expected from natural gas combustion at the burners, uncollected powder by the six cyclones, the Primary Receiver Baghouse, the bin vents and the Packaging Dust Collector. There are three emission points. A summary of emissions is provided in Table 1 and detailed emission calculations can be found in Attachment 3. Since the existing permit (NOC_ATF_WFF_01) emissions basis could not be confirmed the revised calculations are based on the most current data available.

Table 1. Potential Emission Summary Associated with Damrow Dryer and Packaging System

Pollutant	DEP1 ^a (tpy)	DEP2 ^b (tpy)	DEP3 ^c (tpy)	Tote Bin Fugitive (tpy)	Total (tpy)
PM ₁₀	24.38	1.89E-03	1.95	0.20	26.54
PM _{2.5}	24.38	1.89E-03	1.95	0.20	26.54
SO ₂	0.05	--	--	--	0.05
NO _x	8.37	--	--	--	8.37
VOC	0.46	--	--	--	0.46
CO	7.03	--	--	--	7.03
HAPs	6.74E-03	--	--	--	6.74E-03
CO _{2e}	10,001	--	--	--	10,001

^a DEP1 includes emissions from the Damrow Dryer burners, six cyclones and the Primary Receiver Baghouse.

^b DEP2 includes emissions from the powder bin vents.

^c DEP3 includes emissions from the Packaging Dust Collector.

Emissions from the Cyclones (CYC1-6) and Primary Receiver Baghouse (RBGH1)

There is one stack (DEP1) that combines the emissions from the dryer burners, six cyclones and the Primary Receiver Baghouse. Gaseous pollutant (NO_x, SO₂, CO, VOC, HAPs, GHGs) and condensable particulate matter emissions from the dryer burner are calculated based on U.S. EPA AP-42, *Compilation of Air Pollutant Emission Factors* (AP-42) emission factors and are discussed in more detail in the section below. Only filterable

particulate emissions are expected from the six cyclones and the Primary Receiver Baghouse. The filterable PM emissions for these units are based on the Horizon Engineering source testing completed in May 1999 for the combined DEP1 stack.⁵ The results show on average the filterable PM emissions are at 0.008 grain per dry standard cubic foot (dscf). The maximum flow rate of 79,100 dscf per minute is used to estimate the filterable PM₁₀ and PM_{2.5} emissions. It's conservatively assumed that filterable PM₁₀ emissions are the same as the filterable PM_{2.5} emissions. Note that the filterable PM emissions from the burners should be covered in the 0.008 grain loading, since the burners exhaust is routed to the same stack. Detailed calculations can be found in Attachment 3.

Emissions from the Dryer Burners (PBRN1, PBRN2 and SBRN3)

As discussed previously, the natural gas-fired burners have a maximum heat input of 19.5 MMBtu/hr. Emission factors are obtained from AP-42, Chapter 1.4: Natural Gas Combustion. For NO_x emissions from the burner, the uncontrolled emission factor is used. A default heating value of 1,020 Btu/scf for natural gas from AP-42 is used to convert the AP-42 emission factors in unit of lb pollutant per million scf (lb/MMscf) to be in unit of lb/MMBtu.

Many of the speciated emission factors from AP-42 are not representative of expected emissions from the proposed dryer burner; thus, this application relies on factors rated "C" or better, which includes benzene, toluene, and formaldehyde for HAP emissions. Detailed calculations can be found in Attachment 3.

GHG calculation methodologies are codified in Washington Administrative Code (WAC) 173-441-120. The calculation methods are incorporated by reference from 40 CFR Part 98, for the GHG Mandatory Reporting Rule (MRR). The PTE of CO₂, CH₄, and N₂O are determined using the calculation methodology in 40 CFR 98.33(a)(1)(i), assuming continuous operation at maximum natural gas firing rate. Total GHG emissions are quantified using the CO₂e. CO₂e emissions are computed as the sum of the mass emissions rates of individual GHG species, weighted by the Global Warming Potential (GWP) of each species: 1 for CO₂, 25 for CH₄, and 298 for N₂O. Attachment 3 contains the calculation of CO₂e emissions.

Emissions from the Powder Bins (BIN1-3)

As discussed previously, each powder bin has a bin vent equipped with polyester membrane filter and they exhaust through one stack (DEP2). Based on the vendor specifications (provided in Attachment 2), the control efficiency is 99.99%. For conservatism a 99% control efficiency has been applied with an AP-42 emission factor and the maximum hourly throughput to get the emission rate from the bin vents. The emission factor is obtained from Table 9.9-1 for storage bin (vent) for Grain Elevators, AP-42, which is the best available emission factor for uncontrolled emissions from bin vents. The maximum throughput is determined to be the sum of the output capacity of the Niro Dryer (4,700 lb powder/hr) and the Damrow Dryer (9,000 lb powder/hr). Detailed calculation can be found in Attachment 3.

Emissions from the Packaging Dust Collector (DCBGH1)

As discussed previously, the Packaging Dust Collector (DCBGH1) controls emissions from the Packaging Receiver Baghouse (RBGH2) and the packager (PAK1). The packaging dust collector exhausts through DEP3. The emissions from the Packaging Dust Collector are estimated based on the fan capacity and a conservative engineering estimated grain loading of 0.01 gr/dscf. The fan is a NYB GI fan, size 224 DH with a capacity of 5,200

⁵ The tests were done while the Damrow Dryer was running two different products, whey and skim milk. The average grain loading of all runs are used.

cfm according to the vendor specifications (provided in Attachment 2). It is assumed that the exhaust is at ambient temperature. Detailed calculations can be found in Attachment 3.

Fugitive Emissions from Tote Bin (TBIN1)

As discussed previously, the tote bin (TBIN1) could be filled by gravity through the auger (AG1). The tote bin is located at one end of the filtermat, and the filling process is uncontrolled. However, the tote bin and the auger are located in the Damrow Dryer building. The emission factor is calculated based on the material handling Equation 1 of AP-42, Chapter 13.2.4. To give a conservative estimate on the fugitive emissions from the filling, the lower range of moisture content and mean wind speed in AP-42 Chapter 13.2.4 are used, and the particle size multiplier is assumed to be 1 for PM₁₀ and PM_{2.5} for milk powder. The throughput is conservatively assumed to be the capacity of the Damrow Dryer. The estimated fugitive emissions from the tote bin are also provided in Attachment 3.

FACILITY-WIDE PTE

The facility-wide potential to emit (PTE) is provided in Table 2, including the emissions from the proposed GEA Dryer project and the proposed new boiler (application submitted under separate cover). As shown in Table 2, the PTE is below all applicable major source thresholds for all pollutants. Therefore, the Sunnyside facility is not a major source under Title V nor prevention of significant deterioration (PSD) rules, and is an area source for hazardous air pollutants (HAPs).

Table 2. Facility-Wide PTE

	Annual Emission Rate (tpy)						
	PM ₁₀	PM _{2.5}	SO ₂	NO _x	VOC	CO	HAPs
Facility-Wide PTE ^a	81.49	81.25	0.63	48.67	5.01	81.98	0.09
PSD Major Source Threshold ^b	250	250	250	250	250	250	N/A
PSD Major Source?	No	No	No	No	No	No	No
Title V Threshold ^c	100	100	100	100	100	100	25
Title V Required?	No	No	No	No	No	No	No

^a The facility-wide PTE excludes the fugitive emissions associated with the GEA dryer and Damrow dryer for PSD and Title V applicability determination purposes.

^b PSD major source thresholds are 250 tpy for each criteria pollutant for a source type like Darigold, per 40 CFR 52.21(b)(1).

^c Title V thresholds are 100 tpy for each criteria pollutant.

REQUEST TO REVISE THE EXISTING PERMIT

All process equipment and control devices described previously were permitted in NOC_ATF_WFF_01 and installed in 1992.⁶ NOC_ATF_WFF_01 indicates that the installation at the time of the permit issuance satisfied the requirements of Best Available Control Technology (BACT). Additionally, use of natural gas as sole fuel for

⁶ The dryer auger, tote bin and the packaging unit were not specifically called out in the permit, but they are in the drawing 755-98148 which is referenced in the permit. A copy of the drawing is provided in Attachment 4.

the Damrow Dryer burners and the operation configuration satisfied the requirements of BACT for air toxics. The permit also requires an Operation and Maintenance (O&M) plan for the control devices and process equipment associated with the Damrow Dryer and associated packaging system. Darigold has developed and implemented an O&M plan as such, and therefore is in compliance with the BACT requirement.

Additionally, NOC_ATF_WFF_01 sets the No.2 oil usage limit of 1,104,000 gallons per year for the existing two 800 horsepower (hp) boilers (BLR1 and BLR2). Darigold would like to update the permit language to indicate that the fuel oil authorized in NOC_ATF_WFF_01 is only used in periods of gas curtailment, startup, and 48 hours per year for testing in order to demonstrate the boiler is exempt from 40 CFR 63 Subpart JJJJJJ per 40 CFR 63.11195(e).

Darigold requests to only revise the permit to indicate the correct dryer burner heat input, the correct list of emission units, and revised potential emission calculations. All applicable regulatory requirements to the Damrow Dryer and associated packaging system will remain in effect and Darigold will continue to be in compliance with these requirements.

If you have any questions or comments about the information presented in this letter, please do not hesitate to call me at (253) 867-5600.

Sincerely,

Trinity Consultants



Ashley Jones
Senior Consultant

Attachments

Attachment 1: NSR Form
Attachment 2: Vendor Specifications
Attachment 3: Emission Inventory and Calculations
Attachment 4: Drawing 755-98148

cc: Ms. Mylene Guneron, YRCAA;
Mr. Todd Hughes, Darigold;
Mr. Doug Pettinger, Darigold;
Ms. Hui Cheng, Trinity

ATTACHMENT 1

NSR Form



Yakima Regional Clean Air Agency

INSTRUCTIONS FOR PERMIT APPLICATION

Use this sheet as a checklist to determine when your application is substantially complete.

Each PERMIT APPLICATION for the construction, installation or establishment of a new air contaminant source, or modification of existing air pollution source or control equipment or permit, needs to be accompanied by the following information to be considered complete:

Included N/A

- ☒ ☐ Process flow sheets and equipment layout diagrams.
- ☐ ☒ Control equipment manufacturer, model number, size, serial numbers (for each piece of control equipment).
- ☒ ☐ Quantify average and maximum hourly throughput values, average yearly totals, and maximum concentrations for each pollutant.
- ☒ ☐ Applicant's calculation of the kinds and amounts of emissions for each emission point, materials handling operation or fugitive category (both controlled and uncontrolled).
- ☒ ☐ Plot plan including identification of proposed emission points to the atmosphere, distance to property boundaries, height of buildings and stack height above ground level.
- ☐ ☒ Identification of raw materials and/or product specifications (physical and chemical properties) and typical ranges of operating conditions as related to each emission point (toxic air contaminants require a separate summary); Material Safety Data Sheets (MSDS) should be included in the PERMIT APPLICATION for all compounds used.
- ☒ ☐ Identification of the methods/equipment proposed for prevention/control of emissions to the atmosphere.
- ☐ ☒ Information sufficient to demonstrate the ability of the emission controls proposed as being consistent with those provided in the applicable regulations (BACT/NSPS/RACT/NESHAPS/LAER analysis). See attached worksheet for typical layout of BACT analysis information.
- ☐ ☒ The kinds and amounts of emission offset credits proposed for assignment when operations are within a non-attainment boundary (see WAC 173-400-120 and 131).
- ☒ ☐ Estimates of the proposed project ambient impact under average and least favorable conditions where pertinent to PSD (WAC 173-400-720) or Toxic Air Pollutants (WAC 173-460) requirements.
- ☐ ☒ Additional information, evidence, or documentation as required by the Board of Directors, or the Control Officer, to show that the proposed project will meet federal, state and local air pollution control regulations.
- ☐ ☒ For applications that include equipment that has previously been approved, authorized or registered, a lapse is considered to have occurred if the registration fees are delinquent for more than one calendar year or the source has not operated within five years prior to the receipt of any required PERMIT APPLICATION (WAC 173-400-110).
- ☒ ☐ Applications that include previously approved or authorized equipment require that additional information regarding previous owners or approvals be provided so that YRCAA records can be updated. Equipment registered and/or approved for a given company cannot be authorized without a legal name change, purchase of company or equipment, or a legal contract or subcontract to do business with or for the approved source. Responsibility for operation of authorized equipment rests with the registered source.
- ☒ ☐ All applications need to be accompanied with a completed SEPA checklist or SEPA determination. YRCAA may process the SEPA determination, if no other agency has done it. In this case a SEPA checklist with the proper fees must be submitted with the NSR application.

The application transmittal shall conform to YRCAA review requirements wherever possible as detailed in the General Regulations for Air Pollution Sources (WAC 173-400).

Each drawing, document, or other form of transmittal considered by the applicant to be proprietary and confidential must be suitably identified as confidential in red ink, and signed and dated by the applicant or its agent. Be aware that YRCAA follows the requirements in 40 CFR 2 for determination of confidentiality. YRCAA may not process company sensitive information as confidential.

Orders of Approval (to construct, modify, or install) are issued for specific equipment or processes described in the application. Changes to the processes or control equipment are not allowed without new source review (Permit Application and Permit) if these changes result in an emission of a different type or an increase in emissions (WAC 173-400-110). Process equipment changes that result in decreased emissions require notification to YRCAA.

The SIC code is identified as the four digit major group classification in the 1987 Standard Industrial Code Classification Manual listing of SIC codes can be obtained for free from the internet.

Mail or deliver in person the completed application package to:

Yakima Regional Clean Air Agency
329 North First Street
Yakima, WA 98901-2303

Application fees must accompany application for the application to be considered complete. An invoice will be sent out for the Engineering review after final decision on the application. Make checks payable to "Yakima Regional Clean Air Agency" or "YRCAA".

The PERMIT APPLICATION package submitted must be complete. All applications are screened for completeness before processing. Applicants submitting incomplete application packages will be notified of their incomplete status and may result in a delay in processing the application.

Yakima Regional Clean Air Agency
PERMIT APPLICATION / NEW SOURCE REVIEW
BACT ANALYSIS WORKSHEET

Facility Name: Darigold Inc., Sunnyside Facility

Date: 6/24/2015

CONTROL ALTERNATIVE	EMISSIONS	EMISSIONS REDUCTION (a)	INSTALLED CAPITAL COST (b)	TOTAL ANNUALIZED COST (c,g)	AVERAGE COST EFFECTIVENESS OVER BASELINE (d)	INCREMENTAL COST EFFECTIVENESS (e)	ENERGY INCREASE OVER BASELINE (f)	TOXICS IMPACT	ADVERSE ENVIRONMENTAL IMPACT
	[lbs/hr] & [tons/yr]	[tons/yr]	[\$]	[\$]	[\$/ton]	[\$/ton]	[mmBtu/yr]	[Yes/No]	[Yes/No]
1) See application - no additional BACT analysis is required									
2)									
3)									
4)									
5) Uncontrolled Baseline (worst case - no controls)									

(a) Emissions reduction over baseline control level.

(b) Installed capital cost relative to baseline.

(c) Total annualized cost (capital, direct, and indirect) of purchasing, installing, and operating the proposed control alternative. A capital recovery factor approach using a real interest rate (i.e., absent inflation) is used to express capital costs in present-day annual costs.

(d) Average cost effectiveness over baseline is equal to total annualized cost for the control option divided by the emissions reductions resulting from the uncontrolled baseline.

(e) The optional incremental cost effectiveness criterion is the same as the average cost effectiveness criteria except that the control alternative is considered relative to the next most stringent alternative rather than the baseline control alternative.

(f) Energy impacts are the difference in total project energy requirements with the control alternative uncontrolled baseline expressed in equivalent millions of Btus per year.

(g) Assumptions made on catalyst life may have a substantial affect upon cost effectiveness.

Notes:

The number of alternatives to be evaluated will vary depending on application.

Values for each variable should be provided as they are applicable. Use N/A if not applicable.

Emission rates are the expected or predicted emission rates.

Calculations should provide for a range of alternatives.

Emissions reduction should use estimated efficiency if actual efficiency is unknown - should so state.

Attach worksheets as necessary to substantiate above values.



Filing Fee: \$400.00

329 North First Street, Yakima WA 98901
Phone: (509) 834-2050 Fax: (509) 834-2060
Website: <http://www.yakimacleanair.org>

OFFICIAL USE ONLY

YRCAA NSR No: NSRP-19-DG-15 Date Fee Paid: 06/24/15

Received by: Michelle Filing Fee: \$400.00

☐ YRCAA is the lead agency for the SEPA process. Processing Fee \$400.00

The filing fee must be paid before review will begin. A surcharge fee for time required preparing and processing the application for approval will be invoiced after the permit to operate is issued.

New Source Review Application (NSR)

Stationary/Permanent Source

INSTALLATION OR ESTABLISHMENT OF NEW AIR CONTAMINANT SOURCES

NSR Application is Required for Construction, Installation or Establishment of an Air Pollution Source
Or

Replacement or Substantial Alteration of Emission Control Technology on an Air Pollution Source or Equipment

I. General Information:

BUSINESS NAME Darigold, Inc.

NATURE OF BUSINESS Food Processing

MAILING ADDRESS 400 Alexander Rd., Sunnyside, WA 98944

FACILITY ADDRESS (if different): _____

PHONE and FAX NUMBERS (509) 837-8000

Email: _____

TYPE OF PROCESS, EQUIPMENT, OR APPARATUS _____

An existing whey powder process, including an existing filtermat dryer (Damrow Dryer), associated process equipment and control devices. See application for more details.

LIST OF AIR CONTAMINANT(S) WHICH WILL BE PRODUCED AND/OR CONTROLLED _____

PM10, PM2.5, SO2, NOx, CO, VOC, HAPs and CO2e.

ESTIMATED STARTING DATE: Installed in 1992

ESTIMATED COMPLETION DATE: Installed in 1992

Compliance with SEPA (State Environmental Policy Act) - Check One of the Options Below:

- ☐ A DNS or EIS has been Issued by Another Agency for this Project and a Copy is Attached.
- ☐ If no DNS or EIS Exists for this Project, a Completed Checklist for this Project and the SEPA Processing Fee are Attached. *YRCAA SEPA checklist is available by phone, or by our website.*
- ☐ The city/county has established an exemption for this project.
- ☒ I certify that the SEPA has been satisfied or this project is exempt:

October 23, 1990 by City of Sunnyside

Date

Government Agency

Previous NSR/Air Permits Number issued by YRCAA for the Facility, if any
NOC_22_WFF_00, NSRP_22_DI_07, NOC_ATF_WFF_01

Describe Input to Output Process (Attach drawings, schematics, prints, or block diagrams)
See drawing attached to the application

ESTIMATED COSTS: OF BASIC SOURCE EQUIPMENT \$ NA
OF CONTAMINANT CONTROL APPARATUS \$ NA

Process: Production Output per Year (tons, pounds, etc) 78,840,000 lbs

Maximum Output per Hour (tons, pounds, etc) 9,000 lbs

Percentage of Production (%)

Dec - Feb 25

Mar - May 25

Jun - Aug 25

Sep - Nov 25

Operating Schedule: Hrs/Day 24

Days/Wk 7

Wks/Yr 52

II. Emissions Estimations and Calculations:

1. Criteria Pollutants (gr/dscf, tons/yr, lbs/hr., ppm, etc.)

Particulate (PM₁₀, PM_{2.5}) 26.54 tons/yr

Volatile Organic Compounds 0.46 tons/yr

Nitrogen Oxides 8.37 tons/yr

Sulfur Oxides 0.05 tons/yr

Carbon Monoxide 7.03 tons/yr

Lead none

2. Toxic Air Pollutants (Name)	Quantity (in gr/dscf, tons/yr, lbs/hr. ppm, etc.)
Benzene	1.76E-04 tons/yr
Formaldehyde	6.28E-03 tons/yr
Toluene	2.85E-04 tons/yr

3. Fugitive Pollutants (Source) Quantity (in gr/dscf, tons/yr, lbs/hr, ppm, etc.)
None

4. Air Pollution Modeling
Results Not required
Computer Printout Attached? ☐ Yes ☐ No

III. Emission Data:

1. Stack Height (Feet) 75.5 Inside Diameter (feet) 4 ft by 9.5 ft
Gas Exit Temp (degrees F) 126 Gas Exit Velocity (ft/min) 2,082 standard ft/min
Flow Rate (cfm) 79,100 standard cfm
Shared Stack? If a shared stack, identify process (es) or point(s) which share the stack.
Distance from Stack to Property Line 121 ft

2. Discharge Point or points (if no stack or other than stack)

DEP3 Height (feet) 34 Inside Diameter (feet) 1.08
Gas Exit Temp (degrees F) Ambient Gas Exit Velocity (ft/min) 5,641
Flow Rate (cfm) 5,200

Shared discharge point? If a shared discharge point, identify process (es) or point(s) which share the discharge point. No

Distance from discharge point to Property Line 97 ft

3. Fuel Type Natural gas % Sulfur Negligible
% Ash _____ Unit of Measure (gal./cu.ft./etc.) cu. ft.
BTU per Unit of Measure 1,020 Consumption Units per Year 167,470,588
Maximum Consumption Units per Hour 19,118

4. Building Dimensions

Height (feet) _____ Length (feet) _____ Width (feet) _____

Damrow Dryer Building: Height 73.5 ft, Length 130 ft, Width 90 ft

Powder Warehouse: Height 33 ft, Length 285 ft, Width 120 ft

IV. Air Pollution Control Equipment:

Baghouse	Primary Powder Receiver Baghouse (RBGH1) - unknown		Model #, Serial # _____
	Efficiency	NA	PM _{2.5} : NA and PM ₁₀ : NA
	Bag Height (feet)	NA	Bag Diameter (feet) _____
	Filter Area (feet squared)	_____	Blower Flow Rate (cfm) _____
	Filter Media	_____	Dimensions (feet) _____
	Discharge Area Dimensions (feet) _____		
	Cleaning Mechanism (shake) (air psi) _____		
	Other Data Combined stack PM grain loading for DEP 1 is 0.008 gr/dscf		
Scrubber	Type	NA	Model #, Serial # _____
	Efficiency	_____	
	Gas Differential Pressure (psi)	_____	Liquor Differential Pressure (psi) _____
	Liquor Flow (gpm)	_____	Discharge Area Dimensions (feet ²) _____
	Gas Flow (cfm)	_____	Other Data _____
Cyclone	Type	NA	Model #, Serial # _____
	Efficiency	_____	PM _{2.5} : _____ and PM ₁₀ : _____
	Gas Flow (cfm)	_____	Discharge Area Dimensions (feet ²) _____
	Other Data _____		
Precipitator	Type	NA	Model #, Serial # _____
	Efficiency	_____	
	Gas Flow (cfm)	_____	Gas Velocity (ft/sec) _____
	Residence Time	_____	Gas Differential Pressure (psi) _____
	Precipitation Rate (ft/sec)	_____	Discharge Area Dimensions (feet ²) _____
	Other Data _____		
Ad/Absorp	Type	NA	Model #, Serial # _____
	Efficiency	_____	
	Gas Flow	_____	Gas Velocity (ft/sec) _____
	Gas Temp (degree F)	_____	Bed Volume (ft ³) _____
	Bed Dimensions (feet)	_____	Capacity (hours) _____
	Contaminant (lb/day)	_____	Regeneration time (hours) _____

Other Packaging Dust Collector
Type (DCBGH1) - unknown Model #, Serial # _____
Efficiency NA
Gas Flow (cfm) 5,200 Discharge Area Dimensions (feet) _____
Other Data _____

V. Additional Information:

1. Attach Related Information on Chemicals or Materials that will be emitted. (MSDS Sheets, Company Information, etc.)

Note: Indicate how much quantity are used per MSDSs

☐ Yes ☒ No, if not why? No chemicals is emitted directly associated with the dryer

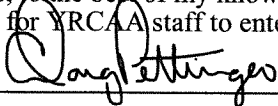
2. Fugitive Dust Control Plan (Attach if Necessary)
3. Attach Operation and Maintenance Manual of Pollution Control Equipment.

☐ Yes ☒ No, if not, why? Available upon request

4. Attach Vendor Information or Manufacturer's Instructions on Pollution Control Equipment.

☐ Yes ☒ No, if not, why? Available upon request

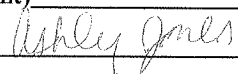
APPLICANT: I hereby certify that the information contained in this application, including supplemental forms and data, when required, is, to the best of my knowledge, complete and correct. I also agree to all fees for processing this permit and grant permission for YRCA staff to enter the premises for inspection.

Signature  Date 06/22/2015

Title Sr Director EHS Date 06/22/2015

Name and Title of Individual Filling out Form:

Name (print) Ashley Jones, Senior Consultant - Trinity Consultants

Signature 

Name and Title of Contact Person, if Different than Above:

Name Todd Hughes, 208-324-5390 ext 304

Title Environmental Analyst - Darigold

Name and Title of the Responsible Official for the permit, if Different than Above:

Name Doug Pettinger, 206-552-6995

Title Director of Environmental Compliance - Darigold

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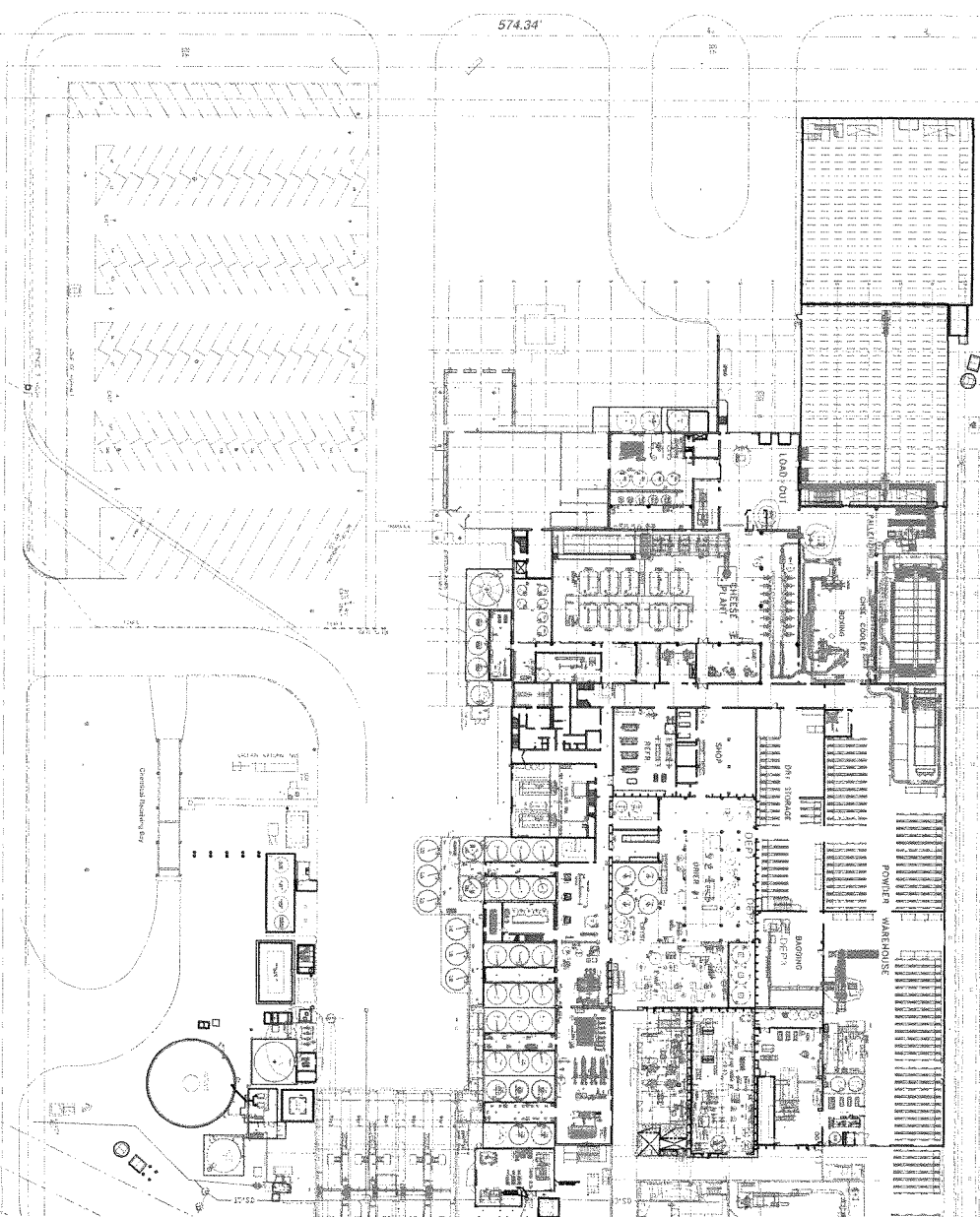
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4

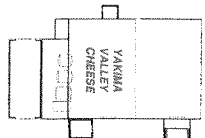
UNION PACIFIC RAILROAD

1250' FIRE LANE

574.34'



LYNDEN TRANSPORT



240.00'

ATTACHMENT 2

Vendor Specifications

1. 800 hp Boiler Specifications
2. Maxon NP-I Burner Specifications
3. Bin Vent Filter Specifications
4. Packaging Dust Collector (DCBGH1) Fan Specifications



DIVISION OF AQUA-CHEM, INC.
P. O. BOX 421 • MILWAUKEE, WISCONSIN 53201

PROPOSAL

Page 1 of 7 Pages

DARIGOLD
P. O. Box 79007
Seattle, WA 98119

Address

SUBJECT:

PLANT EXPANSION - SUNNYSIDE WA
Cleaver-Brooks Firetube Boiler Proposal
Attention: Ron Taylor

Proposal No. 4874-GW
Date May 20, 1994
COLE INDUSTRIAL, INC.
P. O. Box 1336
Lynnwood, WA 98046
(206) 774-6602

PERFORMANCE CRITERIA

Manufacturer:	Cleaver-Brooks	
Model:	CB 200-800-150	
Quantity:	Two (2)	
Horsepower:	800 HP	
Steam Output:	27,600 PPH	
Design Pressure:	150 PSIG	
Operating Pressure:	125 PSIG	
Minimum Efficiency:	(Fuel to Steam):	(Thermal):
Natural Gas:	83.5	84.5
Oil #2:	86.8	87.8
Burner Turndown Ratio:		
Natural Gas:	10 : 1	
Oil #2:	8 : 1	
Minimum Heating Surface:	3,500 Sq. Ft.	
Maximum Heat Release:	161,139 BTU/Cu. Ft.	
Electrical:	460/3/60	
Available Gas Pressure:	10 PSIG	
Maximum Noise Levels:	87 DBA	
(Measured 5' from front of boiler)		

The boiler shall be a four-pass horizontal firetube boiler with five sq. ft. of heating surface per rated boiler horsepower. The boiler shall be mounted on a heavy steel base frame and shall be complete with integral forced draft burner, burner controls, boiler trim, and refractory. The entire boiler/burner package shall be U.L. listed. The boiler shall be ready for attachment of water, fuel, drain, electrical, and vent connections, and shall be factory fire tested.

The boiler shall be fabricated to meet ASME Code.

BOILER SHELL - The boiler shell shall be constructed in accordance with ASME Boiler and Pressure Vessel Code and shall receive authorized boiler inspection prior to shipment. Unit shall be stamped at 150 psig and operate at 125 psig. Two lifting eyes, located on top of the boiler, shall be included. The exhaust gas vent shall be located at the front of the boiler on the top

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THE TERMS AND CONDITIONS OF SALE ON THE REVERSE SIDE ARE PART OF THIS PROPOSAL

REV. 2/81 C9-1878A



DIVISION OF AQUA-CHEM, INC.
P. O. BOX 421 • MILWAUKEE, WISCONSIN 53201

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Date May 20, 1994
COLE INDUSTRIAL, INC.
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(206) 774-6602

SUBJECT: **PLANT EXPANSION - SUNNYSIDE WA**
Cleaver-Brooks Firetube Boiler Proposal
Attention: Ron Taylor

centerline. Two (2) bottom blowdown outlets shall be provided, one located in front and one located in rear. Boiler tubes shall be a minimum of 2.5" OD with a tube wall thickness of at least .105".

FRONT AND REAR DOORS - The front and rear doors shall be hinged and davited, and shall be sealed with fiberglass tadpole gaskets. Doors shall be fastened with heavy-duty capscrews which thread into replaceable brass nuts.

Front and rear tube sheets and all flues shall be fully accessible for inspection or cleaning when the doors are swung open.

Observation ports for the inspection of the flame conditions shall be provided at each end of the boiler.

REFRACTORY - Rear refractory and insulation shall be contained in the formed rear door which swings open for ready inspection of the refractories and insulation.

INSULATION AND JACKET - The boiler insulation shall consist of 2" fiberglass blanket under a sectional preformed sheet metal lagging. This lagging and insulation may be readily removed and reinstalled if necessary.

PAINTING - The entire boiler, base frame, and other components shall be factory-painted prior to shipment using a hard finish enamel.

The following trim items shall be included:

- Water Column, with reflex gauge glass/tricocks/chain pulls
- Low Water Cutoff, Model 157
- Auxiliary Low Water Cutoff, Manual Reset, Model 150
- Steam Pressure Gauge, 8"
- Safety Relief Valves
- Steam Pressure Sensors
- Steam Header Valve, (1) 6" 240# non-return/(1) 6" 240# OS&Y
- Surface Blowdown Valve, 1" 200#
- Bottom Blowdown Valves, (1) SO 2" 200# ASME/(2) QO 2" 200# ASME

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Page 3 of 7 Pages

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SUBJECT:

PLANT EXPANSION - SUNNYSIDE WA
Cleaver-Brooks Firetube Boiler Proposal
Attention: Ron Taylor

- Feedwater Pump Control, Full Modulation, Model 193-7
- Control Circuit Transformer
- IRI Gas and Oil Train
- UL Listing - KVMR Boiler/Burner
- Fisher Gas Pressure Regulator, with 60 PSIG body
- Feedwater Regulator, size 1" with 3-valve by-pass
- Vent Stub reinforced for 3000# weight capacity
- High Temperature Cutout with Alarm and Pilot Light
- Low Fire Hold

FORCED DRAFT BLOWER - All air for combustion shall be supplied by a blower mounted in the front boiler door above the burner. It shall be directly connected to a flanged type ODP motor. This rigid mounting with the blower wheel inside the head shall eliminate all vibration and reduce noise level. The carefully balanced blower wheel shall be cast aluminum with radial blades. The combustion air damper shall be an integral rotating damper and shall be automatically adjusted for proper air quantity by a mod motor to maintain proper fuel-air ratios.

ELECTRICAL EQUIPMENT - The control panel entrance shall be mounted on the right hand side, near the front of the boiler. Equipment shall include motor starters with fused protection. Oil heat and moisture resistant wire shall be used throughout. Control panel shall be NEMA 1, watertight and dust tight.

GAS BURNER - The gas burner shall be integral with the front head of the boiler, and shall be of the high radiant multi-port type. The burner shall operate on full modulation principle with 10 : 1 turndown ratio. Fuel metering shall be accomplished through a multiple point adjustable cam.

GAS PILOT - Gas pilot shall be the premix type with electric spark ignition.

FUEL GAS TRAIN - The gas train and controls shall meet IRI and UL Standards, and shall include gas pressure regulator with 60# body, plug cocks, control valve(s) or sensors, safety shut off valves, two (2) pressure gauges, and gas butterfly modulating fuel control valve. Unit shall be piped and premounted at the factory, matchmarked and shipped loose.

OIL PILOT - Oil pilot shall be a light oil pilot.

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#2 FUEL OIL PIPING - The #2 fuel oil piping shall include oil pressure regulating devices, adjustable cam oil flow control valve, solenoid safety shut off valve, two (2) pressure gauges, and fuel strainer.

CB-HAWK BOILER MANAGEMENT SYSTEM - The CB Hawk microcomputer based boiler management control system shall be used to control and monitor the complete sequencing of the burner while providing significantly enhanced boiler operation and status information.

The integrated system shall consist of a microcomputer based boiler controller and solid state sensors to provide automatic burner sequencing, flame supervision, system status indication, self checking diagnostics, and 73 fault messages. The CB-Hawk's operating sequence shall be fixed and cannot be altered. This sequence shall be stand-by, prepurge, pilot ignition, main burner ignition, run and post purge periods.

The system shall be designed for single point full modulating control of fuel and combustion air as dictated by the CB-Hawk internal firing rate control algorithm characterized to the specific burner boiler combination. Not applicable on on/off or high/low burners.

Using an 80 character two line liquid crystal display and keyboard, the CB-Hawk shall allow the user to adjust pre and post purge extensions, setpoint, setback setpoint, and other control settings. Fault messages shall be displayed in English, not codes. A security accesses code shall be used to prevent unauthorized changes from being made while allowing all parameters to be viewed.

Separate status indicators shall display demand, main fuel valve open, low water condition and alarm status, plus an alarm contact.

The CB-Hawk shall also provide a built-in integral stress reducing start-up algorithm to increase boiler life.

The CB-Hawk equipped boiler shall be U.L. recognized and meets FM and IRI codes.

SHOP TEST - The complete packaged boiler shall receive factory tests to check construction, operation, and function of all controls. All shop tests may be witnessed by the purchaser at his own expense and upon sufficient notice to the company.

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Page 5 of 7 Pages

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May 20, 1994
Date COLE INDUSTRIAL, INC.
P. O. Box 1336
Lynnwood, WA 98046
(206) 774-6602

START UP - After installation of the equipment, a factory-trained and certified field engineer shall start and test the equipment, set firing ratios, demonstrate efficiency guarantee and shall train the operating personnel in the care, operation, and maintenance of the equipment; as follows:

- Ten (10) day(s) start up and testing including supervision during boil out. Boil out chemicals shall be recommended and supplied by the boiler manufacturer.
- Provide a factory authorized start up report including, but not limited to the following information for all fuels at 25, 50, 75, and 100% of firing rate:
 - CO, O₂
 - Stack temperature
 - Overall efficiency, accomplished as follows:

Combined analysis reading showing fuel to water efficiency by using published factory radiation and convection losses.

- Two (2) day(s) training shall be provided after completion of above start up.
- Six (6) Operation and Maintenance Manuals including cut away views of burner and boiler, and burner mounting to boiler. Also included in Operation and Maintenance Manuals shall be schematics including fuel trains; general inspection, adjustment, and maintenance instructions; complete spare parts lists; and trouble shooting procedures.

GUARANTEE - The entire boiler/burner package shall be guaranteed and warranted by the boiler manufacturer. Warranty shall include all parts for a period of 12 months from the start up date.

PRICE: FOB Factory **\$ SEE COVER SHEET**

ESTIMATED FREIGHT: **\$ 8,034.00 Each**

WEIGHT: **54,000 lbs.**

DELIVERY SCHEDULE: **12 Weeks**

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(206) 774-6602

ENHANCED EQUIPMENT OPTIONS and PRICING:

CBLE (LOW EMISSIONS) OPTIONS:

OPTIONAL 60 PPM SYSTEM

<u>Emissions:</u>	<u>Natural Gas</u>	<u>#2 Oil *</u>
Corrected to 3% O ²		
NO _x	60 PPM	185 PPM
CO	100 PPM	90 PPM

► 60 PPM System Add \$ 6,245.00 Each Boiler

OPTIONAL 30 PPM SYSTEM

<u>Emissions:</u>	<u>Natural Gas</u>	<u>#2 Oil *</u>
Corrected to 3% O ²		
NO _x	30 PPM	140 PPM
CO	100 PPM	90 PPM

► 30 PPM System Add \$ 10,560.00 Each Boiler

* #2 OIL MAXIMUM FUEL NITROGEN CONTENT OF 0.05% AND SULFUR CONTENT OF 0.5%

CB HAWK ADDITIONAL COMPONENT OPTIONS:

COMMUNICATIONS MODULE for CB Hawk System. The communications module shall provide for remote or local programming of non-safety functions such as boiler on, boiler off, operating setpoint, night setback, etc. It shall also provide for local and remote communication of individual boiler shutdowns and 73 fault codes that are date and time stamped. On a fault shutdown condition, the communications module shall report the shutdown to either a local computer or printer and/or call out up to three pre-

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programmed telephone numbers via the modem. The communications module shall also be able to activate a remote pager as one of the three pre-programmed telephone numbers if so desired.

CB HAWK LEAD LAG ENHANCER shall provide precise multiple boiler control. The CB Hawk Lead Lag Enhancer shall pinpoint the optimum firing range of each boiler to deliver the exact amount of hot water to the system, operating in selectable sequence to precisely satisfy load demands and ensure that only boilers needed will operate at any given time. Modulation shall be factory configured per specific application requirements to allow faster delivery and greater efficiency.

Yes

- ▶ Communications Module/Lead Lag Enhancer Add \$ 12,440.00 Lot

Very truly yours,

CLEAVER-BROOKS Div., AQUA-CHEM, Inc.
COLE INDUSTRIAL, Inc., Representative

Glenn Waldenberg
Sales Manager

mm\m:\sh\q\4874

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REV. 2/81 C9-1878A

Specifications of "NP" & "RG" AIRFLO® burners

NP-I & NP-II AIRFLO® burners

Differential gas pressure at burner inlet

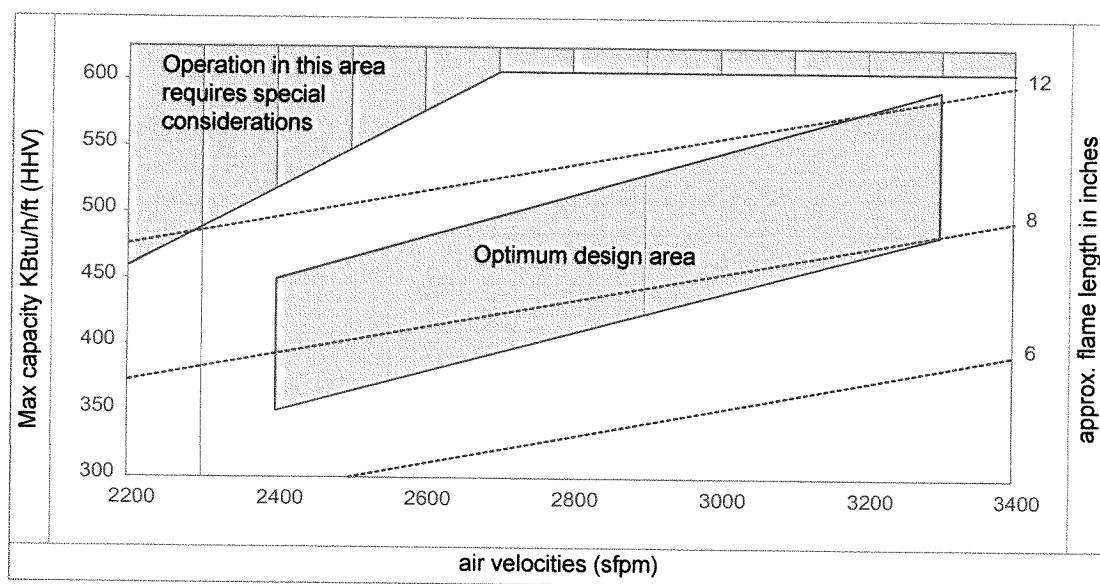
For burner capacity = 0.5 MBtu/h/ft

Fuel	NP-I	NP-II
natural gas (1000 Btu/ft ³ HHV, sg = 0.6)	5" wc	2-1/2" wc
propane (2500 Btu/ft ³ HHV, sg = 1.57)	2" wc	1" wc

Note :

- For other capacities per foot or gases with different heating values and/or specific weights as shown in the above table, values for differential gas pressure will behave according to the normal laws of physics.
- Listed values are approximate net pressures at burner inlet, NOT taking into account any losses in piping/gas manifolds etc.
- Stated pressures are indicative. Actual pressures are function of altitude, type of fuel, gas quality.

Optimum operation parameters



Note :

- Flame length is as measured from leading edge of mixing plates (see sketch on page 4-21.5-11).
EXAMPLE: Series NP-I AIRFLO® burner at 3000 sfpm and at 0.5 MBtu/h per foot would have an approximate flame length of 10 in. Contact MAXON for operation outside the optimum operation area.
- **Airstream velocity** across and through the burner's mixing plates must be kept uniform and within desired limits by use of a silhouette profile plate through which the burner fires. Refer to page 4-21.5-11 for more details on sizing of this profile plate.
- **Pilot capacities** are nominally rated at 25,000 Btu/h with natural gas differential pressure of 4" wc to 6" wc. Suitable for natural gas, propane and propane-air mixtures. Contact MAXON for applications on butane or other gases than specified here.

Minimum capacities

Minimum capacities are given as a guideline. They strongly depend on process conditions.

Air velocities sfpm			2200	2400	2600	2800	3000	3200	3400
Minimum capacity KBtu/h/ft (HHV)	NP-I	natural gas	12	14	16	18	20	22	24
		propane	not recommended		20	22	24	28	30
	NP-II	natural gas	15	18	20	23	25	27	29
		propane	not recommended		23	25	28	30	33

BAY AREA INDUSTRIAL FILTRATION, INC.

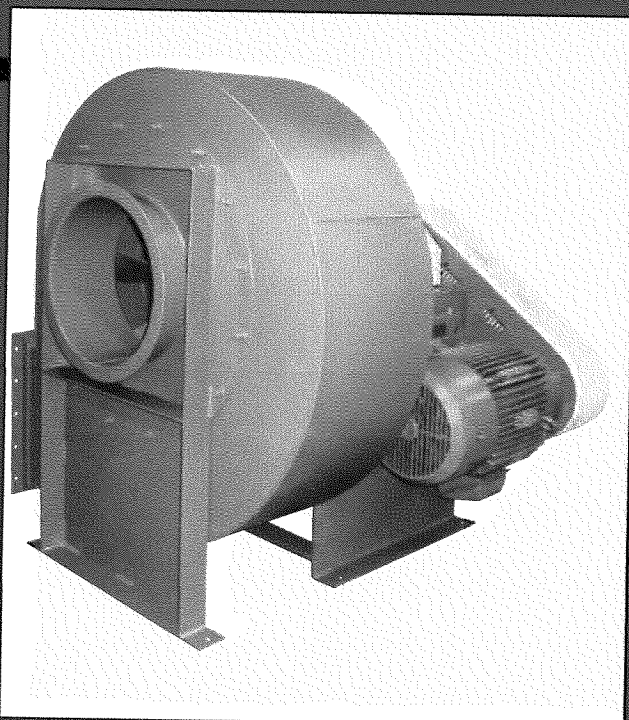
6355 Coliseum Way Oakland, CA 94621 • PO Box 2071 San Leandro, CA 94577 • Phone (510) 562-6373 • FAX (510) 562-2649

16 OZ POLYESTER MEMBRANE SPECIFICATIONS

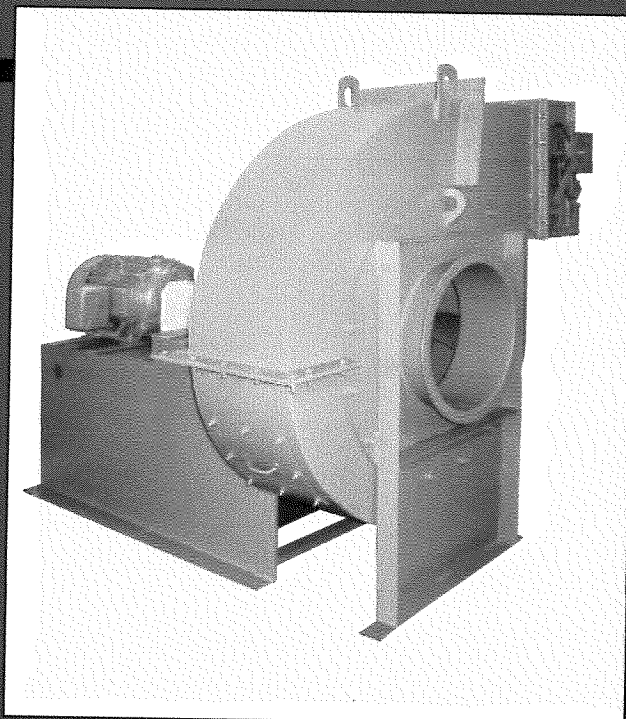
Material:	Polyester with PTFE Laminate
Weight:	16 oz per square yard
Thickness:	0.085"
Air Permeability:	7 CFM
Mullen Burst:	350 psi
Micro Retention:	99.99% of particles 1 micron
Temperature:	275° F

SERIES 20 AND SERIES 30 GI FANS

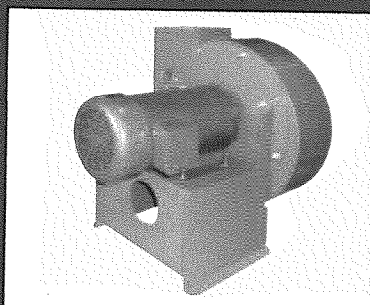
WITH RUGGED RADIAL-BLADE WHEELS



- Capacities to 77,000 CFM
- Static pressures to 22"WG
- Temperatures to 1000°F.



- Capacities to 95,000 CFM
- Static pressures to 32"WG
- Temperatures to 1000°F.

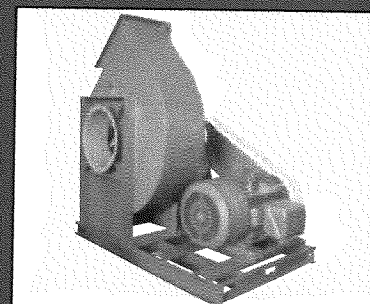


COMPACT GI FANS

- Capacities to 2,200 CFM
- Static pressures to 14"WG

SERIES 45 GI FANS

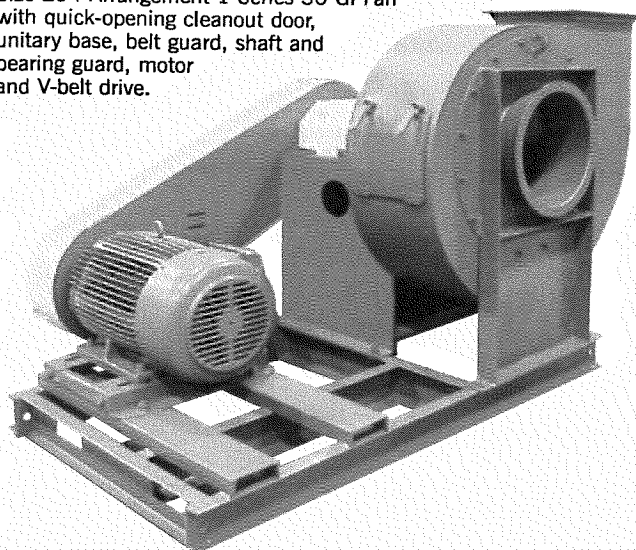
- Capacities to 100,000 CFM
- Static pressures to 46"WG



THE NEW YORK BLOWER COMPANY
7660 Quincy Street
Willowbrook, IL 60527-5530

Visit us on the Web: <http://www.nyb.com>
Phone: (800) 208-7918 Email: nyb@nyb.com

Size 294 Arrangement 1 Series 30 GI Fan with quick-opening cleanout door, unitary base, belt guard, shaft and bearing guard, motor and V-belt drive.



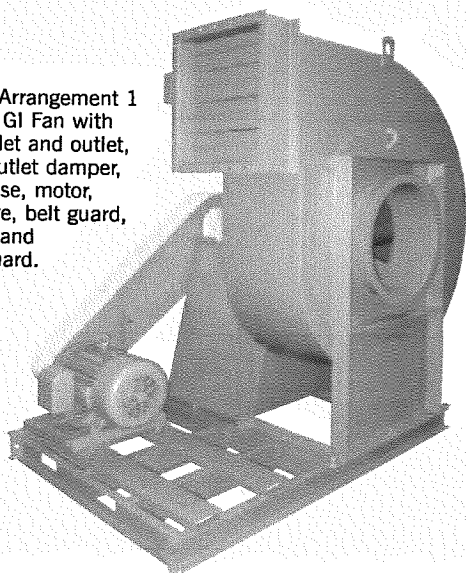
INDUSTRIAL AIR-MOVING APPLICATIONS

- Dust collection
- Pneumatic conveying
- Moisture blow-off
- Oven and dryer exhaust
- Combustion air
- Heat recovery
- Incinerators
- Scrubber exhaust

TYPICAL USER INDUSTRIES

- Chemical industry
- Pulp and paper
- Forest products
- Petrochemical
- Food processing
- Pharmaceutical
- Primary metals
- Printing

Size 504 Arrangement 1 Series 20 GI Fan with flanged inlet and outlet, external outlet damper, unitary base, motor, V-belt drive, belt guard, and shaft and bearing guard.



AMCA SEAL

The New York Blower Company certifies that the Series 20 GI Fans shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

SERIES 20/30 GI FANS

...centrifugal fans designed for industrial process air and material-handling applications

This bulletin covers the Series 20 and Series 30 GI Fans, two of four **nyb** radial-blade fan lines which cover a wide range of performance and application requirements. The design parameters and standard features of Series 20 and Series 30 GI Fans are listed below.

- 14" through 85" wheel diameters
- 9" through 49" inlet diameters
- Up to 22" SP, 77,000 CFM for Series 20
- Up to 32" SP, 95,000 CFM for Series 30
- Temperatures to 1000°F.

STANDARD FEATURES

Welded construction—provides rigidity for rugged industrial applications. In smaller sizes, welded housings and bases are bolted together so that housings can be unbolted and rotated to other discharge positions in the field.

Rotatable and reversible—Series 20 GI Fans with LS wheels, Sizes 144 through 364, and Series 30 GI Fans with LS wheels, Sizes 194 through 294, can be rotated and reversed in the field to obtain clockwise or counterclockwise rotation and any of the available discharge positions...Series 20 GI Fans with DH wheels, Sizes 194 through 364, and Series 30 GI Fans with DH, BP, or RD wheels, Sizes 144 through 294, can be rotate to various discharge positions but cannot be reversed to obtain opposite wheel rotation in the field.

Lifting eyes—on all sizes for ease of handling.

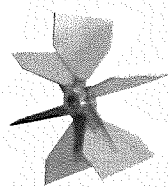
Flanged inlets and flanged outlets—with holes on all fans...see page 23 for standard hole locations. Series 20 fans come standard with slip inlets and outlets (drilled flanges are optional). Series 30 fans come standard with drilled flanged inlets and outlets...slip connection available as an option.

Bearings—ball or spherical roller bearings selected for extended service life over full catalog range [See pages 19 and 20 for size and type].

Shafting—turned, ground, and polished shafting is straightened to close tolerance to minimize "run out" and ensure smooth operation.

Precision balancing—Series 20 and Series 30 GI Fan wheels are dynamically balanced before final assembly. After assembly, all fans are test-run at as-ordered operating speed.

CHOICE OF WHEEL DESIGNS

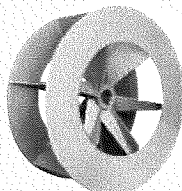


**LS
WHEEL**

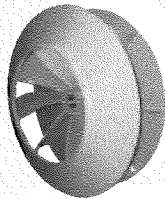
LS wheel—Sizes 144 through 854 for Series 20 fans, Sizes 194 through 364 for Series 30 fans.

RIM wheel—Sizes 404 through 854 for Series 30 fans.

Flat radial-blade design best for material-conveying applications with airstreams containing coarse material or heavy dust and particulate matter. As with the DH wheel, the LS and RIM wheels provide stable airflow performance over the entire pressure range, from wide-open to completely closed-off.



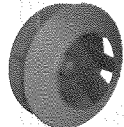
**RIM
WHEEL**



DH WHEEL

Available in Sizes 194 through 854.

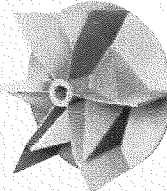
Unique, high-efficiency [up to 74% ME] radial wheel utilizes curved blades and a tapered frontplate to minimize turbulence and control flow through the wheel. Can be used for airstreams with moderate dust loads that do not contain large particles or wet, sticky materials. Performance is stable from wide-open to completely closed-off.



AH/AM WHEEL

Available in sizes 144 through 364 for Series 20 fans, Sizes 194 through 364 for Series 30.

High efficiency shrouded wheels. AH is ideally suited for light to moderate dust loads. AM can accommodate heavier loads. Performance is stable from wide-open to completely closed off.



**BP/RD
WHEEL**

BP wheel—available for Series 30 fans in Sizes 144 through 854. Backplate wheel designed for material-handling applications involving paper or plastic scrap and trim, granular material, and low-density bulk materials. Support gussets used on Sizes 454 through 854. For static pressures to 30"WG.

RD wheel—available for Series 30 fans Sizes 174 through 404. Rugged-duty version of BP wheel for high-density bulk material such as wood chips, corrugated paper trim, and metal scrap or trim. Constructed for static pressures to 20"WG.

ARRANGEMENTS

For applications requiring temperatures from 801°F.-1000°F., stainless steel wheel and alloy shaft are required.

ARRANGEMENT 1

Arrangement 1 fans can be utilized in direct drive or belt drive installations. Fan and motor can be field-mounted or can be mounted on any nyb-supplied unitary base. For approximate unitary base dimensions, see Page 22.

Maximum temperatures—standard fan: 300°F., heat fan: 1000°F.

ARRANGEMENT 4

Traditional arrangement utilizing fan pedestal and foot-mounted motor. Seven discharge positions are available to meet requirements. Arrangement 4V available on application.

Maximum temperatures—standard fan: 180°F.

ARRANGEMENT 8

Arrangement 8 fan construction includes driver sub-base integrated with fan bearing pedestal providing a unitary package in which driver is direct-coupled to the fan shaft with a flexible coupling.

Maximum temperatures—standard fan: 300°F., heat fan: 1000°F.

ARRANGEMENT 9, 9E

Packaged arrangement with motor slide base mounted on fan pedestal. Motor can be mounted on the left or right side of fan pedestal. Refer to chart on page 7 for maximum motor size limits.

Maximum temperatures—standard fan: 300°F., heat fan: 600°F.

NOTE: Motors weighing more than 600 pounds require special construction...consult nyb.

ARRANGEMENT 9F

Available in sizes 404 through 574 for Series 20 and sizes 334-454 for Series 30 fans. Integral motor platform provides packaged convenience for larger motor horsepower than standard Arrangement 9. Motor platform can be on the left or right side of fan pedestal.

Maximum temperatures—standard fan: 300°F., heat fan: 600°F.

ARRANGEMENT 10

Series 20 Arrangement 10 fans provide a compact package with good access to the motor, drive and bearings for easy installation and maintenance.

Sizes 144 and 174 are available only with LS wheels. Sizes 194 through 364 are available with LS or DH wheels.

Maximum temperatures—standard fan: 200°F., heat fan: 600°F.

Size 454 Arrangement 9F Right Series 20 GI Fan with flanged inlet and outlet, flush-bolted cleanout door, external outlet damper, motor, V-belt drive, belt guard, and shaft and bearing guard.

Size 364 Arrangement 8 Series 30 GI Fan with flush-bolted cleanout door, split housing, external outlet damper, coupling guard, shaft and bearing guard, and motor.

ACCESSORIES

• FLANGES

Outlet flange angles welded flush with fan outlet and provided with holes... inlet flange bar welded to inlet collar and provided with holes... companion flanges with matching hole patterns also available. Optional on Series 20. Standard on Series 30.

• DRAIN

Threaded tank flange located at the lowest point of scroll.

• CLEANOUT DOORS—Three types available.

Quick-opening—gasketed...after turning cam levers, door swings open on hinges.

Bolted—gasketed...closely spaced steel studs keep door secured.

Raised bolted—gasketed...allows space for insulation when desired ...door raised 2" from fan housing.

Cleanout doors are located at approximately 3 o'clock or 9 o'clock positions on the housing scroll opposite fan discharge...if specific location is required, provide detailed information.

• INLET BOX

Available in Sizes 224 through 854. Minimizes entry losses normally associated with 90° turns at or near the fan inlet...makes such losses predictable. See separate **nyb** Catalog Sheet for details. **Caution:** Use of inlet boxes in material-handling applications is not recommended as inlet box may act as a settling chamber.

NOTE: Optional flanged inlet required on Series 20 fan.

• PARALLEL-BLADE INLET BOX DAMPER

Spins air in direction of rotation at reduced damper settings, providing horsepower savings greater than with outlet dampers. See separate **nyb** Catalog Sheet for details and **nyb** Engineering Letter for damper selection information. Available in sizes 224 through 854.

• SHAFT SEAL

Ceramic-felt seal elements compressed between metal backing and retaining plates...elements can be easily split for field replacement.

• OUTLET DAMPERS

Outlet dampers are available for use with all GI Fans. Outlet dampers are available with parallel or opposed-blade construction.

Standard outlet-damper construction includes removable linkage and casing side to allow for replacement of bushings, bearings and vanes. Optional flanged ball bearing or stuffing-box construction allows damper selection to suit the application. Optional flanged outlet required on Series 20 fans.

See separate **nyb** Catalog Sheet for complete damper details and **nyb** Engineering Letter for damper selection information.

• EXTERNAL INLET-VANE DAMPER

External-vane construction for flange mounting to fan inlet...available for Sizes 294 and larger. The vanes spin the air in direction of rotation, providing greater power savings at reduced loads than with outlet dampers. Recommended for use with DH wheel with relatively clean airstreams. Maximum temperature: 800°F. Optional flanged inlet required on Series 20 fans.

See separate **nyb** Engineering Letter for damper selection information.

• UNITARY BASE

Structural steel base provides common support for fan, motor and drive components...also available with spring-type or rubber-in-shear isolators...flexible duct connections are necessary for use with isolation bases. (See Page 22 for approximate dimensions.)

• BELL MOUTH INLET

Available in Sizes 194 through 854.

Catalog ratings are for GI Fans with inlet and outlet ducts...when no inlet duct is used as in a combustion air-supply application, entrance loss must be added to static pressure calculated for the system...for bare inlets, that loss is approximately equal to the fan velocity pressure. Example: 4000 FPM velocity=1-inch static pressure...screened bell mouth inlets render such losses negligible.

SAFETY EQUIPMENT

Safety accessories are available from **nyb**, but selection of the appropriate devices is the responsibility of the system-designer who is familiar with the particular installation, or application, and can provide for guards for all exposed moving parts as well as protection from access to high-velocity airstreams. Neither **nyb** nor its sales representatives is in a position to make such determination. Users and/or installers should read "Recommended Safety Practices for Air Moving Devices" as published by the Air Movement and Control Association International, Arlington Heights, Illinois.

MODIFICATIONS

ABRASION-RESISTANT CONSTRUCTION

The following modifications are available to increase service life when fan is subjected to abrasion or erosion from air-borne contaminants.

ASTM A-514 blades—wheel blades fabricated to alloy steel with 321 minimum Brinell hardness. (Available on LS/RIM, BP, and RD wheels).

Checkerplate blades—wheel blades fabricated of four-way floor plate. (Available on Series 30 LS/RIM, BP and RD wheels).

Scroll liners—removable liners of ASTM A-514 alloy are bolted to housing interior...split housing required. (Available on Series 30 fans).

HANDLING CORROSIVES

Industrial exhaust and process applications are sometimes made more difficult due to the presence of corrosive fumes or particulate. Alternate alloy construction or special paint systems can usually provide some degree of longer life.

GI Fans can be constructed with airstream parts of aluminum, 304, or 316 stainless steel. 316 generally provides the best corrosion resistance of the three types available. However, the effectiveness of any particular alloy can only be judged by the user's experience in his or similar applications.

A separate **nyb** Engineering Letter provides basic information regarding the different types of coatings that are available for fan equipment. That information may assist the user in determining the specific coating that may serve his purposes. However, **nyb** cannot guarantee the suitability of a coating for a particular application. **nyb** can only warrant that the surface preparation will be in accordance with the appropriate Steel Structures Painting Council Standard Practice and that the coatings will be applied according to the coating manufacturer's instructions.

SPARK-RESISTANT CONSTRUCTION [SRC]

There is no method of construction that can guarantee against the potential of producing sparks in fans. We can only use spark-resistant materials and manufacturing techniques that tend to minimize the potential of two or more components making contact which may produce sparks. Refer to **nyb** Engineering Letter for additional information and limitations of SRC. The following types of construction are available:

AMCA A [AIRSTREAM] SRC

To include all airstream parts constructed of a spark-resistant alloy...maximum temperature: 200°F.

AMCA B [WHEEL] SRC

To include the fan wheel constructed of a spark-resistant alloy and a buffer plate around the housing shaft-hole opening...maximum temperature: 200°F.

AMCA C [BUFFER] SRC

To include buffer rings adjacent to the wheel front and back, and a buffer plate around the housing shaft-hole opening...maximum temperature: 800°F. (with heat fan construction).

ALL TYPES SRC

Fan must be constructed so that no bearings, drive components, or electrical apparatus are located in the airstream. User must electrically ground all fan and system components. Refer to Engineering Letter 15 for the full meaning and limits of spark-resistant construction.

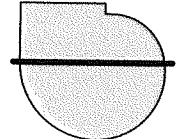
Note: SRC not available on Series 30 GI Fans with BP or RD wheels.

SPLIT-HOUSING CONSTRUCTION

Sizes 404 and larger for Series 20, and Sizes 334 and larger for Series 30 are available with split housings...bars are welded to housing to permit bolting sections together. Inlet and outlet connections do not have to be removed except as noted.

TYPE A

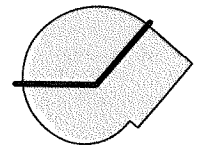
**Bottom Horizontal
Up Blast (shown)
Down Blast**



Horizontal split allows removal of top section without disturbing inlet connection...outlet connection must be broken on Up Blast fans only.

TYPE B

**Top Horizontal
Top Angular Down
(shown)
Bottom Angular Up
Top Angular Up**



Split allows removal of pie-shaped section without disturbing inlet or outlet connections.

HEAT-FAN CONSTRUCTION

Successful operation of fans at elevated temperatures requires consideration of two main factors.

1. Effect of temperature on wheel maximum safe speeds [see page 7].
2. Effect of air density on aerodynamic performance [see page 6].

Heat fan modifications include shaft coolers and shaft-cooler guards on all arrangements and motor heat shields for Arrangements 9, 9E, 9F, and 10.

Aluminum shaft coolers are designed to move ambient air over the inboard bearing and dissipate heat transferred through the shaft.

Arrangements 1 and 8 GI Fans can be modified for 801°F.-1000°F. operation. In this temperature range, stainless steel wheel and shafting are required.

950X/960X alloy wheels are also available to maintain standard safe speed limits at 500°F.-800°F. temperatures when required.

Note: When temperature exceeds 300°F., high-temperature paint is furnished.

SELECTION OF SERIES 20 AND 30 GI FANS

The selection of a General Industrial Fan involves consideration of a number of factors. Initially, the type of wheel must be selected. For airstreams with moderate dust loads, the AH and DH wheel are often chosen because of their higher operating efficiency. The AM/LS/RIM wheel are more suited for airstreams containing material and particulate, but it is not as efficient as the DH wheel. If the airstream contains stringy material such as paper trim, a BP or RD wheel should be chosen.

Once a wheel type has been determined, a fan size must be selected. For any given performance requirement [CFM and static pressure], two, three or more fan sizes may be capable of that duty. As with the choice of wheel types, several factors can influence what fan size is chosen. In a material-conveying application, a minimum conveying velocity may be required and the fan size should be selected to give the required velocity. For more details on material handling, refer to **nyb** Engineering Letter on pneumatic conveying. There may be some size constraints and the smallest size fan may be selected. Consider an application requiring 13,920 CFM at 26"SP at 70°F. at sea level. The following fans could be chosen:

364 DH -1968 RPM, 82.9 BHP, 5824 OV
 364 LS -1981 RPM, 97.6 BHP, 5824 OV
 404 DH -1704 RPM, 81.2 BHP, 4800 OV
 404 RIM-1726 RPM, 88.7 BHP, 4800 OV
 454 DH -1483 RPM, 83.6 BHP, 3772 OV
 454 RIM-1501 RPM, 89.6 BHP, 3772 OV

Comparing the BHP requirements of the DH and the LS/RIM designs illustrates the energy savings that the DH wheel provides. If the DH design is suitable for the application and the criteria is to choose the most efficient fan, the Size 404 DH would be chosen. If the application requires a minimum outlet velocity [OV] of 5000 FPM for conveying material, the Size 364 LS would be chosen. The requirements and limitations of the specific installation will determine the best choice.

If sound is a factor, generally the most efficient fan will be the quietest selection. Full sound power ratings are available on all GI fans in **nyb's** Fan Selection Program [Fan-to-Size].

CORRECTIONS FOR AIRSTREAMS OTHER THAN STANDARD DENSITY [.075 lb./cu. ft.]

The capacity tables on pages 8 through 18 gives fan performance based on air at 70°F. at sea level at a density of .075 lb./cu. ft. If the airstream density is other than .075 lb./cu. ft., corrections must be made to static pressure and brake horsepower requirements [see page 8].

**SP AND BHP
CORRECTION FACTORS
FOR TEMPERATURE [°F.]**

Temp. °F.	Factor	Temp. °F.	Factor
-50°	.77	200°	1.25
-25°	.82	250°	1.34
0°	.87	300°	1.43
20°	.91	350°	1.53
40°	.94	400°	1.62
60°	.98	450°	1.72
70°	1.00	500°	1.81
80°	1.02	550°	1.91
100°	1.06	600°	2.00
120°	1.09	700°	2.19
140°	1.13	800°	2.38
160°	1.17	900°	2.56
180°	1.21	1000°	2.76

NOTE: If correction factor for both temperature and altitude is required, multiply factors from Charts V and VI together: 600°F. and 3000' - 2.00 x 1.12=2.24 (combined factor)

**SP AND BHP
CORRECTION FACTORS
FOR ALTITUDE
[ft. above sea level]**

Temp. °F.	Factor
0	1.00
500	1.02
1000	1.04
1500	1.06
2000	1.08
2500	1.10
3000	1.12
3500	1.14
4000	1.16
4500	1.18
5000	1.20
5500	1.22
6000	1.25
6500	1.27
7000	1.30
7500	1.32
8000	1.35
9000	1.40
10000	1.45

**CORRECTION
FACTORS FOR
RAREFICATION
[NEGATIVE
INLET PRESSURE]**

SP [in W.G.]	Factor
5	1.01
10	1.03
15	1.04
20	1.05
25	1.07
30	1.08
35	1.09
40	1.11

Temperature Correction Factors for Wheel Maximum Safe Speed

Factors to be Applied to Maximum Safe Speeds Shown in Capacity Tables

TEMPERATURE CORRECTION FACTORS FOR MAXIMUM SAFE SPEEDS FOR ALL SERIES 20 & 30 LS/RIM AND DH WHEELS, AND SERIES 30 BP AND RD WHEELS SIZES 144-404

Temp. [°F]	Materials of construction					
	Mild steel	950X/960X*	Aluminum	304 SST	316 SST	347 SST
70°	1.0	1.0	1.0	1.0	0.95	1.00
200°	1.0	1.0	0.97	0.89	0.92	1.00
300°	1.0	1.0	—	0.82	0.88	0.99
400°	1.0	1.0	—	0.78	0.86	0.97
500°	0.97	1.0	—	0.75	0.83	0.97
600°	0.94	1.0	—	0.73	0.80	0.97
700°	0.91	1.0	—	0.71	0.78	0.96
800°	0.82	1.0	—	0.70	0.77	0.96
900°	—	—	—	0.68	0.76	0.95
1000°	—	—	—	—	0.75	0.94

*Material type at nyb option. Not available for sizes 144 - 294 LS wheels. BP, RD, and DH wheels are constructed of a combination of mild steel and alloy components.

TEMPERATURE CORRECTION FACTORS FOR MAXIMUM SAFE SPEEDS FOR SERIES 30 BP WHEELS SIZES 454-854 AND SERIES 20 AND 30 AM WHEELS SIZES 144-364

Temp. [°F]	Materials of construction				
	950X/960X*	Aluminum [AM Only]	304 SST	316 SST	347 SST
70°	1.0	1.0	0.74	0.76	0.75
200°	0.96	1.0	0.70	0.72	0.72
300°	0.94	—	0.66	0.69	0.70
400°	0.93	—	0.63	0.67	0.68
500°	0.92	—	0.60	0.64	0.67
600°	0.92	—	0.58	0.63	0.66
700°	0.86	—	0.57	0.62	0.64
800°	0.80	—	0.56	0.61	0.63
900°	—	—	0.55	0.60	0.62
1000°	—	—	—	0.59	0.61

TEMPERATURE CORRECTION FACTORS FOR MAXIMUM SAFE SPEEDS FOR SERIES 20 AND 30 AH WHEELS SIZES 144-364

Temp. [°F]	Materials of construction				
	950X/960X*	Aluminum [AM Only]	304 SST	316 SST	347 SST
70°	1.0	1.0	0.62	0.64	0.63
200°	0.97	1.0	0.59	0.61	0.61
300°	0.94	—	0.55	0.58	0.59
400°	0.91	—	0.53	0.56	0.57
500°	0.88	—	0.50	0.54	0.56
600°	0.85	—	0.49	0.53	0.55
700°	0.81	—	0.48	0.52	0.54
800°	0.77	—	0.47	0.51	0.53
900°	—	—	0.46	0.50	0.52
1000°	—	—	—	0.49	0.52

ARRANGEMENT 10

MAXIMUM MOTOR SIZE LIMITS			
Size	Maximum motor frame		Maximum motor case length* [C-NW]
	Open	TE	
144	184T	184T	14½
174	215T	215T	16⅝
194	215T	215T	16⅝
224	256T	254T	18⅝
264	256T	254T	18⅝
294	284T	256T	19½
334	284T	284T	22½
364	284T	284T	22½

SERIES 30 MOTOR LIMITATIONS ARRANGEMENT 9

MAXIMUM MOTOR SIZE LIMITS			
Size	Maximum motor case length* [C-NW]		Maximum BL†
	300°F.	600°F.	
144	10¼	8¾	11½
174	13¼	11¾	12⅞
194	21½	20	16½
224	24	22½	20¾
264	26	24½	22⅞
294	26	24½	26½
334	21½	20	26¾
364	21	19½	30⅝
404	23½	21½	33⅞
454	25½	23½	38⅞
504	28	26½	—
574	28¾	27¼	—
644	31½	30	—
714	34½	33	—
784	38½	37	—
854	42½	41	—

SERIES 20 MOTOR LIMITATIONS - ARR. 9 AND 9E

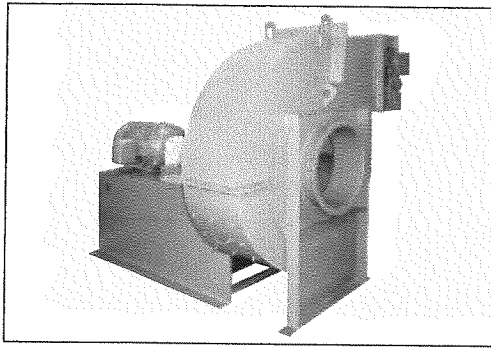
MAXIMUM MOTOR SIZE LIMITS					
Size	Maximum motor case length* [C-NW]				Max. BL†
	Arrangement 9		Arrangement 9E		
	300°F.	600°F.	300°F.	600°F.	
144	10¼	8¾	15¾	14¼	11½
174	13¼	11¾	18	16½	12⅞
194	16	14½	18	16½	16⅞
224	17	15½	22	20½	20¾
264	20	18½	25	23½	22¼
294	22½	21	25	23½	26⅝
334	24	22½	27	25½	27⅞
364	27	25½	—	—	31⅞
404	24	22½	—	—	34⅞
454	26	24½	—	—	39¾
504	28½	27	—	—	44⅞
574	29¼	27¾	—	—	51⅞
644	32	30½	—	—	38
714	35	33½	—	—	44
784	39	37½	—	—	46
854	43	41½	—	—	51

ARRANGEMENT 9F

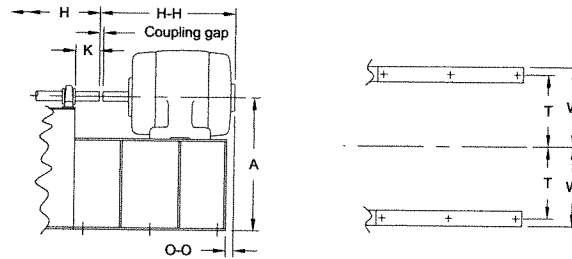
AVAILABLE MOTOR SIZE LIMITS			
Size	Maximum motor case length* [C-NW]		Minimum motor frame size
	300°F.	600°F.	
404	27¼	25¾	286T
454	28½	27	324T
504	30¼	28¾	364T
574	30¼	28¾	364T

ARRANGEMENT 9F

AVAILABLE MOTOR SIZE LIMITS			
Size	Maximum motor case length* [C-NW]		Minimum motor frame size
	300°F.	600°F.	
334	28½	27	254T
364	28¼	26¾	254T
404	30¼	28¾	286T
454	30¼	28¾	324T



DIRECT-DRIVE ARRANGEMENTS



ARRANGEMENT 8 MOTOR PEDESTAL DIMENSIONS

These approximate dimensions can be used to estimate the overall size of Arrangement 8 fans. Add the appropriate dimensions from the right to the Arrangement 1 fan dimensions on page 21 or 22.

Note: Coupling gap is based on the FALK STEELFLEX coupling sizes shown. As the gap will vary with other coupling sizes or types, so will the Arrangement 8 motor pedestal dimensions.

Motor frame size	Coupling		O-O*		H-H*			
					Open		TE	
	Size	Gap	Min.	Max.	Min.	Max.	Min.	Max.
143 -145T	30T	1/8	3/4	3 1/8	10 7/8	12 1/2	11 5/8	13 1/8
182 -184T	40T	1/8	3/4	3 5/8	12 7/8	14 3/4	14 5/8	15 3/4
213 -215T	50T	1/8	1 3/8	5 1/2	15 7/8	17 3/8	17 1/8	20
254 -256T	60T	1/8	1	5 7/8	20 9/8	22 1/2	22 1/2	25 1/2
284 -286T	70T	1/8	1 1/2	6 3/8	23 1/2	25 1/8	25 3/8	28 3/8
284TS-286TS	70T	1/8	1 1/2	6 1/2	22 1/8	23 3/4	24 1/8	27 1/8
324 -326T	80T	1/8	1	6 3/4	26 1/8	27 3/4	28 1/4	31 7/8
324TS-326TS	80T	1/8	1	6 3/4	24 5/8	26 1/8	26 3/4	30 3/8
364 -365T	90T	1/8	1 1/8	7	28 1/4	29 7/8	32 1/2	34 1/8
364TS-365TS	90T	1/8	1 5/8	7	26 5/8	27 5/8	30 3/8	32
404 -405T	90T	1/8	2 3/8	8 3/4	32 5/8	34 1/4	37 3/8	39
404TS-405TS	90T	1/8	2 3/8	8 3/4	29 5/8	31 1/4	34 3/8	36
444 -445T	100T	3/16	1 5/8	9 3/8	37 3/8	40	42	45 1/8
444TS-445TS	100T	3/16	2 1/8	9 3/8	34 1/8	36 1/4	38 3/8	41 3/8

*H-H and O-O based on several major motor manufacturers—consult **nyb** for exact dimensions. Dimensions not to be used for construction unless certified.

USING CAPACITY TABLES

For a given fan size, wheel design, CFM and static pressure, capacity tables can be used to obtain outlet velocity, wheel RPM, and BHP. If capacities are at conditions other than 70°F., sea level, or standard density [.075 lb./cu. ft.], correction factors must be applied to static pressure and BHP.

1. If conditions other than standard density [.075 lb./cu. ft.] are involved, correct static pressure for air density. Refer to Page 6.
2. Select size, wheel type, RPM, and BHP of fan from capacity table.
3. Check maximum safe speed of fan at operating temperatures as shown on Page 7.
4. Determine actual performance at operating conditions by correcting static pressure and brake horsepower.

EXAMPLE: A fan is required for 7800 CFM at 5000 OV at 12" SP at 600°F. for light dust handling.

1. Page 6 gives a 2.00 factor for 600°F. Corrected static pressure is 12"SP x 2.00=24"SP at 70°F. Select fan from capacity tables for 7800 CFM at 24"SP.
2. A Size 294 with DH wheel is selected for 7800 CFM at 24"SP at 2285 RPM and 42.9 brake horsepower.
3. On Page 7, the maximum safe speed of a Size 294 Series 30 GI Fan at 600°F. is 2453 RPM [2610 x .94]. Fan is satisfactory for operation at 600°F.
4. Actual performance: 7800 CFM at 12"SP [24" ÷ 2.00] at 2285 RPM at 21.5 BHP [42.9 ÷ 2] at 600°F.

SERIES 20 & 30 LS & RIM WHEELS

SERIES 30 PERFORMANCE SHADED IN BLUE

144 LS  Max. safe speeds Ser. 20 LS=4605 RPM	CFM	OV	2"SP		4"SP		6"SP		8"SP		10"SP		12"SP		14"SP		16"SP		18"SP		20"SP		22"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	500	1166	1419	0.28	1937	0.58	2347	0.93	2693	1.31	2996	1.72	3279	2.17	3547	2.66	3792	3.17	4012	3.68	4240	4.26	4439	4.82
	750	1748	1533	0.47	2029	0.86	2413	1.27	2755	1.73	3055	2.21	3329	2.73	3578	3.26	3812	3.82	4038	4.42	4249	5.03	4458	5.69
	1000	2331	1664	0.71	2140	1.22	2519	1.73	2839	2.26	3128	2.82	3389	3.39	3639	4.01	3874	4.65	4098	5.33	4299	5.99	4503	6.71
	1250	2914	1808	1.03	2264	1.67	2632	2.3	2943	2.92	3223	3.57	3487	4.25	3723	4.92	3960	5.67	4159	6.35	4379	7.16	4566	7.90
	1500	3497	1964	1.44	2406	2.23	2759	2.98	3065	3.73	3337	4.47	3592	5.24	3826	6.02	4058	6.85	4260	7.64	4462	8.48		
	1750	4079	2130	1.94	2548	2.88	2892	3.77	3196	4.66	3464	5.53	3709	6.39	3949	7.32	4163	8.20	4367	9.10	4557	10.0		
	2000	4662	2305	2.57	2702	3.65	3037	4.70	3334	5.74	3591	6.72	3838	7.73	4062	8.72	4273	9.71	4479	10.7				
	2250	5245	2487	3.33	2863	4.56	3180	5.74	3472	6.93	3729	8.07	3969	9.21	4188	10.3	4399	11.4						
2500	5828	2681	4.28	3028	5.60	3336	6.94	3618	8.28	3874	9.60	4100	10.8	4325	12.1	4535	13.4							

174 LS 	CFM	OV	2"SP		4"SP		6"SP		8"SP		10"SP		12"SP		14"SP		16"SP		18"SP		20"SP		22"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
 Max. safe speeds Ser. 20 LS=3930 RPM	1000	1580	1227	0.59	1641	1.13	1964	1.70	2245	2.34	2501	3.04	2724	3.76	2928	4.51	3128	5.33	3317	6.19	3486	7.03	3660	7.98
	1325	2093	1312	0.87	1715	1.55	2031	2.24	2306	2.99	2541	3.74	2766	4.57	2974	5.44	3163	6.31	3346	7.25	3519	8.21	3693	9.26
	1650	2607	1409	1.22	1793	2.05	2108	2.90	2367	3.74	2611	4.66	2826	5.57	3021	6.50	3213	7.50	3395	8.53	3558	9.54	3723	10.6
	1975	3120	1515	1.64	1885	2.66	2183	3.65	2444	4.65	2675	5.66	2897	6.74	3093	7.80	3281	8.91	3453	10.0	3622	11.2	3783	12.4
	2300	3633	1631	2.16	1984	3.37	2274	4.53	2532	5.71	2757	6.86	2963	8.01	3160	9.22	3337	10.4	3518	11.7	3681	12.9	3839	14.2
	2625	4147	1754	2.79	2089	4.18	2371	5.54	2614	6.84	2843	8.19	3049	9.52	3236	10.8	3420	12.2	3595	13.6	3755	15.0	3912	16.4
	2950	4660	1881	3.55	2201	5.13	2467	6.64	2713	8.18	2932	9.67	3129	11.1	3319	12.6	3497	14.1	3667	15.6	3824	17.1		
	3275	5174	2011	4.44	2317	6.20	2576	7.91	2813	9.64	3024	11.3	3223	13.0	3408	14.6	3581	16.2	3748	17.9	3903	19.5		
	3600	5687	2147	5.50	2435	7.42	2690	9.35	2915	11.2	3120	13.1	3313	14.9	3502	16.8	3672	18.6	3836	20.4				

Performance certified is for installation Type D: Ducted inlet, Ducted outlet. Power rating (BHP) does not include transmission losses. Performance ratings do not include the effects to aperturancs (accessories).

SERIES 20 & 30 LS & RIM WHEELS

SERIES 30 PERFORMANCE SHADED IN BLUE

194 LS  Max. safe speeds Ser. 20 LS=3425 RPM Ser. 30 LS=3985 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1400	2121	1467	1.6	2005	3.24	2437	5.12	2789	7.09	3120	9.34	3260	10.4	3412	11.7	3541	12.8	3680	14.1	3808	15.4	3933	16.7
	1675	2538	1509	1.97	2038	3.83	2448	5.82	2808	8.02	3138	10.5	3279	11.6	3418	12.9	3555	14.2	3685	15.5	3826	17.0	3939	18.3
	1950	2955	1557	2.38	2070	4.45	2479	6.67	2832	9.04	3150	11.6	3302	13.0	3445	14.3	3574	15.7	3699	17.0	3832	18.5	3959	20.1
	2225	3371	1615	2.88	2111	5.16	2510	7.57	2858	10.1	3167	12.8	3318	14.3	3463	15.8	3597	17.3	3717	18.6	3845	20.2	3969	21.8
	2500	3788	1672	3.42	2157	5.95	2553	8.61	2887	11.3	3205	14.3	3339	15.7	3485	17.3	3612	18.8	3750	20.5	3863	22.0	3983	23.7
	2775	4205	1739	4.05	2209	6.82	2595	9.70	2930	12.7	3229	15.7	3379	17.4	3509	19.0	3632	20.5	3764	22.3	3884	23.9		
	3050	4621	1809	4.78	2258	7.74	2636	10.8	2972	14.1	3268	17.4	3404	19.0	3537	20.7	3663	22.4	3799	24.4	3918	26.1		
	3325	5038	1883	5.59	2318	8.80	2686	12.1	3013	15.6	3308	19.1	3445	20.9	3580	22.8	3710	24.7	3835	26.5	3951	28.4		
	3600	5455	1962	6.52	2381	9.96	2741	13.5	3064	17.2	3347	20.9	3485	22.8	3609	24.7	3743	26.7	3856	28.6	3977	30.6		

224 LS  Max. safe speeds Ser. 20 LS=2900 RPM Ser. 30 LS=3440 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1600	1720	1214	1.69	1680	3.51	2039	5.57	2352	7.93	2625	10.5	2742	11.7	2871	13.2	2991	14.7	3098	16.1	3202	17.6	3310	19.2
	2050	2204	1243	2.19	1703	4.33	2066	6.71	2372	9.28	2640	12.00	2757	13.4	2884	15.00	2992	16.4	3108	18.00	3215	19.6	3335	21.2
	2500	2688	1283	2.78	1727	5.25	2088	7.95	2388	10.8	2661	13.8	2778	15.3	2905	17.00	3018	18.6	3126	20.3	3227	21.9	3348	23.8
	2950	3172	1330	3.46	1759	6.29	2112	9.32	2416	12.5	2677	15.7	2802	17.4	2919	19.2	3034	21.00	3136	22.6	3245	24.5	3369	26.6
	3400	3656	1389	4.26	1797	7.45	2138	10.8	2438	14.3	2698	17.8	2821	19.7	2938	21.6	3056	23.5	3163	25.5	3267	27.4	3397	29.6
	3850	4140	1456	5.21	1845	8.77	2174	12.5	2464	16.3	2734	20.3	2857	22.4	2961	24.2	3080	26.4	3192	28.5	3292	30.6	3400	32.9
	4300	4624	1528	6.30	1896	10.2	2217	14.3	2506	18.6	2759	22.8	2881	25.00	3000	27.3	3099	29.3	3214	31.7	3320	34.00	3424	36.4
	4750	5108	1606	7.58	1954	11.8	2258	16.2	2538	20.8	2787	25.4	2907	27.8	3026	30.3	3142	32.8	3239	35.00	3341	37.4		
	5200	5591	1689	9.09	2019	13.6	2312	18.4	2579	23.3	2825	28.3	2946	30.9	3055	33.4	3172	36.2	3272	38.7	3379	41.4		

264 LS  Max. safe speeds Ser. 20 LS=2510 RPM Ser. 30 LS=2980 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1800	1452	1039	1.92	1448	4.17	1762	6.76	2031	9.72	2264	12.9	2379	14.7	2485	16.5	2580	18.3	2682	20.3	2779	22.3	2863	27.1
	2500	2016	1065	2.64	1466	5.32	1780	8.33	2040	11.5	2276	15.1	2389	17.1	2485	18.8	2589	20.9	2686	22.9	2780	25.1	2880	30.8
	3200	2581	1103	3.53	1494	6.74	1798	10.1	2061	13.8	2295	17.8	2402	19.8	2509	22.0	2602	24.0	2701	26.3	2795	28.6	2890	35.1
	3900	3145	1150	4.56	1524	8.34	1825	12.3	2084	16.4	2318	20.8	2430	23.2	2527	25.4	2631	27.9	2722	30.2	2809	32.5	2902	40.0
	4600	3710	1207	5.79	1564	10.2	1860	14.7	2110	19.3	2344	24.2	2452	26.8	2556	29.4	2652	31.9	2738	34.3	2830	37.0	2928	45.0
	5300	4274	1277	7.31	1606	12.2	1893	17.3	2146	22.6	2371	28.0	2477	30.7	2580	33.6	2677	36.4	2766	39.1	2862	42.1	2969	50.5
	6000	4839	1352	9.12	1665	14.5	1933	20.1	2182	26.1	2400	31.9	2504	34.9	2606	38.1	2704	41.2	2796	44.3	2880	47.2		
	6700	5403	1434	11.3	1723	17.1	1983	23.3	2225	29.9	2439	36.4	2543	39.7	2635	42.8	2733	46.3	2827	49.8	2915	53.2		
	7400	5968	1520	13.9	1795	20.2	2042	27.0	2266	33.8	2478	41.0	2581	44.7	2674	48.2	2764	51.7	2859	55.6	2950	59.4		

294 LS  Max. safe speeds Ser. 20 LS=2195 RPM Ser. 30 LS=2610 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	2400	1509	911	2.53	1274	5.49	1555	8.91	1787	12.6	2002	16.9	2101	19.2	2185	21.3	2275	23.7	2363	26.3	2448	28.9	2526	31.4
	3300	2075	933	3.42	1281	6.91	1562	10.9	1796	15.2	2002	19.7	2100	22.2	2196	24.7	2287	27.4	2372	30.0	2448	32.5	2528	35.3
	4200	2642	963	4.46	1307	8.70	1575	13.2	1810	18.1	2016	23.2	2110	25.8	2203	28.6	2294	31.5	2371	34.1	2453	37.0	2540	40.3
	5100	3208	1008	5.76	1330	10.6	1596	15.8	1828	21.3	2027	26.9	2125	29.9	2209	32.7	2299	35.9	2389	39.2	2465	42.2	2547	45.6
	6000	3774	1057	7.28	1367	12.8	1620	18.6	1847	24.8	2042	30.9	2137	34.2	2227	37.5	2311	40.8	2401	44.5	2482	48.0	2560	51.5
	6900	4340	1115	9.14	1410	15.4	1653	21.8	1868	28.4	2065	35.4	2158	39.0	2248	42.7	2333	46.4	2411	49.9	2495	53.8	2569	57.5
	7800	4906	1180	11.4	1458	18.2	1691	25.3	1905	32.8	2098	40.5	2190	44.5	2270	48.1	2357	52.3	2438	56.3	2511	60.1	2590	64.4
	8700	5472	1249	14.1	1509	21.4	1737	29.2	1940	37.3	2130	45.7	2213	49.7	2304	54.3	2381	58.4	2464	62.9	2542	67.4		
	9600	6038	1321	17.2	1569	25.2	1785	33.6	1986	42.5	2161	51.2	2253	56.0	2336	60.7	2416	65.3	2492	69.9	2573	74.9		

334 LS  Max. safe speeds Ser. 20 LS=2035 RPM Ser. 30 LS=2360 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3000	1523	829	3.21	1151	6.93	1402	11.2	1617	16.1	1805	21.4	1890	24.1	1975	27.1	2051	30.0	2126	32.9	2206	36.3	2273	39.3
	4050	2056	855	4.36	1168	8.72	1415	13.6	1625	19.0	1813	24.8	1898	27.9	1982	31.1	2061	34.3	2134	37.5	2213	41.1	2282	44.5
	5100	2589	886	5.70	1190	10.8	1430	16.3	1637	22.3	1825	28.8	1908	32.0	1990	35.5	2071	39.1	2148	42.7	2220	46.3	2286	49.8
	6150	3122	927	7.35	1218	13.3	1456	19.6	1662	26.3	1840	33.2	1922	36.7	2003	40.5	2085	44.4	2156	48.1	2233	52.3	2296	55.9
	7200	3655	972	9.28	1255	16.1	1481	23.1	1681	30.5	1857	38.1	1943	42.2	2025	46.3	2101	50.3	2176	54.6	2249	58.9	2318	63.2
	8250	4188	1022	11.6	1291	19.3	1516	27.2	1708	35.3	1889	44.0	1965	48.0	2047	52.5	2125	57.1	2197	61.5	2267	66.0	2341	71.0
	9300	4721	1079	14.3	1336	22.9	1554	31.8	1741	40.6	1919	50.2	1996	54.7	2070	59.2	2149	64.3	2224	69.3	2292	74.1		
	10350	5254	1139	17.6	1381	26.9	1593	36.7	1778	46.5	1948	56.7	2026	61.7	2101	66.7	2173	71.8	2250	77.5	2322	83.0		
	11400	5787	1200	21.3	1433	31.5	1635	42.1	1818	53.0	1983	63.9	2062	69.5	2132	74.6	2206	80.4	2277	86.1	2343	91.6		

SERIES 20 & 30 LS & RIM WHEELS

SERIES 30 PERFORMANCE SHADED IN BLUE

404 LS/RIM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
 Max. safe speeds Ser. 20 LS=1640 RPM Ser. 30 RIM=1905 RPM	3200	1103	669	3.55	942	8.17	1151	13.6	1330	19.9	1487	26.7	1558	30.3	1628	34.1	1702	36.3	1763	39.8	1827	43.8	1891	48.0
	4800	1655	681	4.91	947	10.5	1156	16.8	1330	23.7	1487	31.4	1556	35.2	1624	39.3	1686	41.6	1750	45.7	1813	50.0	1881	54.9
	6400	2207	702	6.59	961	13.2	1164	20.5	1337	28.4	1491	36.8	1561	41.1	1630	45.7	1685	48.3	1752	53.1	1815	57.9	1870	62.3
	8000	2759	731	8.64	979	16.3	1178	24.7	1351	33.7	1502	43.1	1570	47.8	1639	52.9	1691	55.9	1752	60.8	1809	65.5	1870	70.9
	9600	3310	765	11.1	1003	19.9	1197	29.4	1360	39.1	1513	49.8	1581	55.0	1636	58.7	1701	64.1	1757	69.2	1818	74.8	1876	80.4
	11200	3862	802	13.9	1031	24.1	1217	34.5	1385	45.9	1526	56.9	1598	63.2	1646	66.8	1712	72.9	1772	78.8	1830	84.7	1892	91.4
	12800	4414	845	17.4	1063	28.7	1245	40.5	1408	53.0	1547	65.2	1619	72.1	1667	76.2	1729	82.7	1787	88.9	1848	95.8	1902	102
	14400	4966	892	21.6	1098	34.0	1275	47.0	1429	60.2	1574	74.4	1639	81.3	1687	86.0	1751	93.3	1807	100	1866	107		
	16000	5517	942	26.6	1140	40.2	1311	54.5	1459	68.8	1599	83.9	1652	89.6	1713	97.0	1772	104	1826	111	1884	119		

454 LS/RIM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
 Max. safe speeds Ser. 20 LS=1460 RPM Ser. 30 RIM=1690 RPM	5600	1518	602	5.81	837	12.5	1025	20.4	1181	29.0	1317	38.3	1383	43.4	1445	48.6	1497	51.1	1554	56.2	1616	62.1	1667	67.4
	7400	2005	616	7.57	846	15.4	1030	24.4	1184	33.9	1322	44.4	1384	49.6	1443	55.0	1495	58.4	1552	64.0	1608	69.8	1656	75.3
	9200	2493	634	9.65	857	18.7	1036	28.6	1189	39.3	1326	50.9	1388	56.7	1449	62.8	1498	66.6	1551	72.3	1607	78.8	1659	85.1
	11000	2981	659	12.1	875	22.5	1052	33.9	1199	45.5	1332	57.9	1394	64.3	1456	71.2	1497	74.7	1554	81.4	1608	88.2	1658	94.8
	12800	3469	688	15.1	894	26.7	1066	39.3	1213	52.3	1344	65.8	1406	73.0	1451	77.4	1511	84.8	1565	91.9	1617	99.1	1667	106
	14600	3957	719	18.5	920	31.7	1084	45.3	1229	59.6	1359	74.6	1418	82.0	1462	87.0	1519	94.8	1572	102	1622	110	1677	118
	16400	4444	752	22.5	945	37.0	1104	51.9	1249	67.9	1373	83.6	1434	92.0	1481	98.0	1533	106	1588	114	1634	122	1687	131
	18200	4932	788	27.2	974	43.1	1131	59.6	1265	76.0	1390	93.4	1449	102	1492	108	1550	118	1600	126	1654	136		
	20000	5420	827	32.6	1003	49.7	1155	67.4	1290	85.7	1412	104	1460	112	1516	121	1563	129	1620	140	1665	149		

504 LS/RIM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
 Max. safe speeds Ser. 20 LS=1305 RPM Ser. 30 RIM=1505 RPM	7200	1558	537	7.4	750	16.0	914	25.8	1053	36.6	1179	48.7	1233	54.6	1291	61.5	1338	64.8	1388	71.1	1441	78.4	1486	84.8
	9300	2013	550	9.51	756	19.4	916	30.3	1058	42.7	1182	55.8	1237	62.4	1290	69.2	1338	73.5	1389	80.6	1434	87.3	1483	94.8
	11400	2468	567	12.0	767	23.3	927	35.7	1062	48.9	1182	62.9	1243	71.0	1292	77.9	1337	82.7	1385	89.9	1437	98.2	1484	106
	13500	2922	585	14.8	781	27.7	936	41.3	1070	56.0	1193	71.8	1245	79.3	1302	88.1	1340	92.6	1392	101	1435	109	1481	117
	15600	3377	608	18.1	797	32.6	949	47.8	1082	63.8	1199	80.5	1253	89.0	1293	94.4	1349	104	1394	112	1442	121	1487	130
	17700	3831	634	21.9	814	37.9	965	54.9	1092	71.9	1213	90.8	1264	99.7	1304	106	1353	115	1402	124	1449	134	1495	144
	19800	4286	661	26.4	835	43.9	982	62.4	1107	81.1	1222	101	1275	111	1315	118	1367	128	1415	138	1457	148	1502	158
	21900	4740	692	31.7	860	50.8	1001	70.7	1126	91.3	1237	112	1292	124	1332	131	1379	142	1423	152	1469	163		
	24000	5195	723	37.6	884	58.2	1022	79.7	1143	102	1251	124	1295	133	1341	143	1391	155	1438	167	1481	178		

574 LS/RIM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
 Max. safe speeds Ser. 20 LS=1145 RPM Ser. 30 RIM=1325 RPM	10000	1669	474	10.2	658	21.7	803	34.8	925	49.2	1034	65.0	1085	73.4	1133	82.1	1175	86.6	1220	95.3	1264	104	1306	113
	13000	2170	487	13.3	667	26.8	810	41.9	930	58.0	1036	75.1	1087	84.4	1136	94.0	1177	98.6	1220	109	1261	118	1304	128
	16000	2671	505	17.1	678	32.6	816	49.4	936	67.5	1042	86.7	1093	96.9	1138	107	1177	113	1216	122	1258	133	1303	144
	19000	3172	526	21.5	692	39.2	827	57.9	945	78.1	1049	98.9	1099	110	1136	117	1179	128	1222	138	1262	149	1305	161
	22000	3673	549	26.7	711	46.8	843	67.8	956	89.7	1058	112	1106	124	1141	132	1187	144	1228	155	1271	168	1308	180
	25000	4174	576	32.9	730	55.1	860	78.6	969	102	1073	128	1119	140	1151	148	1198	162	1242	175	1280	188	1322	202
	28000	4674	604	40.1	752	64.5	875	89.6	986	116	1087	144	1131	157	1166	167	1209	181	1248	194	1289	208		
	31000	5175	632	48.2	776	75.1	895	102	1002	131	1099	160	1144	175	1180	186	1224	202	1260	215	1305	232		
	34000	5676	665	58.1	802	87.1	919	117	1024	148	1120	180	1154	191	1198	207	1239	223	1278	239	1313	253		

644 LS/RIM  Max. safe speeds Ser. 20 LS=1025 RPM Ser. 30 RIM=1185 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	16000	2130	434	16.4	595	33.1	723	51.8	829	71.5	925	93.1	972	105	1011	116	1049	123	1087	134	1128	147	1164	159
	19000	2530	446	20.0	603	38.7	729	59.4	833	80.9	930	104	973	116	1015	129	1047	136	1089	149	1126	162	1165	176
	22000	2929	460	24.2	614	45.3	736	67.8	840	91.4	934	116	979	130	1020	143	1051	151	1092	165	1126	177	1163	191
	25000	3329	476	28.9	623	51.9	743	76.3	847	102	941	130	985	144	1025	157	1055	166	1095	181	1130	195	1167	209
	28000	3728	492	34.1	636	59.6	752	85.9	855	114	948	143	990	158	1023	168	1063	184	1099	198	1138	214	1171	229
	31000	4128	511	40.3	650	68.0	764	96.6	867	127	957	159	998	174	1028	184	1070	202	1103	216	1142	233	1175	249
	34000	4527	531	47.2	665	77.0	778	108	877	141	966	174	1006	190	1038	202	1078	220	1114	237	1149	254	1184	271
	37000	4927	552	55.1	683	87.5	790	120	887	155	978	191	1016	208	1048	221	1084	238	1124	258	1160	276		
	40000	5326	574	64.2	699	98.2	807	134	900	170	989	209	1020	222	1057	240	1096	260	1133	280	1166	298		

784 LS/RIM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	22000	1982	354	22.4	487	45.9	594	72.7	682	101	760	132	796	148	831	164	864	175	895	191	928	209	957	226
	27500	2477	365	28.8	495	56.2	598	85.9	686	118	765	152	801	170	837	189	864	199	895	217	926	236	954	253
	33000	2973	380	36.4	505	67.8	605	101	692	137	769	174	806	194	839	213	865	225	899	246	927	264	956	285
	38500	3468	396	45.4	515	80.3	614	118	700	157	775	198	813	220	837	233	870	254	902	276	930	296	963	321
	44000	3964	414	55.7	530	95.3	625	137	710	180	784	225	819	248	844	262	875	285	909	310	937	332	966	355
	49500	4459	434	68.1	545	111	637	157	721	205	793	253	827	278	852	294	885	320	916	345	943	368	972	394
	55000	4955	455	82.5	563	131	652	180	731	231	805	285	836	309	863	330	894	356	922	380	951	408		
	60500	5450	478	99.4	581	151	668	205	744	259	814	315	840	336	874	366	902	392	932	421	964	453		
	66000	5946	501	118	599	174	685	233	760	291	829	352	855	375	883	403	913	433	946	467	971	494		
Max. safe speeds Ser. 20 LS = 845 RPM Ser. 30 RIM = 975 RPM																								

854 LS/RIM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	28000	2126	328	28.7	449	57.8	546	90.8	627	126	699	163	733	183	767	205	793	216	822	236	850	257	878	278
	34000	2582	338	36.0	456	69.3	550	106	630	144	702	186	734	206	766	228	791	242	823	265	848	285	880	311
	40000	3037	350	44.4	464	81.8	556	122	635	165	706	210	739	233	769	256	794	272	825	296	854	321	881	345
	46000	3493	365	54.4	474	96.2	565	141	641	187	712	237	746	263	768	277	800	305	827	328	855	355	882	381
	52000	3948	379	65.6	487	113	575	162	650	212	718	264	753	294	774	310	803	337	832	364	860	393	887	421
	58000	4404	397	79.1	499	130	583	183	659	239	726	296	758	325	780	344	811	374	839	404	865	432		
	64000	4860	414	94.4	512	150	595	207	670	269	734	328	767	361	789	382	818	412	846	444	872	475		
	70000	5315	432	112	528	172	608	234	682	300	745	363	770	389	798	420	828	456	854	488	882	524		
	76000	5771	453	132	543	196	622	263	692	331	757	403	779	427	809	463	837	500	864	535	888	568		
Max. safe speeds Ser. 20 LS=770 RPM Ser. 30 RIM=890 RPM																								

SERIES 20 & 30 DH WHEELS

SERIES 30 PERFORMANCE SHADED IN RED

194 DH 	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1400	2121	1482	1.47	2024	3.05	2452	4.79	2819	6.69	3136	8.67	3300	9.82	3447	10.9	3570	11.9	3703	13.1	3846	14.4	3955	15.4
	1675	2538	1527	1.78	2049	3.53	2477	5.51	2840	7.60	3156	9.78	3303	10.9	3450	12.1	3580	13.2	3721	14.6	3856	15.9	3982	17.2
	1950	2955	1583	2.13	2084	4.06	2493	6.18	2858	8.51	3181	10.9	3327	12.2	3463	13.4	3598	14.7	3730	16.0	3857	17.3	3978	18.7
	2225	3371	1653	2.57	2135	4.69	2536	7.02	2881	9.45	3191	12.0	3344	13.4	3482	14.7	3620	16.2	3757	17.6	3880	19.0		
	2500	3788	1725	3.07	2190	5.37	2569	7.81	2920	10.5	3224	13.3	3367	14.7	3505	16.1	3636	17.6	3776	19.2	3895	20.7		
	2775	4205	1804	3.65	2248	6.12	2620	8.76	2948	11.6	3257	14.6	3400	16.1	3539	17.7	3673	19.3	3799	20.9	3914	22.4		
	3050	4621	1887	4.32	2311	6.94	2670	9.74	2999	12.8	3293	15.9	3435	17.6	3575	19.3	3696	20.9	3825	22.6	3945	24.3		
	3325	5038	1978	5.11	2382	7.88	2735	10.9	3049	14.1	3341	17.4	3471	19.1	3611	20.9	3735	22.6	3853	24.3	3978	26.2		
	3600	5455	2069	5.99	2456	8.92	2797	12.1	3108	15.5	3388	19.0	3519	20.8	3649	22.6	3775	24.5	3897	26.3				

Max. safe speeds

Ser. 20 DH = 3425 RPM

Ser. 30 DH = 3985 RPM

224 DH  Max. safe speeds Ser. 20 DH = 2900 RPM Ser. 30 DH = 3440 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1600	1720	1222	1.52	1701	3.23	2077	5.12	2397	7.17	2682	9.36	2816	10.5	2944	11.7	3064	12.9	3183	14.2	3300	15.5	3412	16.8	
2050	2204	1260	1.95	1713	3.93	2090	6.17	2405	8.53	2690	11.1	2818	12.3	2945	13.7	3067	15.0	3183	16.4	3290	17.8	3404	19.3	
2500	2688	1311	2.47	1748	4.75	2097	7.18	2414	9.89	2687	12.6	2821	14.1	2946	15.6	3056	17.0	3175	18.6	3288	20.2	3395	21.7	
2950	3172	1373	3.08	1788	5.64	2132	8.41	2423	11.3	2704	14.4	2825	16.0	2947	17.6	3070	19.3	3180	20.9	3286	22.6	3399	24.4	
3400	3656	1442	3.82	1839	6.65	2167	9.67	2451	12.8	2719	16.2	2845	18.0	2967	19.8	3080	21.5	3193	23.4	3304	25.3	3412	27.2	
3850	4140	1517	4.69	1897	7.81	2209	11.1	2491	14.5	2752	18.2	2869	20.1	2983	21.9	3105	24.0	3204	25.8	3318	27.9	3421	29.9	
4300	4624	1596	5.71	1958	9.08	2266	12.7	2540	16.5	2786	20.3	2903	22.3	3017	24.4	3126	26.4	3243	28.7	3337	30.6	3436	32.7	
4750	5108	1681	6.92	2030	10.6	2262	14.5	2587	18.4	2831	22.6	2948	24.8	3052	26.9	3163	29.1	3268	31.4	3367	33.6			
5200	5591	1769	8.31	2103	12.3	2390	16.4	2641	20.6	2885	25.2	2993	27.4	3098	29.7	3200	32.0	3309	34.5	3411	37.0			

264 DH 	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP		RPM BHP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	2400	1935	1073	2.28	1477	4.71	1805	7.47	2078	10.4	2320	13.4	2436	15.0	2549	16.8	2657	18.5	2758	20.2	2847	21.9	2943	23.7
	3050	2460	1113	2.95	1497	5.79	1812	8.93	2085	12.3	2323	15.8	2443	17.7	2553	19.6	2648	21.4	2750	23.4	2847	25.3	2935	27.2
	3700	2984	1167	3.77	1532	7.02	1836	10.6	2099	14.4	2336	18.3	2450	20.4	2556	22.5	2653	24.5	2757	26.8	2846	28.8	2941	31.1
	4350	3508	1230	4.77	1573	8.38	1865	12.4	2118	16.5	2354	20.9	2464	23.2	2569	25.6	2666	27.8	2762	30.1	2855	32.5	2945	34.9
	5000	4032	1299	5.97	1627	9.99	1909	14.4	2149	18.9	2376	23.7	2483	26.2	2586	28.7	2684	31.2	2775	33.7	2871	36.4	2957	38.9
	5650	4556	1374	7.42	1690	11.9	1956	16.6	2189	21.5	2410	26.7	2516	29.5	2608	32.0	2706	34.8	2799	37.6	2884	40.2	2974	43.1
	6300	5081	1453	9.14	1754	14.0	2007	19.1	2242	24.5	2453	30.1	2549	32.9	2642	35.7	2743	38.8	2826	41.6	2914	44.6		
Ser. 20 DH = 2510 RPM	6950	5605	1533	11.1	1826	16.5	2073	22.0	2293	27.7	2496	33.6	2592	36.7	2687	39.8	2779	43.0	2865	46.1	2958	49.5		
Ser. 30 DH = 2980 RPM	7600	6129	1618	13.5	1899	19.2	2135	25.1	2355	31.4	2545	37.5	2643	40.9	2731	44.0	2825	47.6	2905	50.7				

SERIES 20 & 30 DH WHEELS

SERIES 30 PERFORMANCE SHADED IN RED

334 DH 	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3200	1624	830	3.05	1153	6.57	1405	10.5	1621	14.8	1811	19.5	1900	21.9	1984	24.4	2068	27.1	2142	29.6	2221	32.4	2297	35.3
	4200	2132	855	3.93	1166	8.08	1414	12.7	1626	17.6	1815	22.9	1901	25.6	1985	28.4	2065	31.2	2145	34.3	2218	37.2	2289	40.1
	5200	2640	889	4.97	1189	9.77	1430	15.0	1638	20.6	1824	26.5	1909	29.5	1993	32.7	2076	36.0	2145	38.9	2219	42.2	2298	45.8
	6200	3147	929	6.2	1214	11.6	1446	17.3	1653	23.6	1836	30.2	1920	33.5	1998	36.8	2082	40.5	2156	44.0	2226	47.4	2301	51.3
	7200	3655	977	7.73	1252	13.7	1476	20.1	1677	27.1	1851	34.0	1940	38.0	2013	41.4	2092	45.2	2169	49.2	2237	52.9	2310	57.0
	8200	4162	1026	9.47	1289	16.1	1509	23.2	1703	30.7	1876	38.3	1955	42.2	2041	46.6	2110	50.4	2185	54.6	2258	59.0	2329	63.4
	9200	4670	1080	11.6	1335	18.8	1545	26.4	1736	34.6	1900	42.7	1980	47.0	2057	51.4	2135	56.0	2207	60.5	2279	65.1	2342	69.4
	10200	5178	1137	14.0	1382	21.9	1589	30.3	1766	38.7	1939	48.0	2013	52.4	2093	57.3	2159	61.7	2230	66.5	2306	71.8		
	11200	5685	1193	16.8	1432	25.4	1630	34.2	1807	43.5	1969	53.0	2044	57.9	2118	62.8	2197	68.4	2262	73.2	2332	78.6		

Max. safe speeds
Ser. 20 DH=2035 RPM
Ser. 30 DH=2360 RPM

364 DH  Max. safe speeds Ser. 20 DH = 1840 RPM Ser. 30 DH = 2135 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3800	1577	747	3.62	1041	7.87	1267	12.6	1467	17.9	1637	23.4	1715	26.3	1795	29.5	1867	32.5	1936	35.7	2012	39.3	2074	42.5
	5200	2158	774	4.86	1054	9.95	1279	15.6	1471	21.7	1642	28.3	1721	31.6	1798	35.1	1870	38.6	1938	42.1	2010	46.0	2074	49.7
	6600	2739	811	6.37	1077	12.3	1295	18.9	1480	25.7	1650	33.2	1725	36.9	1799	40.7	1872	44.8	1942	48.8	2007	52.8	2078	57.3
	8000	3320	854	8.19	1110	15.0	1318	22.4	1500	30.3	1666	38.6	1740	42.7	1813	47.0	1887	51.6	1952	55.9	2021	60.6	2093	65.4
	9400	3900	903	10.4	1148	18.1	1351	26.5	1527	35.2	1688	44.4	1761	49.0	1829	53.5	1897	58.2	1971	63.6	2037	68.7	2093	73.2
	10800	4481	959	13.2	1189	21.6	1383	30.7	1559	40.6	1709	50.2	1786	55.6	1851	60.4	1921	65.8	1985	71.1	2054	76.9	2115	82.3
	12200	5062	1015	16.4	1241	25.9	1427	35.9	1594	46.4	1744	57.2	1814	62.7	1881	68.2	1953	74.4	2011	79.6	2072	85.3		
	13600	5643	1075	20.3	1291	30.7	1472	41.5	1633	52.8	1777	64.3	1848	70.5	1917	76.7	1983	83.0	2045	89.1	2100	94.8		
15000	6224	1137	24.8	1344	36.1	1521	47.9	1674	59.8	1821	72.7	1888	79.0	1952	85.4	2012	91.7	2077	98.7					

404 DH 	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	4400	1517	666	4.05	928	8.53	1131	13.4	1305	18.7	1459	24.4	1530	27.4	1600	30.5	1663	33.6	1723	36.6	1787	40.1	1848	43.6
	6100	2103	686	5.55	941	11.3	1142	17.4	1309	23.7	1459	30.3	1534	34.0	1598	37.3	1668	41.2	1727	44.7	1790	48.7	1846	52.3
	7800	2690	717	7.34	958	14.2	1153	21.4	1320	29.0	1471	37.0	1543	41.2	1607	45.1	1669	49.2	1736	53.7	1789	57.6	1847	61.9
	9500	3276	756	9.56	987	17.5	1174	25.9	1339	34.8	1483	43.8	1553	48.5	1618	53.1	1682	57.9	1743	62.8	1802	67.7	1857	72.4
	11200	3862	799	12.2	1019	21.2	1201	30.9	1361	40.9	1505	51.3	1570	56.4	1631	61.3	1695	66.9	1754	72.1	1816	78.0	1869	83.2
	12900	4448	847	15.4	1057	25.6	1232	36.3	1387	47.5	1522	58.5	1591	64.6	1653	70.4	1715	76.4	1776	82.7	1831	88.5	1889	94.9
Max. safe speeds	14600	5034	896	19.3	1098	30.4	1265	42.1	1417	54.5	1552	67.1	1619	73.7	1674	79.5	1734	86.0	1798	93.3	1851	99.7		
Ser. 20 DH=1640 RPM	16300	5621	948	23.9	1141	36.0	1307	49.1	1450	62.1	1580	75.6	1647	83.2	1706	90.0	1764	97.1	1818	104	1876	112		
Ser. 30 RIM=1905 RPM	18000	6207	1002	29.3	1190	42.6	1346	56.3	1490	71.0	1618	85.8	1681	93.6	1735	101	1793	108	1846	116	1903	124		

454 DH 	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			6400	1734	596	5.83	825	12.1	1005	18.9	1155	26.0	1295	33.9	1358	37.9	1418	42.0	1472	45.9	1530	50.5	1581	54.6
	8700	2358	620	8.03	840	15.9	1013	24.1	1163	33.0	1300	42.4	1360	46.9	1418	51.6	1477	56.7	1533	61.7	1588	66.9	1637	71.8
	11000	2981	652	10.7	861	20.1	1030	30.0	1177	40.4	1308	51.2	1372	57.0	1429	62.5	1486	68.2	1539	73.9	1590	79.4	1644	85.7
	13300	3604	691	13.9	889	24.8	1051	36.3	1196	48.5	1326	61.1	1384	67.1	1441	73.5	1498	80.2	1549	86.4	1603	93.2	1654	100
	15600	4228	733	18.0	923	30.3	1081	43.4	1220	57.1	1346	71.3	1400	77.8	1458	85.2	1512	92.4	1564	99.8	1616	107	1665	115
	17900	4851	781	22.9	962	36.7	1111	51.0	1246	66.3	1368	82.0	1426	90.0	1478	97.5	1533	106	1584	114	1634	122	1687	131
Max. safe speeds	20200	5474	829	28.8	1001	43.9	1149	60.1	1280	76.9	1394	93.5	1450	102	1503	111	1561	121	1607	129	1655	138	1703	147
Ser. 20 DH = 1460 RPM	22500	6098	879	35.8	1046	52.5	1187	70.0	1315	88.3	1426	106	1484	116	1533	125	1586	135	1635	145	1680	154	1727	165
Ser. 30 RIM = 1690 RPM	24800	6721	932	44.1	1092	62.4	1230	81.3	1351	101	1461	120	1515	131	1567	141	1616	152	1662	162	1709	175	1756	185

504 DH 	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			8000	1732	531	7.26	738	15.1	899	23.7	1034	32.6	1156	42.2	1212	47.3	1266	52.4	1319	57.9	1366	63	1417	68.7
	10500	2273	552	9.69	749	19.2	906	29.5	1038	40.0	1159	51.4	1214	57.1	1268	63.1	1320	69.1	1367	75.0	1418	81.6	1463	87.8
	13000	2814	576	12.5	764	23.7	916	35.5	1051	48.3	1166	61.1	1221	67.8	1276	74.8	1323	81.2	1374	88.5	1422	95.6	1466	102
	15500	3355	603	15.7	785	28.7	935	42.5	1062	56.6	1179	71.5	1229	78.5	1284	86.6	1334	94.4	1383	102	1429	110	1472	118
	18000	3896	635	19.7	809	34.2	951	49.4	1078	65.6	1193	82.4	1245	90.6	1293	98.6	1345	108	1391	116	1436	125	1484	134
	20500	4437	669	24.4	836	40.5	973	57.3	1098	75.3	1207	93.2	1259	103	1309	112	1355	121	1405	131	1449	140	1496	151
	23000	4978	706	30.1	865	47.5	1000	66.2	1120	85.8	1225	105	1279	116	1324	125	1373	136	1417	146	1465	157		
	25500	5519	744	36.7	899	55.9	1028	75.9	1145	97.1	1247	118	1297	129	1345	140	1396	152	1437	163	1480	174		
	28000	6061	783	44.3	932	65.1	1057	86.5	1171	109	1272	132	1324	145	1369	156	1417	169	1461	181	1502	193		

Max. safe speeds

Ser. 20 DH = 1305 RPM

Ser. 30 RIM = 1505 RPM

644 DH	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			14000	1864	421	12.7	579	26.1	704	40.4	811	55.7	907	72.3	949	80.3	995	89.7	1034	98.2	1073	107	1110	116
			18000	2397	435	16.6	589	32.8	713	50.2	815	67.9	911	87.2	952	96.5	996	107	1037	117	1073	127	1111	137
			22000	2929	456	21.3	601	40.0	722	60.3	826	81.4	918	103	961	114	1002	126	1039	136	1078	148	1114	160
			26000	3462	478	26.7	619	48.4	734	71.0	835	94.8	925	119	968	132	1007	144	1046	157	1083	170	1123	184
			30000	3995	502	33.2	637	57.1	751	83.2	848	109	938	137	978	151	1015	164	1056	179	1092	193	1131	208
			34000	4527	530	41.2	659	67.5	768	95.7	863	125	948	154	990	170	1029	186	1065	201	1104	217	1139	233
			38000	5060	558	50.3	683	79.2	788	110	880	141	967	175	1005	191	1041	207	1080	225	1115	242	1153	261
			42000	5593	587	61.1	708	92.6	809	125	900	160	984	196	1022	214	1057	231	1093	249	1131	269	1166	288
			46000	6125	617	73.6	735	108	833	143	922	180	1003	219	1041	238	1076	257	1110	276	1145	296	1178	315

714 DH	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			18000	1957	382	16.4	525	33.4	638	51.7	733	70.9	821	91.9	860	102	897	113	933	124	970	135	1001	146
			23000	2500	397	21.5	535	42.0	645	63.7	739	86.5	822	110	862	122	902	136	935	147	972	161	1005	174
			28000	3043	415	27.3	548	51.4	654	76.5	747	103	830	130	867	144	907	159	943	173	977	188	1009	202
			33000	3587	436	34.4	563	61.6	666	90	756	120	838	151	875	166	912	182	946	198	982	215	1013	231
			38000	4130	460	42.9	582	73.6	681	105	770	139	849	173	884	190	923	209	956	225	991	244	1021	262
			43000	4674	485	53.3	601	86.4	698	122	785	159	861	196	898	215	932	234	967	254	999	273	1032	294
			48000	5217	512	65.5	623	102	717	140	802	181	876	221	914	243	946	263	980	285	1011	306	1045	329
			53000	5761	539	79.5	647	119	737	160	820	204	893	248	928	271	962	294	994	317	1026	340	1056	363
			58000	6304	568	96.1	672	139	760	183	839	230	912	278	945	301	977	325	1011	351	1043	377		

784 DH	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			22000	1982	348	20.0	478	40.6	583	63.4	668	86.4	746	111	782	124	817	138	850	151	882	165	914	179
			28000	2523	362	26.2	488	51.1	588	77.6	672	105	749	134	785	149	821	164	853	179	883	194	915	211
			34000	3063	379	33.2	499	62.3	596	92.7	681	125	756	158	792	175	824	192	856	209	886	226	919	245
			40000	3604	398	41.9	512	74.4	607	109	688	145	764	183	797	202	831	221	864	241	894	260	925	281
			46000	4144	420	52.2	530	89.0	622	128	702	168	773	209	807	231	840	252	872	274	900	294	931	317
			52000	4685	443	64.7	547	104	637	148	713	191	785	238	818	261	850	284	881	308	909	330	940	355
			58000	5225	466	79.0	568	123	653	169	729	218	800	268	830	292	863	319	894	345	922	370	950	396
			64000	5766	492	96.4	590	144	671	193	746	246	812	299	843	326	875	353	905	382	934	410	962	438
			70000	6306	517	116	613	168	692	221	765	277	830	335	860	363	889	391	920	423	948	454	974	482

854 DH	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			26000	1974	320	23.7	440	48.3	532	74.3	614	103	686	132	718	147	751	163	781	179	811	195	840	212
			32500	2468	332	30.3	446	59.2	538	90.0	618	123	688	156	722	174	751	191	784	210	810	226	840	246
			39000	2961	344	37.7	456	71.3	544	106	624	144	692	182	724	201	755	221	785	241	814	262	841	282
			45500	3455	361	46.7	467	84.2	554	124	630	166	699	209	731	231	760	252	790	274	818	297	844	319
			52000	3948	378	57.2	480	99.0	565	143	640	190	706	237	737	261	768	286	797	310	824	335	851	359
			58500	4442	397	69.7	496	116	577	164	649	214	715	266	747	294	777	321	805	348	830	372	857	399
			65000	4935	417	84.5	512	135	591	187	662	242	726	298	756	326	785	356	813	385	841	414	865	442
			71500	5429	437	101	529	155	607	212	676	272	738	331	767	362	797	394	824	426	850	456	877	490
			78000	5923	457	120	547	179	622	239	689	301	751	368	781	401	808	435	834	467	862	503	888	537

SERIES 20 & 30 AH WHEELS

SERIES 30 PERFORMANCE SHADED IN GREEN

144 AH	CFM	OV	2"SP		4"SP		6"SP		8"SP		10"SP		12"SP		14"SP		16"SP		18"SP		20"SP		21"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			800	1865	1646	0.50	2086	0.88	2464	1.31	2806	1.79	3137	2.31	3431	2.83	3691	3.33						
			950	2214	1783	0.66	2183	1.08	2536	1.56	2858	2.08	3159	2.64	3446	3.24	3713	3.84	3957	4.44	4187	5.04	4418	5.67
			1100	2564	1911	0.83	2302	1.34	2630	1.85	2933	2.42	3204	2.99	3474	3.63	3728	4.29	3967	4.96	4198	5.65	4434	6.40
			1250	2914	2049	1.05	2440	1.66	2733	2.19	3024	2.80	3286	3.43	3535	4.09	3783	4.81	4005	5.51	4220	6.23	4439	7.02
			1400	3263	2192	1.30	2569	1.98	2864	2.63	3126	3.23	3383	3.92	3619	4.62	3840	5.34	4062	6.11	4280	6.92	4473	7.68
			1550	3613	2335	1.59	2695	2.33	3000	3.10	3247	3.77	3485	4.46	3710	5.20	3932	5.99	4144	6.81	4340	7.61	4540	8.47
			1700	3963	2481	1.92	2832	2.74	3129	3.57	3383	4.40	3599	5.10	3825	5.89	4029	6.69	4234	7.56	4424	8.41	4604	9.26
			1850	4312	2635	2.31	2974	3.22	3258	4.10	3519	5.03	3738	5.89	3933	6.64	4131	7.46	4330	8.36	4525	9.32		
			2000	4662	2785	2.74	3116	3.74	3394	4.69	3648	5.68	3876	6.69	4069	7.57	4255	8.40	4439	9.29				

174 AH	CFM	OV	2"SP		4"SP		6"SP		8"SP		10"SP		12"SP		14"SP		16"SP		18"SP		20"SP	
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SERIES 20 & 30 AH WHEELS

SERIES 30 PERFORMANCE SHADED IN GREEN

194 AH  Max. safe speeds Ser. 20 AH=3425 RPM Ser. 30 AH=3985 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	2000	3030	1569	1.99	2052	3.73	2444	5.51	2801	7.46	3116	9.47	3258	10.5	3414	11.6	3548	12.7	3678	13.7	3805	14.8	3924	15.9
	2250	3409	1630	2.36	2095	4.25	2486	6.27	2816	8.27	3123	10.4	3275	11.6	3421	12.8	3548	13.9	3685	15.1	3808	16.2	3938	17.5
	2500	3788	1696	2.78	2143	4.81	2517	6.97	2847	9.20	3151	11.5	3295	12.7	3434	14.0	3566	15.2	3687	16.4	3817	17.7	3932	18.9
	2750	4167	1766	3.24	2196	5.41	2566	7.80	2891	10.2	3180	12.7	3325	14.0	3450	15.2	3586	16.5	3713	17.9	3830	19.2	3955	20.6
	3000	4545	1836	3.72	2258	6.12	2637	10.2	2933	11.3	3223	14.0	3356	15.3	3485	16.6	3609	18.0	3741	19.5	3847	20.7	3979	22.3
	3250	4924	1911	4.27	2318	6.86	2667	9.52	2975	12.3	3265	15.3	3388	16.6	3520	18.1	3648	19.6	3770	21.1	3883	22.5		
	3500	5303	1990	4.89	2387	7.71	2719	10.5	3025	13.4	3307	16.5	3432	18.0	3555	19.5	3687	21.2	3800	22.7	3919	24.3		
	3750	5682	2071	5.57	2458	8.63	2784	11.6	3075	14.6	3348	17.8	3476	19.5	3603	21.1	3726	22.8	3844	24.5	3955	26.1		
	4000	6061	2153	6.32	2527	9.56	2847	12.7	3131	15.9	3399	19.3	3530	21.1	3649	22.8	3764	24.5	3887	26.3				

224 AH  Max. safe speeds Ser. 20 AH=2900 RPM Ser. 30 AH=3440 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1500	1613	1191	1.38	1657	2.91	2028	4.58	2351	6.38														
	2000	2151	1226	1.80	1678	3.71	2037	5.76	2345	7.90	2616	10.1												
	2500	2688	1281	2.31	1710	4.53	2054	6.91	2354	9.42	2621	12.0	2746	13.3	2904	15.5	3025	17.1	3143	18.8				
	3000	3226	1352	2.95	1752	5.43	2087	8.15	2379	11.0	2645	14.0	2765	15.5	2909	17.6	3028	19.3	3145	21.1				
	3500	3763	1425	3.66	1811	6.50	2130	9.48	2413	12.7	2666	15.9	2790	17.7	2933	19.9	3041	21.6	3158	23.6	3255	25.3	3358	24.6
	4000	4301	1506	4.48	1876	7.70	2179	10.9	2457	14.5	2703	18.0	2818	19.9	2946	22.2	3062	24.2	3170	26.2	3270	28.1	3376	30.2
	4500	4839	1594	5.49	1947	9.03	2240	12.6	2501	16.3	2752	20.4	2867	22.4	2979	24.8	3081	26.7	3189	28.9	3291	31.1	3400	33.4
	5000	5376	1688	6.67	2024	10.5	2311	14.5	2561	18.5	2799	22.8	2917	25.5	3025	27.7	3128	29.9	3226	32.1	3330	34.5	3428	36.8
	5500	5914	1783	8.04	2106	12.2	2385	16.6	2634	21.0	2855	25.4	2972	28.5	3070	30.7	3175	33.1	3276	35.6	3371	38.0		

264 AH  Max. safe speeds Ser. 20 AH=2510 RPM Ser. 30 AH=2980 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	2800	2258	1070	2.52	1459	5.17	1763	8.14	2035	11.5	2271	15.1	2381	16.9	2490	18.9								
	3400	2742	1114	3.16	1483	6.12	1785	9.43	2044	13.0	2275	16.9	2383	18.9	2491	21.0	2620	23.2	2722	25.4	2819	27.6	2910	29.8
	4000	3226	1170	3.93	1519	7.24	1807	10.8	2065	14.8	2286	18.8	2392	20.9	2499	23.3	2629	25.9	2724	28.1	2815	30.4	2912	32.9
	4600	3710	1230	4.79	1560	8.48	1838	12.4	2091	16.7	2308	21.0	2413	23.3	2538	26.2	2628	28.4	2724	30.9	2828	33.7	2912	36.0
	5200	4194	1290	5.74	1608	9.87	1881	14.2	2118	18.7	2336	23.4	2443	25.8	2542	28.7	2647	31.5	2747	34.3	2838	36.9	2919	39.4
	5800	4677	1357	6.89	1668	11.5	1922	16.1	2154	21.0	2365	26.0	2470	28.7	2575	32.1	2670	34.8	2758	37.5	2853	40.4	2939	43.3
	6400	5161	1430	8.25	1727	13.2	1973	18.3	2196	23.4	2408	29.0	2504	31.8	2597	35.2	2694	38.2	2785	41.2	2871	44.1	2961	47.3
	7000	5645	1501	9.76	1787	15.1	2033	20.7	2250	26.4	2448	32.1	2548	35.9	2641	39.0	2729	42.0	2813	45.0	2903	48.3		
	7600	6129	1576	11.5	1853	17.2	2089	23.2	2302	29.3	2496	35.5	2596	39.7	2682	42.8	2765	45.9	2852	49.3	2935	52.6		

294 AH  Max. safe speeds Ser. 20 AH=2195 RPM Ser. 30 AH=2610 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3800	2390	953	3.44	1289	6.91	1560	10.9	1794	15.4	2009	20.4	2102	22.9	2224	24.9								
	4600	2893	997	4.35	1318	8.28	1579	12.6	1804	17.3	2012	22.7	2104	25.3	2223	28.0	2311	30.7	2397	33.5	2478	36.2	2566	39.4
	5400	3396	1047	5.38	1349	9.78	1602	14.5	1822	19.6	2021	25.1	2118	28.1	2230	31.4	2319	34.3	2399	37.2	2485	40.3	2567	43.6
	6200	3899	1103	6.58	1391	11.6	1632	16.7	1850	22.3	2045	28.1	2135	31.1	2235	34.8	2325	38.0	2407	41.2	2496	44.8	2575	48.1
	7000	4403	1161	7.96	1439	13.5	1672	19.2	1884	25.3	2068	31.3	2158	34.6	2256	38.8	2335	42.0	2420	45.5	2498	48.9	2581	52.7
	7800	4906	1227	9.63	1491	15.7	1715	21.9	1917	28.4	2100	35.0	2192	38.6	2278	43.0	2360	46.5	2436	50.0	2517	53.8	2591	57.5
	8600	5409	1290	11.5	1548	18.1	1766	25.0	1962	32.0	2140	39.1	2224	43.7	2310	47.6	2385	51.2	2464	55.1	2538	58.9		
	9400	5912	1359	13.7	1605	20.7	1818	28.2	2004	35.7	2177	43.3	2247	48.7	2342	52.4	2419	56.4	2502	60.9	2570	64.7		
	10200	6415	1427	16.1	1666	23.7	1873	31.7	2056	39.9	2235	49.7	2313	53.9	2389	58.0	2461	62.2	2538	66.7				

334 AH  Max. safe speeds Ser. 20 AH=2035 RPM Ser. 30 AH=2360 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	4800	2412	861	4.44	1162	8.71	1407	13.5	1621	18.7	1814	24.2	1903	27.0	1983	29.7								
	5700	2864	898	5.53	1184	10.3	1419	15.6	1626	21.2	1816	27.3	1904	30.5	1985	33.5	2071	36.1	2150	39.3	2225	42.4	2306	45.9
	6600	3317	940	6.80	1208	12.1	1439	17.9	1639	24.0	1823	30.6	1903	33.8	1991	37.4	2078	40.9	2153	44.2	2225	47.5	2302	51.2
	7500	3769	986	8.24	1244	14.2	1464	20.5	1657	27.0	1837	34.1	1918	37.7	1995	41.2	2081	45.6	2159	49.5	2229	53.0	2304	56.9
	8400	4221	1032	9.84	1284	16.5	1493	23.3	1678	30.3	1852	37.8	1933	41.7	2012	45.6	2093	50.7	2169	54.8	2244	59.0	2310	62.9
	9300	4673	1081	11.7	1328	19.1	1531	26.6	1708	34.0	1875	41.9	1958	46.2	2030	50.2	2107	55.8	2181	60.2	2248	64.4	2319	68.9
	10200	5126	1135	13.8	1373	22.0	1571	30.1	1743	38.2	1906	46.6	1982	50.9	2055	56.5	2127	61.1	2204	66.2	2265	70.4	2341	75.8
	11100	5578	1189	16.1	1419	25.0	1613	33.8	1782	42.6	1935	51.4	2014	56.2	2081	61.7	2155	66.9	2218	71.4	2293	77.1	2353	81.8
12000	6030	1247	18.8	1465	28.3	1657	37.9	1824	47.5	1976	57.1	2033	61.5	2105	66.8	2183	72.7	2250	78.0	2311	83.0			

SERIES 20 & 30 AM WHEELS

SERIES 30 PERFORMANCE SHADED IN ORANGE

144 AM  Max. safe speeds Ser. 20 AM=4605 RPM	CFM	OV	4"SP		6"SP		8"SP		10"SP		12"SP		14"SP		16"SP		18"SP		20"SP		22"SP		23"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	500	1166	1925	0.60	2333	0.96	2687	1.37	2990	1.78	3275	2.24	3532	2.71	3772	3.20	4004	3.73	4222	4.28	4413	4.80	4515	5.09
	750	1748	2007	0.88	2399	1.32	2727	1.77	3032	2.29	3305	2.83	3561	3.39	3796	3.97	4029	4.60	4233	5.20	4437	5.85	4546	6.22
	1000	2331	2147	1.28	2496	1.80	2811	2.33	3102	2.91	3369	3.51	3614	4.15	3851	4.83	4070	5.52	4286	6.26	4480	6.97	4575	7.34
	1250	2914	2314	1.80	2645	2.43	2937	3.07	3202	3.71	3462	4.41	3687	5.07	3925	5.84	4135	6.58	4346	7.39	4531	8.16		
	1500	3497	2496	2.45	2807	3.18	3088	3.94	3335	4.69	3578	5.48	3805	6.28	4017	7.07	4220	7.89	4410	8.7	4597	9.55		
	1750	4079	2700	3.31	2989	4.12	3258	4.99	3496	5.86	3729	6.77	3938	7.65	4145	8.57	4332	9.45	4522	10.4				
	2000	4662	2900	4.33	3189	5.29	3437	6.23	3669	7.21	3887	8.21	4102	9.27	4285	10.2	4453	11.2						
	2250	5245	3090	5.48	3394	6.70	3631	7.73	3852	8.79	4067	9.92	4260	11.0										
	2500	5828	3291	6.85	3587	8.26	3845	9.58	4050	10.7	4247	11.9	4439	13.1										

174 AM  Max. safe speeds Ser. 20 AM=3930 RPM	CFM	OV	4"SP		6"SP		8"SP		10"SP		12"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1000	1580	1614	1.01	1944	1.54	2232	2.10	2493	2.71	2736	3.35	2958	4.02	3154	4.67	3342	5.36						
	1325	2093	1690	1.39	1997	2.02	2270	2.70	2512	3.39	2740	4.12	2950	4.87	3159	5.68	3346	6.48	3527	7.31	3696	8.15	3865	9.04
	1650	2607	1790	1.89	2084	2.62	2333	3.37	2563	4.17	2786	5.04	2984	5.88	3174	6.76	3360	7.69	3534	8.61	3702	9.56	3872	10.6
	1975	3120	1903	2.53	2178	3.36	2420	4.20	2647	5.12	2847	6.03	3039	6.99	3227	8.02	3397	9.01	3567	10.1	3724	11.1	3884	12.2
	2300	3633	2029	3.33	2283	4.25	2523	5.24	2733	6.21	2929	7.22	3119	8.30	3295	9.39	3462	10.5	3615	11.6	3782	12.8	3927	14.0
	2625	4147	2163	4.28	2410	5.38	2625	6.42	2832	7.52	3026	8.65	3206	9.80	3373	11.0	3545	12.2	3694	13.4	3840	14.6		
	2950	4660	2297	5.38	2538	6.67	2747	7.86	2947	9.09	3125	10.3	3308	11.6	3469	12.8	3624	14.1	3781	15.5	3925	16.8		
	3275	5174	2433	6.63	2670	8.14	2875	9.51	3062	10.8	3244	12.2	3413	13.6	3570	14.9	3722	16.3	3876	17.8				
	3600	5687	2572	8.06	2806	9.80	3008	11.4	3193	12.9	3364	14.4	3529	15.9	3684	17.4	3834	18.9						

194 AM  Max. safe speeds Ser. 20 AM=3425 RPM Ser. 30 AM=3985 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		31"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1800	2727	1528	1.92	2042	3.63	2458	5.45	2822	7.47	3159	9.68	3312	10.8	3465	12.0	3602	13.1	3734	14.2	3875	15.5	3930	16.0
	2050	3106	1569	2.23	2076	4.20	2481	6.18	2836	8.29	3166	10.7	3309	11.8	3466	13.1	3597	14.3	3738	15.6	3859	16.8	3923	17.5
	2300	3485	1616	2.61	2120	4.83	2512	6.98	2854	9.21	3170	11.6	3325	12.9	3482	14.2	3599	15.5	3735	16.9	3868	18.3	3924	18.9
	2550	3864	1674	3.07	2162	5.45	2547	7.85	2888	10.3	3196	12.8	3334	14.1	3475	15.4	3608	16.8	3739	18.2	3881	19.8	3930	20.4
	2800	4242	1728	3.56	2203	6.06	2592	8.80	2922	11.4	3223	14.1	3364	15.5	3501	16.9	3630	18.3	3759	19.8	3875	21.1	3941	22.0
	3050	4621	1791	4.13	2249	6.76	2635	9.73	2961	12.6	3250	15.5	3394	17.0	3527	18.4	3654	19.9	3780	21.4	3895	22.9	3955	23.7
	3300	5000	1855	4.75	2299	7.55	2677	10.7	3000	13.8	3292	17.0	3425	18.5	3555	20.0	3695	21.8	3811	23.3	3935	24.9		
	3550	5379	1925	5.47	2354	8.45	2719	11.6	3049	15.1	3333	18.5	3470	20.2	3604	21.9	3719	23.5	3842	25.2	3957	26.8		
	3800	5758	1992	6.25	2412	9.45	2767	12.7	3086	16.3	3373	20.0	3513	21.9	3638	23.7	3759	25.4	3889	27.4				

224 AM  Max. safe speeds Ser. 20 AM=2900 RPM Ser. 30 AM=3440 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1500	1613	1202	1.53	1665	3.36	2035	5.51	2339	7.84	2616	10.5	2750	11.9	2865	13.3	2990	14.9	3102	16.4	3207	17.9	3306	19.4
	2000	2151	1240	1.99	1692	4.13	2051	6.57	2354	9.19	2619	12.0	2745	13.5	2869	15.0	2986	16.6	3094	18.2	3211	20.0	3315	21.8
	2500	2688	1293	2.58	1723	4.96	2073	7.70	2375	10.7	2645	13.8	2768	15.5	2878	17.0	2997	18.8	3111	20.6	3218	22.4	3317	24.1
	3000	3226	1353	3.28	1773	6.01	2109	8.98	2400	12.2	2664	15.7	2784	17.4	2906	19.3	3015	21.1	3121	23.0	3235	25.0	3329	26.9
	3500	3763	1414	4.09	1824	7.20	2154	10.5	2440	14.0	2695	17.7	2814	19.6	2936	21.7	3038	23.6	3149	25.7	3256	27.8	3348	29.8
	4000	4301	1483	5.10	1884	8.57	2205	12.2	2479	15.9	2734	19.9	2846	21.9	2967	24.2	3073	26.3	3178	28.5	3281	30.7	3381	33.0
	4500	4839	1562	6.29	1945	10.1	2260	14.1	2527	18.1	2779	22.4	2892	24.6	3000	26.8	3116	29.3	3210	31.4	3309	33.7	3415	36.3
	5000	5376	1646	7.63	2008	11.8	2320	16.2	2583	20.6	2822	25.1	2936	27.4	3046	29.8	3151	32.2	3250	34.6	3354	37.2		
	5500	5914	1732	9.14	2077	13.8	2377	18.4	2644	23.3	2886	28.3	2990	30.7	3103	33.3	3200	35.7	3302	38.4	3398	41.0		

264 AM  Max. safe speeds Ser. 20 AM=2510 RPM Ser. 30 AM=2980 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1800	1452	1031	1.81	1436	3.98	1749	6.51	2018	9.39	2254	12.5	2365	14.2	2476	16.0	2576	17.8	2671	19.6	2774	21.7	2856	23.4
	2500	2016	1064	2.47	1459	5.05	1768	7.96	2032	11.2	2269	14.7	2374	16.5	2475	18.3	2585	20.4	2669	22.2	2769	24.4	2856	26.4
	3200	2581	1109	3.27	1485	6.30	1790	9.61	2051	13.2	2279	17.0	2392	19.1	2493	21.1	2590	23.2	2681	25.2	2778	27.6	2868	29.9
	3900	3145	1161	4.20	1524	7.76	1817	11.5	2080	15.6	2304	19.7	2414	22.0	2505	24.0	2603	26.3	2699	28.7	2790	31.1	2887	33.7
	4600	3710	1220	5.34	1578	9.49	1858	13.7	2103	18.1	2331	22.8	2438	25.2	2530	27.5	2631	30.0	2721	32.5	2817	35.2	2899	37.7
	5300	4274	1282	6.74	1625	11.3	1903	16.1	2147	21.1	2364	26.2	2463	28.7	2565	31.4	2659	34.1	2753	36.9	2837	39.5	2925	42.3
	6000	4839	1351	8.38	1684	13.4	1958	18.8	2188	24.2	2402	29.8	2502	32.6	2598	35.5	2689	38.3	2786	41.5	2874	44.5	2953	47.3
	6700	5403	1428	10.2	1743	15.8	2010	21.7	2244	27.8	2449	33.8	2550	37.0	2637	40.0	2731	43.2	2818	46.3	2911	49.8		
7400	5968	1509	12.4	1802	18.6	2064	24.8	2296	31.5	2503	38.3	2596	41.6	2686	44.9	2772	48.2	2863	51.8	2948	55.3			

334 AM  Max. safe speeds Ser. 20 AM = 2035 RPM Ser. 30 AM = 2360 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			3000	1523	820	3.19	1146	6.75	1395	10.7	1609	15.2	1797	20.0	1885	22.6	1966	25.1	2053	28.1	2129	30.8	2200	33.5
4000	2030	843	4.22	1155	8.53	1405	13.2	1616	18.2	1803	23.6	1890	26.4	1974	29.4	2052	32.3	2129	35.3	2204	38.5	2277	41.8	
5000	2538	870	5.34	1176	10.6	1416	16.0	1626	21.7	1813	27.7	1900	30.8	1976	33.8	2058	37.2	2136	40.6	2208	43.9	2278	47.3	
6000	3046	906	6.65	1200	12.7	1437	19.0	1644	25.6	1825	32.3	1904	35.5	1991	39.2	2069	42.7	2143	46.3	2212	49.7	2285	53.6	
7000	3553	948	8.24	1229	14.9	1460	22.1	1656	29.4	1839	37.0	1926	41.1	2008	45.0	2081	48.8	2161	53.0	2229	56.7	2301	60.9	
8000	4061	990	10.1	1265	17.5	1488	25.5	1682	33.6	1859	42.1	1941	46.3	2018	50.6	2096	55.0	2172	59.5	2238	63.6	2317	68.7	
9000	4569	1039	12.3	1303	20.4	1520	29.1	1707	37.9	1883	47.3	1967	52.2	2042	56.8	2117	61.6	2185	66.1	2264	71.5	2327	76.1	
10000	5076	1089	14.9	1342	23.6	1555	33.0	1741	42.7	1906	52.6	1987	57.8	2065	63.1	2138	68.2	2211	73.5	2277	78.5	2353	84.5	
11000	5584	1144	17.9	1386	27.2	1593	37.3	1779	48.1	1941	58.7	2016	64.0	2097	70.0	2164	75.2	2236	81.0	2302	86.5			

364 AM  Max. safe speeds Ser. 20 AM=1840 RPM Ser. 30 AM=2135 RPM	CFM	OV	4"SP		8"SP		12"SP		16"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		32"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			4400	1826	752	4.63	1038	9.47	1263	14.8	1457	20.7	1627	27.0	1704	30.2	1783	33.7	1848	36.9	1919	40.5	1987	44.1
5600	2324	773	5.90	1057	11.9	1278	18.1	1463	24.6	1633	31.6	1711	35.2	1787	39.0	1859	42.9	1925	46.6	1997	50.9	2060	54.9	
6800	2822	805	7.41	1072	14.3	1292	21.6	1480	29.2	1646	37.0	1725	41.1	1795	45.0	1862	48.9	1935	53.4	2003	57.9	2066	62.2	
8000	3320	839	9.16	1097	16.9	1309	25.2	1491	33.7	1659	42.7	1732	47.0	1805	51.5	1876	56.2	1946	60.9	2012	65.7	2074	70.4	
9200	3817	876	11.2	1127	19.9	1332	29.1	1511	38.7	1672	48.5	1752	53.8	1822	58.7	1891	63.7	1958	68.9	2023	74.0	2085	79.1	
10400	4315	918	13.7	1158	23.0	1358	33.3	1530	43.6	1695	55.0	1762	59.9	1834	65.5	1906	71.4	1972	77.0	2036	82.6	2104	88.9	
11600	4813	961	16.5	1194	26.7	1390	37.9	1562	49.5	1713	61.0	1786	67.1	1856	73.1	1927	79.5	1991	85.6	2055	91.8	2116	98.1	
12800	5311	1008	19.9	1234	31.0	1425	42.9	1591	55.3	1737	67.7	1809	74.2	1877	80.8	1942	87.2	2011	94.3	2074	101	2130	107	
14000	5809	1057	23.7	1275	35.7	1457	48.1	1618	61.2	1768	75.1	1834	81.7	1906	89.2	1966	95.7	2030	103	2098	111			

SERIES 30 BP & RD WHEELS

RD PERFORMANCE SHADED IN BROWN

144 BP  Max. safe speeds Ser. 30 BP=4405 RPM	CFM	OV	6"SP		7"SP		8"SP		9"SP		10"SP		11"SP		12"SP		14"SP		16"SP		18"SP		19"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	1300	2889	2648	2.36	2816	2.70	2971	3.05	3119	3.40	3254	3.74	3401	4.13	3528	4.49	3775	5.24	3996	5.97	4219	6.78	4316	7.15
	1425	3167	2711	2.67	2868	3.02	3032	3.42	3168	3.77	3317	4.18	3439	4.53	3569	4.93	3811	5.72	4048	6.56	4251	7.34	4361	7.79
	1550	3444	2772	3.00	2936	3.40	3080	3.78	3227	4.19	3366	4.60	3503	5.03	3624	5.43	3862	6.27	4079	7.09	4303	8.01	4403	8.44
	1675	3722	2830	3.35	2993	3.78	3146	4.21	3284	4.63	3424	5.08	3552	5.51	3677	5.95	3911	6.83	4144	7.78	4351	8.69		
	1800	4000	2894	3.73	3056	4.20	3200	4.64	3349	5.12	3480	5.58	3611	6.05	3728	6.49	3972	7.47	4189	8.42	4397	9.39		
	1925	4278	2964	4.16	3125	4.66	3270	5.14	3411	5.63	3535	6.09	3668	6.61	3789	7.09	4018	8.08	4233	9.07				
	2050	4556	3031	4.61	3184	5.12	3330	5.64	3472	6.17	3598	6.66	3724	7.18	3848	7.72	4075	8.75	4289	9.81				
	2175	4833	3109	5.13	3257	5.66	3403	6.21	3531	6.72	3668	7.30	3788	7.83	3915	8.41	4141	9.51	4356	10.6				
2300	5111	3179	5.65	3327	6.22	3468	6.79	3605	7.37	3727	7.92	3858	8.53	3970	9.08	4193	10.2							

174 BP/RD  Max. safe speeds Ser. 30 RD=3510 RPM Ser. 30 BP=4350 RPM	CFM	OV	6"SP		8"SP		10"SP		12"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	2000	2985	2204	3.68	2464	4.71	2708	5.82	2923	6.92	3119	8.02	3309	9.19	3493	10.4	3656	11.6	3811	12.8	3981	14.2	4125	15.4
	2250	3358	2272	4.32	2534	5.50	2766	6.68	2971	7.83	3173	9.08	3357	10.3	3537	11.6	3700	12.9	3857	14.2	4007	15.5	4169	17.0
	2500	3731	2342	5.04	2600	6.33	2822	7.58	3040	8.94	3230	10.2	3418	11.6	3581	12.9	3751	14.3	3902	15.7	4055	17.1	4200	18.6
	2750	4104	2415	5.83	2663	7.20	2885	8.58	3095	10.0	3292	11.5	3476	13.0	3638	14.4	3801	15.9	3962	17.4	4120	19.0	4251	20.4
	3000	4478	2490	6.72	2738	8.23	2954	9.70	3168	11.3	3351	12.8	3532	14.4	3707	16.0	3871	17.6	4020	19.2	4163	20.8	4318	22.6
	3250	4851	2569	7.70	2810	9.31	3028	10.9	3229	12.6	3418	14.2	3597	15.9	3759	17.6	3924	19.3	4074	21.0	4221	22.8		
	3500	5224	2655	8.83	2892	10.6	3100	12.3	3305	14.1	3483	15.8	3660	17.6	3834	19.5	3987	21.2	4140	23.1	4291	25.0		
	3750	5597	2739	10.0	2966	11.9	3177	13.7	3371	15.6	3555	17.5	3731	19.4	3894	21.3	4048	23.2	4203	25.2	4343	27.1		
4000	5970	2831	11.4	3050	13.3	3258	15.3	3451	17.3	3625	19.2	3800	21.3	3963	23.3	4118	25.3	4263	27.3					

194 BP/RD  Max. safe speeds Ser. 30 RD=3230 RPM Ser. 30 BP=3985 RPM	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			1900	2969	1858	3.32	2321	5.47	2710	7.87	2888	9.17	3052	10.5	3203	11.8	3347	13.2	3492	14.7	3622	16.1	3763	17.7
	2175	3398	1894	3.86	2359	6.27	2747	8.87	2916	10.2	3074	11.6	3232	13.0	3376	14.5	3512	15.9	3647	17.5	3781	19.1	3911	20.8
	2450	3828	1942	4.50	2397	7.12	2772	9.86	2947	11.3	3101	12.7	3255	14.3	3407	15.9	3546	17.5	3675	19.0	3803	20.7	3941	22.6
	2725	4258	1992	5.20	2435	8.04	2811	11.0	2980	12.6	3143	14.2	3296	15.8	3432	17.3	3580	19.1	3705	20.7	3838	22.5	3961	24.3
	3000	4688	2051	5.99	2473	9.00	2841	12.2	3014	13.9	3173	15.6	3323	17.3	3474	19.1	3608	20.8	3736	22.5	3874	24.5	3984	26.2
	3275	5117	2118	6.89	2526	10.1	2881	13.5	3049	15.3	3216	17.2	3353	18.8	3503	20.7	3638	22.6	3769	24.5	3893	26.3		
	3550	5547	2190	7.91	2578	11.3	2931	15.0	3095	16.8	3249	18.7	3396	20.6	3533	22.5	3682	24.7	3803	26.5	3931	28.6		
	3825	5977	2269	9.07	2641	12.7	2980	16.5	3141	18.5	3293	20.5	3439	22.5	3577	24.6	3715	26.7	3850	28.9	3969	30.9		
	4100	6406	2350	10.3	2703	14.1	3036	18.2	3188	20.2	3338	22.4	3483	24.5	3621	26.7	3749	28.8	3885	31.1				

SERIES 30 BP & RD WHEELS

RD PERFORMANCE SHADED IN BROWN

264 BP/RD	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3600	2975	1362	6.08	1705	10.2	1992	14.8	2113	17.0	2234	19.6	2355	22.3	2463	24.9	2562	27.5	2660	30.3	2766	33.4	2856	36.2
	4150	3430	1401	7.25	1733	11.6	2014	16.5	2140	19.1	2259	21.7	2377	24.6	2477	27.2	2587	30.3	2689	33.3	2780	36.2	2878	39.5
	4700	3884	1440	8.56	1763	13.3	2037	18.4	2163	21.2	2283	24.1	2393	26.9	2501	29.9	2605	33.0	2702	36.1	2798	39.3	2892	42.6
	5250	4339	1489	10.1	1798	15.2	2069	20.7	2187	23.4	2309	26.6	2424	29.7	2526	32.8	2625	35.9	2725	39.3	2818	42.6	2910	46.0
	5800	4793	1542	11.9	1838	17.3	2100	23.1	2223	26.2	2335	29.3	2449	32.6	2552	35.9	2653	39.3	2750	42.7	2840	46.1	2937	49.9
	6350	5248	1603	14.1	1886	19.8	2137	25.8	2255	29.1	2370	32.4	2475	35.7	2579	39.2	2681	42.8	2769	46.1	2864	49.8	2951	53.5
	6900	5702	1665	16.4	1932	22.4	2180	28.9	2294	32.2	2405	35.7	2510	39.3	2606	42.7	2710	46.6	2802	50.2	2900	54.3		
	7450	6157	1734	19.2	1990	25.6	2227	32.3	2335	35.8	2439	39.3	2544	43.0	2643	46.8	2740	50.6	2834	54.6	2925	58.6		
	8000	6612	1804	22.3	2046	28.9	2273	36.0	2381	39.7	2487	43.5	2587	47.3	2679	51.1	2778	55.3	2867	59.2	2961	63.6		

294 BP/RD	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	4700	3013	1188	7.58	1486	12.6	1735	18.1	1845	20.9	1951	23.9	2050	26.9	2151	30.2	2238	33.3	2332	36.9	2415	40.2	2494	43.5
	5400	3462	1217	8.94	1506	14.3	1750	20.2	1860	23.3	1968	26.6	2065	29.8	2166	33.3	2255	36.7	2356	40.0	2424	43.8	2500	47.2
	6100	3910	1256	10.6	1534	16.4	1774	22.7	1880	25.9	1991	29.6	2082	32.8	2182	36.6	2267	40.1	2359	44.1	2443	47.9	2519	51.6
	6800	4359	1294	12.4	1566	18.7	1798	25.4	1909	29.0	2009	32.6	2109	36.4	2200	40.1	2287	43.9	2369	47.7	2457	52.0	2538	56.1
	7500	4808	1340	14.5	1596	21.1	1827	28.4	1929	32.0	2035	36.1	2127	39.9	2219	43.9	2308	48.0	2393	52.2	2473	56.3	2559	61.0
	8200	5256	1389	17.0	1639	24.1	1856	31.6	1963	35.7	2062	39.8	2155	43.9	2247	48.2	2329	52.3	2417	56.9	2501	61.5	2580	66.0
	8900	5705	1445	19.8	1679	27.3	1895	35.4	1996	39.6	2088	43.7	2181	48.1	2267	52.4	2351	56.8	2442	61.8	2519	66.3	2602	71.4
	9600	6154	1502	23.0	1726	30.9	1932	39.3	2028	43.6	2120	48.1	2215	52.8	2303	57.6	2382	62.0	2466	67.0	2539	71.4		
	10300	6603	1559	26.5	1774	34.9	1973	43.7	2070	48.4	2158	53.0	2248	57.8	2331	62.6	2412	67.4	2492	72.4	2576	77.9		

334 BP/RD	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	5800	2974	1064	9.32	1331	15.5	1553	22.2	1658	25.9	1755	29.7	1838	33.2	1930	37.4	2009	41.2	2087	45.2	2162	49.4	2233	53.5
	6700	3436	1093	11.1	1355	17.8	1577	25.3	1673	29.0	1771	33.2	1854	37.0	1945	41.4	2020	45.3	2100	49.8	2172	54.1	2249	58.9
	7600	3897	1129	13.2	1376	20.4	1593	28.3	1689	32.3	1788	36.8	1871	40.9	1961	45.7	2038	50.1	2115	54.7	2191	59.5	2266	64.5
	8500	4359	1164	15.6	1406	23.4	1615	31.7	1715	36.3	1805	40.8	1888	45.1	1978	50.3	2057	55.0	2131	59.8	2211	65.2	2278	69.9
	9400	4821	1209	18.4	1438	26.7	1642	35.6	1734	40.2	1830	45.3	1913	50.1	1996	55.1	2076	60.3	2153	65.5	2226	70.8	2292	75.7
	10300	5282	1254	21.6	1473	30.3	1674	40.0	1766	44.9	1854	50.1	1938	55.2	2014	60.2	2096	65.8	2166	70.9	2242	76.7	2312	82.3
	11200	5744	1305	25.2	1517	34.8	1704	44.6	1795	49.9	1878	55.1	1963	60.6	2040	66.0	2116	71.6	2198	78.0	2268	83.7	2333	89.2
	12100	6205	1359	29.4	1559	39.4	1742	49.9	1829	55.3	1913	61.1	1993	66.7	2072	72.7	2144	78.3	2220	84.6	2293	91.0	2354	96.4
	13000	6667	1413	34.1	1607	44.7	1784	55.9	1862	61.2	1947	67.4	2022	73.1	2104	79.7	2171	85.3	2242	91.6	2319	98.6		

364 BP/RD	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	7100	2971	962	11.4	1204	18.9	1405	27.2	1500	31.7	1588	36.4	1664	40.7	1747	45.9	1818	50.6	1889	55.5	1957	60.6	2022	65.7
	8200	3431	989	13.6	1222	21.7	1423	30.8	1513	35.5	1598	40.4	1678	45.3	1755	50.4	1828	55.6	1901	61.2	1967	66.4	2030	71.7
	9300	3891	1019	16.1	1248	25.1	1439	34.6	1527	39.5	1617	45.1	1692	50.1	1770	55.7	1845	61.4	1909	66.6	1978	72.5	2046	78.6
	10400	4351	1055	19.1	1271	28.6	1462	38.9	1547	44.2	1629	49.6	1711	55.5	1785	61.2	1857	67.1	1924	72.9	1997	79.5	2063	85.9
	11500	4812	1093	22.5	1302	32.7	1488	43.8	1573	49.5	1654	55.4	1730	61.2	1805	67.4	1878	73.9	1944	79.9	2015	86.8	2079	93.0
	12600	5272	1134	26.4	1334	37.2	1513	48.9	1597	55.0	1672	60.9	1748	67.2	1824	73.9	1892	80.2	1964	87.3	2024	93.5	2085	100
	13700	5732	1180	30.9	1371	42.5	1542	54.6	1625	61.2	1702	67.7	1773	74.0	1850	81.3	1913	87.6	1980	94.6	2044	102	2112	109
	14800	6192	1229	36.0	1410	48.2	1573	60.9	1653	67.7	1730	74.7	1802	81.7	1869	88.4	1941	96.1	2004	103	2071	111	2134	119
	15900	6653	1279	41.7	1450	54.5	1612	68.2	1688	75.3	1757	82.0	1831	89.7	1900	97.2	1961	104	2027	112	2097	121		

404 BP/RD  Max. safe speeds Ser. 30 RD = 1525 RPM Ser. 30 BP = 1905 RPM	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	8700	3000	881	14.0	1101	23.2	1285	33.2	1371	38.8	1446	44.0	1520	49.6	1590	55.4	1661	61.6	1725	67.5	1787	73.7	1846	79.8
	9900	3414	904	16.5	1120	26.5	1301	37.3	1381	42.8	1455	48.4	1533	54.8	1600	60.6	1673	67.4	1735	73.6	1795	80.0	1853	86.5
	11100	3828	927	19.1	1136	29.8	1316	41.5	1398	47.6	1472	53.6	1546	60.1	1615	66.6	1680	73.1	1745	80.0	1804	86.7	1868	94.2
	12300	4241	956	22.3	1156	33.6	1330	45.9	1411	52.4	1488	59.1	1559	65.7	1629	72.8	1697	80.0	1761	87.2	1820	94.3	1877	101
	13500	4655	988	26.0	1182	38.1	1349	50.9	1429	57.8	1500	64.5	1572	71.6	1643	79.2	1705	86.2	1772	94.2	1835	102	1892	110
	14700	5069	1023	30.1	1206	42.8	1372	56.6	1447	63.5	1518	70.7	1591	78.5	1657	86.0	1722	93.7	1783	102	1850	110	1903	118
	15900	5483	1061	34.9	1235	48.2	1393	62.4	1468	70.0	1541	77.8	1610	85.6	1678	93.8	1738	102	1803	110	1865	119		
	17100	5897	1099	40.1	1266	54.1	1422	69.4	1494	77.1	1563	85.1	1628	92.9	1698	102	1761	111	1822	119	1880	128		
	18300	6310	1140	46.0	1302	60.9	1450	76.6	1518	84.6	1589	93.3	1656	102	1717	110	1776	119	1840	129	1895	137		

SERIES 30 BP WHEELS

504 BP  Max. safe speeds Ser. 30 BP=1505 RPM	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP		
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	
			13700	2998	692	22.1	866	36.8	1013	53.4	1076	61.8	1139	71.2	1194	80.0	1255	90.4	1307	100	1359	110	1408	121	1456
15500	3392	710	25.7	877	41.3	1022	59.0	1084	67.8	1147	77.7	1203	87.1	1257	96.9	1316	108	1361	118	1410	129	1462	141	1510	151
17300	3786	727	29.6	891	46.3	1031	64.8	1098	74.9	1155	84.4	1212	94.6	1267	105	1320	116	1369	127	1422	139	1476	151	1520	161
19100	4179	749	34.3	906	52.0	1045	71.5	1105	81.4	1168	92.5	1226	104	1277	114	1332	126	1381	137	1439	149	1483	161	1530	172
20900	4573	772	39.5	924	58.3	1057	78.5	1122	89.9	1181	101	1234	112	1287	123	1337	135	1392	148	1436	159	1483	172	1530	183
22700	4967	797	45.5	943	65.2	1076	87.1	1133	97.8	1192	110	1247	121	1302	134	1349	145	1400	158	1448	171	1495	185	1540	196
24500	5361	824	52.2	964	72.9	1094	95.9	1152	108	1208	120	1260	131	1316	145	1366	158	1414	171	1458	183	1505	196	1550	207
26300	5755	851	59.6	988	81.7	1110	105	1170	118	1223	130	1276	143	1330	156	1377	169	1427	183	1469	196	1518	207	1563	218
28100	6149	881	68.1	1011	91.0	1133	116	1186	128	1241	141	1292	154	1343	168	1392	182	1440	197	1486	211	1533	222	1579	233

574 BP  Max. safe speeds Ser. 30 BP = 1325 RPM	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	18000	3035	610	29.1	762	48.4	891	70.1	946	81.1	1002	93.3	1050	105	1099	117	1149	131	1194	144	1237	158	1279	172
	20250	3415	625	33.7	773	54.2	897	76.6	954	88.7	1006	101	1059	114	1106	127	1154	141	1198	154	1241	168	1283	183
	22500	3794	640	38.6	785	60.8	907	84.4	961	96.5	1016	110	1067	124	1116	138	1160	151	1207	166	1246	180	1287	195
	24750	4174	657	44.4	797	67.5	916	92.3	974	106	1026	120	1075	134	1122	148	1168	163	1211	178	1254	193	1296	209
	27000	4553	677	50.9	813	75.6	928	101	982	115	1034	130	1082	144	1131	160	1177	175	1223	192	1262	206	1304	223
	29250	4933	699	58.4	827	83.9	943	112	994	126	1047	141	1096	157	1140	172	1188	189	1228	204	1270	221	1309	237
	31500	5312	721	66.6	846	93.7	957	122	1009	138	1059	153	1105	169	1151	185	1195	202	1238	219	1281	236	1320	254
	33750	5691	745	76.0	866	104	972	134	1026	151	1074	167	1118	182	1166	200	1208	217	1248	234	1291	253		
36000	6071	770	86.3	884	116	990	147	1038	163	1088	181	1134	198	1179	216	1220	233	1263	252	1304	271			

644 BP  Max. safe speeds Ser. 30 BP=1185 RPM	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			22000	2941	542	35.4	679	59.4	794	86.1	845	100	890	114	938	129	983	146	1022	160	1063	177	1103	194
25000	3342	555	41.3	687	66.6	801	95.0	850	110	899	125	947	142	990	158	1031	175	1067	191	1106	209	1144	227	
28000	3743	571	48.0	700	75.5	811	105	860	121	906	137	952	154	996	172	1036	189	1075	206	1114	225	1152	244	
31000	4144	588	55.7	712	84.6	820	116	869	133	915	150	962	168	1002	185	1041	203	1083	223	1121	242	1159	261	
34000	4545	606	64.5	727	95.4	831	128	881	146	924	163	971	183	1013	202	1052	220	1093	241	1128	260	1166	281	
37000	4947	625	74.1	741	107	845	142	891	160	935	178	979	198	1019	217	1061	238	1097	257	1135	279	1170	299	
40000	5348	648	85.5	758	120	858	156	905	176	950	196	991	216	1033	236	1073	258	1111	280	1147	301	1182	321	
43000	5749	670	98.0	777	134	872	172	917	192	960	212	1003	234	1042	254	1084	278	1120	300	1154	321	1190	342	
46000	6150	694	112	796	150	889	190	932	210	976	232	1017	254	1054	275	1094	299	1133	323	1164	344	1200	363	

714 BP  Max. safe speeds Ser. 30 BP = 1070 RPM	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	27500	2999	491	44.3	615	74.2	716	106	763	124	806	142	848	161	888	180	925	200	962	220	997	241	1031	262
	31000	3381	503	51.2	623	82.8	724	117	770	136	813	155	853	174	892	194	931	215	966	236	1001	258	1035	280
	34500	3762	516	59.1	632	92.5	730	129	778	149	819	168	860	189	900	211	938	233	974	255	1005	276	1039	299
	38000	4144	531	68.2	642	103	739	142	783	162	829	184	867	205	906	227	943	250	978	273	1013	297	1047	321
	41500	4526	547	78.6	654	115	751	157	795	178	834	199	877	223	915	247	950	269	985	293	1019	318	1054	344
	45000	4907	564	89.9	669	130	761	172	803	194	846	218	882	240	922	265	956	289	994	315	1028	342	1060	367
	48500	5289	582	103	683	144	773	189	816	213	857	237	895	261	932	287	965	310	1000	336	1032	362	1067	391
	52000	5671	601	117	700	161	787	208	828	232	867	257	903	281	942	309	977	336	1010	362	1040	387		
55500	6052	622	133	715	179	800	227	839	252	879	279	914	304	951	332	984	358	1019	388	1053	417			

784 BP  Max. safe speeds Ser. 30 BP=975 RPM	CFM	OV	6"SP		10"SP		14"SP		16"SP		18"SP		20"SP		22"SP		24"SP		26"SP		28"SP		30"SP	
			RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	33000	2984	448	53.4	560	89.2	654	129	696	149	735	171	772	193	809	217	843	240	877	265	910	291	941	317
	37500	3391	459	62.5	568	101	658	141	702	165	740	187	777	210	812	234	848	260	881	286	913	313	944	340
	42000	3797	471	72.3	577	113	668	158	708	181	746	204	783	230	820	256	855	283	887	310	916	335	947	363
	46500	4204	486	84.2	588	128	677	175	717	200	755	225	790	250	827	278	859	305	893	334	925	364	953	391
	51000	4611	501	97.6	599	143	685	192	725	219	764	246	799	273	834	302	867	331	899	360	928	388	959	419
	55500	5018	519	113	613	162	697	214	735	241	771	268	808	297	840	325	875	357	904	386	936	418	965	448
	60000	5425	536	130	626	181	708	236	747	265	781	293	816	322	849	353	882	385	914	417	943	448	975	484
	64500	5832	556	150	642	202	721	260	758	290	793	321	829	353	861	385	893	417	922	449	954	485		
69000	6239	576	171	660	228	735	287	771	318	805	349	839	382	873	417	902	449	934	486	961	517			

SERIES 20 MATERIAL SPECIFICATIONS

MAXIMUM SAFE SPEEDS, SHAFTS, AND BEARINGS FOR SERIES 20 LS, DH, AH, AND AM WHEELS AT 70°

Size	Wheel Max Safe Speed			Arr. 1, 8, 9, 9E, 9F		Arr. 10		LS Wheel			DH Wheel					AH Wheel		AM Wheel	
	Arr. 1, 8, 9, 9F	Arr. 9E	Arr. 10	Shaft Dia.	Bearing	Shaft Dia.	Bearing	Blades	Weight	WR ²	Backplate	Frontplate	Blades	Weight	WR ²	Weight	WR ²	Weight	WR ²
144	4605	3980	4605	1 ³ / ₁₆	B	1 ⁷ / ₁₆	A	10	15	1.5	—	—	—	—	—	25	3.8	20	2.0
174	3930	3930	3745	1 ⁷ / ₁₆	B	1 ⁷ / ₁₆	A	10	19	2.8	—	—	—	—	—	33	7.8	29	4.4
194	3425	3425	3115	1 ¹¹ / ₁₆	C	1 ¹¹ / ₁₆	A	7	34	5	7	10	—	49	11	55	15	46	12
224	2900	2900	2635	1 ¹¹ / ₁₆	C	1 ¹⁵ / ₁₆	A	7	45	13	7	10	—	63	21	72	28	60	24
264	2510	2510	2280	2 ³ / ₁₆	C	1 ¹⁵ / ₁₆	A	7	77	20	7	10	—	78	36	91	49	74	41
294	2195	2195	1995	2 ³ / ₁₆	C	1 ¹⁵ / ₁₆	B	7	85	42	7	10	—	102	69	123	87	100	71
334	2035	2035	1790	2 ³ / ₁₆	D	2 ³ / ₁₆	B	7	103	63	1/4	7	10	157	119	189	167	162	134
364	1840	—	1620	2 ⁷ / ₁₆	D	2 ³ / ₁₆	B	7	115	86	1/4	7	10	184	178	229	251	195	200
404	1640	—	—	2 ⁷ / ₁₆	D	—	—	7	126	114	1/4	—	7	261	327	—	—	—	—
454	1460	—	—	2 ¹¹ / ₁₆	D	—	—	1/4	256	294	1/4	—	7	349	515	—	—	—	—
504	1305	—	—	2 ¹⁵ / ₁₆	D	—	—	1/4	287	423	1/4	—	7	420	805	—	—	—	—
574	1145	—	—	2 ¹⁵ / ₁₆	D	—	—	1/4	338	630	1/4	—	7	651	1623	—	—	—	—
644	1025	—	—	3 ⁷ / ₁₆	D	—	—	1/4	552	1290	3/8	1/4	—	858	2738	—	—	—	—
714	925	—	—	3 ¹⁵ / ₁₆	D	—	—	1/4	609	1744	3/8	1/4	—	1116	4116	—	—	—	—
784	840	—	—	3 ¹⁵ / ₁₆	D	—	—	1/4	860	2970	3/8	1/4	—	1306	5970	—	—	—	—
854	770	—	—	4 ⁷ / ₁₆	E	—	—	1/4	927	3800	3/8	1/4	—	1518	7810	—	—	—	—

NOTE: All weights in lbs.

Bearing Types:

- A Standard Duty Ball, Concentric Lock
- B Medium Duty Ball, Concentric Lock
- C Heavy Duty Ball, Concentric Lock
- D Spherical Roller, Set Screw Mount (2 Bolt Base)
- E Spherical Roller, Set Screw Mount (4 Bolt Base)

MATERIAL SPECIFICATIONS FOR STANDARD STEEL SERIES 20 FANS

Size	Housing					Bearing Pedestal Arr. 1, 9, 9E, 9F Motor Pedestal Arr. 9F (404-574)			Bearing Pedestal Arr. 10					Bare Fan Weights (lbs.)					
	Sides	Scroll	Plates		Inlet Collar				Bearing Pedestal			Motor Platform	Base Angles						
			Inlet	Drive		Top	Sides	Base Bars	Top	Sides	Ends								
144	12		12	10	12	10			10	12		7	1½ x 1½ x ¾ ₁₆		130	135	—	135	107
174	12		10		12	10			10	12		7	1½ x 1½ x ¾ ₁₆		175	181	—	175	145
194	10		10		7	7			7	12		7	2 x 2 x ¾ ₁₆		305	309	—	300	237
224	10		10		7	7			7	10		7	2 x 2 x ¾ ₁₆		365	376	—	420	317
264	10		10		7	7			7	10		1/4	2 x 2 x ¾ ₁₆		460	473	—	530	410
294	10		10		7	¼			7	10	7	1/4	3 x 3 x ¾ ₁₆		715	725	—	675	515
334	10		10		7	¼			7	10	7	1/4	3 x 3 x ¾ ₁₆		920	933	—	880	688
364	10		7		7	¼			7	10	7	1/4	3 x 3 x ¾ ₁₆		1170	—	—	1010	932
404	7		7	—	7	¼		¾	—	—	—	—	—		1340	—	1630	—	—
454	7		7	—	7	¼		¾	—	—	—	—	—		1830	—	2095	—	—
504	7		7	—	7	¼		¾	—	—	—	—	—		2205	—	2515	—	—
574	7		7	—	7	¾	¼	¾	—	—	—	—	—		2955	—	3340	—	—
644	¼	7	¼	—	¼	¾			—	—	—	—	—		4665	—	—	—	—
714	¼	7	¼	—	¼	¾			—	—	—	—	—		5255	—	—	—	—
784	¼	7	¼	—	¼	¾			—	—	—	—	—		6440	—	—	—	—
854	¼	7	¼	—	¼	¾			—	—	—	—	—		8145	—	—	—	—

SERIES 30 MATERIAL SPECIFICATIONS

MAXIMUM SAFE SPEEDS, SHAFTS, AND BEARINGS FOR SERIES 30 BP, RD, LS/RIM, DH, AH, AND AM WHEELS AT 70°

Size	Wheel Max Safe Speed		Arr. 1, 8, 9, 9F							
			LS/RIM		DH, AH, AM		BP/RD			
	BP, DH, LS/RIM, AH, AM	RD	Shaft Dia.	Bearing Type	Shaft Dia.	Bearing Type	Shaft Dia.		Bearing Type	
							@ Wheel	@ Bearings	BP	RD
144	4405	—	—	—	—	—	1 ⁷ / ₁₆	1 ⁷ / ₁₆	B	—
174	4350	3510	—	—	—	—	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	C	B
194	3985	3230	1 ¹¹ / ₁₆	C	1 ¹¹ / ₁₆	C	1 ¹¹ / ₁₆	1 ¹¹ / ₁₆	C	
224	3440	2730	1 ¹⁵ / ₁₆	C	1 ¹⁵ / ₁₆	C	1 ¹⁵ / ₁₆	1 ¹⁵ / ₁₆	C	
264	2980	2365	2 ³ / ₁₆	C	2 ³ / ₁₆	C	2 ³ / ₁₆	2 ³ / ₁₆	C	
294	2610	2060	2 ⁷ / ₁₆	C	2 ⁷ / ₁₆	C	2 ⁷ / ₁₆	2 ⁷ / ₁₆	C	
334	2360	1850	2 ¹¹ / ₁₆	C	2 ⁷ / ₁₆	D	2 ¹¹ / ₁₆	2 ¹¹ / ₁₆	C	
364	2135	1675	2 ¹¹ / ₁₆	D	2 ¹¹ / ₁₆	D	2 ¹¹ / ₁₆	2 ¹¹ / ₁₆	D	
404	1905	1525	3 ⁷ / ₁₆	D	2 ¹¹ / ₁₆	D	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆	D	
454	1690	—	3 ⁷ / ₁₆	D	2 ¹⁵ / ₁₆	D	2 ¹⁵ / ₁₆	3 ⁷ / ₁₆	D	—
504	1505	—	3 ¹⁵ / ₁₆	D	3 ⁷ / ₁₆	D	3 ⁷ / ₁₆	3 ¹⁵ / ₁₆	D	—
574	1325	—	3 ¹⁵ / ₁₆	D	3 ⁷ / ₁₆	D	3 ⁷ / ₁₆	3 ¹⁵ / ₁₆	D	—
644	1185	—	4 ⁷ / ₁₆	E	3 ¹⁵ / ₁₆	D	3 ¹⁵ / ₁₆	4 ⁷ / ₁₆	E	—
714	1070	—	4 ¹⁵ / ₁₆	F	4 ⁷ / ₁₆	E	4 ⁷ / ₁₆	4 ¹⁵ / ₁₆	F	—
784	975	—	5 ⁷ / ₁₆	F	4 ⁷ / ₁₆	E	4 ⁷ / ₁₆	5 ⁷ / ₁₆	F	—
854	890	—	5 ⁷ / ₁₆	F	4 ¹⁵ / ₁₆	F	4 ¹⁵ / ₁₆	5 ⁷ / ₁₆	F	—

Bearing Types:

- B Medium Duty Ball, Concentric Lock
- C Heavy Duty Ball, Concentric Lock
- D Spherical Roller, Set Screw Mount (2 Bolt Base)
- E Spherical Roller, Set Screw Mount (4 Bolt Base)
- F Split Housing Spherical Roller, Adapter Mount

MATERIAL SPECIFICATIONS FOR STANDARD STEEL SERIES 30 FANS

Size	Housing				Bearing Ped. Arr. 1, 9, 9F Motor Ped. Arr. 9F (334-454)		Bare Fan Weights [lbs]		
	Sides & Scroll	Plates		Inlet Collar					
		Inlet	Drive		Top & Sides	Base Bars	Arr. 1, 9	Arr. 9F	Arr. 4
144	12	12	10	10	10		139	—	—
174	12	10		10	10		210	—	—
194	7	10		7	1/4		400	—	279
224	7	10		7	1/4		530	—	376
264	7	10		7	1/4		755	—	581
294	7	10		7	1/4		900	—	711
334	7	10	—	7	1/4	3/8	1140	1430	1028
364	7	7	—	7	1/4	3/8	1360	1680	1215
404	7	7	—	7	1/4	3/8	1655	2030	—
454	7	7	—	7	1/4	3/8	2315	2690	—
504	1/4	7	—	7	3/8	1/2	3115	—	—
574	1/4	7	—	7	3/8	5/8	3790	—	—
644	1/4	1/4	—	1/4	3/8	5/8	4960	—	—
714	1/4	1/4	—	1/4	3/8	5/8	6300	—	—
784	1/4	1/4	—	1/4	3/8	5/8	7140	—	—
854	1/4	1/4	—	1/4	3/8	5/8	8665	—	—

MATERIAL SPECIFICATIONS FOR SERIES 30 FANS

U.S. STANDARD STEEL GAUGE TO 7 GAUGE – DIMENSIONS [INCHES]

Size	LS/RIM Wheel				DH Wheel				
	Blades	Rims	Weight [lbs.]	WR ²	Backplate	Frontplate	Blades	Weight [lbs.]	WR ²
144	–	–	–	–	–	–	–	–	–
174	–	–	–	–	–	–	–	–	–
194	1/4	–	36	7	7	10	–	49	11
224	1/4	–	53	16	7	10	–	63	21
264	1/4	–	89	37	7	10	–	79	37
294	1/4	–	101	54	1/4	7	10	104	70
334	1/4	–	132	87	1/4	7	10	158	120
364	1/4	–	148	111	1/4	7	10	186	180
404	1/4	1/4	272	369	1/4	–	7	263	330
454	3/8	1/4	481	911	1/4	–	7	352	520
504	3/8	1/4	563	1208	1/4	–	7	424	812
574	3/8	1/4	690	2373	3/8	1/4	7	657	1635
644	3/8	1/4	1112	3634	3/8	1/4	–	866	2765
714	3/8	1/4	1256	5044	3/8	1/4	–	1127	4152
784	3/8	1/4	1607	7853	3/8	1/4	–	1319	6032
854	3/8	1/4	1804	9795	3/8	1/4	–	1533	8504

Size	BP Wheel				RD Wheel				AH Wheel		AM Wheel	
	Backplate	Blades	Weight [lbs.]	WR ²	Backplate	Blades	Weight [lbs.]	WR ²	Weight [lbs.]	WR ²	Weight [lbs.]	WR ²
144	7	–	24	4.1	–	–	–	–	–	–	–	–
174	7	–	32	7.9	1/4	–	55	12	–	–	–	–
194	7	–	59	12	1/4	–	72	15	55	15	46	12
224	1/4	–	105	31	3/8	–	134	43	76	29	60	24
264	1/4	–	135	53	3/8	–	175	75	100	53	74	41
294	1/4	–	188	90	3/8	–	239	126	138	96	100	71
334	1/4	–	227	137	3/8	–	291	192	199	176	162	134
364	1/4	–	271	201	3/8	–	351	284	241	266	195	200
404	1/4	–	310	284	3/8	–	406	402	–	–	–	–
454	1/4	3/8	445	622	–	–	–	–	–	–	–	–
504	1/4	3/8	535	1026	–	–	–	–	–	–	–	–
574	3/8	–	790	1870	–	–	–	–	–	–	–	–
644	3/8	–	1000	3111	–	–	–	–	–	–	–	–
714	3/8	–	1240	4723	–	–	–	–	–	–	–	–
784	3/8	–	1480	6816	–	–	–	–	–	–	–	–
854	3/8	–	1730	9058	–	–	–	–	–	–	–	–

HOUSING DIMENSIONS — SERIES 20 AND 30 ALL ARRANGEMENTS

Size	B	C	D	E	F	G	J		L [O.D.]		L [I.D.]	M	a	b†	c	d
									Ser. 20							
							Slip	Flanged*	LS, DH	AH, AM	Ser. 30					
144	10½	11⅞	8¾ ₁₆	9¾	12	10¼	1⅝		9	8	8¾	7⅞	10¾	16	11½	9¾
174	12⅝	13¾	10¼ ₁₆	11⅞	14½	12¼	1⅝		11	9¾	10¾	9½	13⅞	19¼	13¾	11½
194	14	15⅝ ₁₆	10⅞	11⅝ ₁₆	17⅝ ₁₆	13⅝ ₁₆	3⅞	3¾	11		10⅝	9¾	15	22⅝	17	13
224	16½	18⅝ ₁₆	13	14¼ ₁₆	21¾ ₁₆	167 ₁₆	3⅞	3¾	13		12⅝	10¾	17⅝	26⅝	20	15¼
264	18½	21⅝ ₁₆	14⅝ ₁₆	16¾ ₁₆	247 ₁₆	18⅝ ₁₆	4⅞	4¾	15		14⅝	12¾	20¼	30¾	23	17½
294	21	249 ₁₆	167 ₈	18⅝ ₁₆	271 ₁₆	217 ₁₆	4⅞	4¾	17		16⅝	14	23	34¾	26⅞	19⅞
334	23	27¾	18¾	20¾	307 ₈	237 ₈	4⅞	4¾	19		18⅝	15⅝	25¼	38⅞	29¼	22¾
364	25½	30¼	201 ₁₆	22½	34⅞	26¾	5¼	5½	21		20⅝	17¼	28½	42⅞	32¼	24⅝
404	28	33¾ ₁₆	221 ₁₆	241 ₁₆	37¾	29	5¼	5½	23	—	22⅝	19	31⅞	46¼	35¾	27
454	31½	377 ₁₆	251 ₁₆	27⅝ ₁₆	42¾ ₁₆	321 ₁₆	5¼	5½	26	—	25⅝	21¾	35¾	52¼	40	30⅝
504	34½	417 ₈	281 ₁₆	31¼	47¾ ₁₆	369 ₁₆	6	6¼	29	—	28⅝	237 ₈	39¾	57¾	44⅝	34⅞
574	39	479 ₁₆	32⅝	359 ₁₆	539 ₁₆	419 ₁₆	7	7¼	33	—	32⅝	27⅞	44¾	65⅝	50¾	38¾
644	43	53⅝ ₁₆	36½	39¾	60¼ ₁₆	46½	7¼	7½	37	—	36½	30½	50¼	727 ₈	57	43½
714	47½	58⅝ ₁₆	40⅝ ₁₆	44¼ ₁₆	66¾	51½	7¼	7½	41	—	40½	33⅝	55½	80⅝	627 ₈	48
784	52	64¾	44¼	48¾	72⅝ ₁₆	569 ₁₆	7¼	7½	45	—	44½	367 ₈	607 ₈	88½	69	52¾
854	57	70½	48¾ ₁₆	529 ₁₆	797 ₁₆	61½	7¼	7½	49	—	48½	40⅞	66¾	96⅝	75	57¾

* Flanged inlet standard on Series 30. Dimensions are for drawings shown on pages 23 through 27.

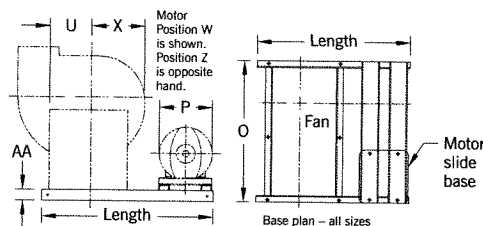
† Maximum with outlet flange.

UNITARY BASE

Structural steel channel base provides factory-designed package of fan, motor, drive, and belt guard. Also available with rubber-in-shear or spring isolation. Built-in motor rails allow adjustment of belt tension.

Unitary base with isolation is also available for Arrangement 8, 9, and 9F fans.

NOTE: Down Blast discharge requires special construction. Also, some larger Series 20 GI Fans on unitary bases cannot be shipped as an assembled package.



Approximate base length = $U + X + P + 16$
 U = from fan base dimension drawing on pages 18-19.

X = dimension from fan centerline to edge of scroll nearest motor. Dimension varies with discharge and motor position. Refer to dimensional drawings on pages 18-19.

P = diameter of motor from table shown.

16 = constant - allows for motor clearance.

NOTE: These dimensions are only approximate. Exact dimensions furnished after order is placed.

DIMENSIONS [INCHES]

Size	AA			Motor frame	Typical P dim. TEFC motor
	Unitary base with isolation	Standard Unitary Base	O		
144	3*	3*	20½	143T	7¾
174	3*	3*	25	145T	7¾
194	3*	3*	28¾	182T	9½
224	3*	3*	30¾	184T	9½
				213T	12
264	4†	4†	35¾	215T	12
294	4†	4†	39¾	254T	14½
334	4†	4†	42¾	256T	14½
364	6	6	47	284T	15¼
				286T	15¼
404	6	6	52¾		
454	6	6	57¼	324T	17¾
504	6	6	62¼	326T	17¾
574	8	6	68½	364T	19½
				365T	19½
644	8	6	74½	404T	21⅝
714	8	6	80¾		
784	8	6	88	405T	21⅝
854	8	6	95¼	444T	24⅞
				445T	24⅞
				447T	24½
				449T	24½

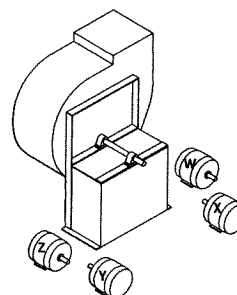
* 4" channel used for motors larger than 215T.
 † 6" channel used for motors larger than 286T.

AMCA STANDARD MOTOR POSITIONS

Drawing below shows AMCA motor position designations for Arrangement 1 fans. These designations are required when ordering:

1. V-belt drives.
2. Vibration and unitary bases.
3. Belt guards.

Motor positions are independent of fan rotation and discharge positions and are determined by viewing fan from drive end and selecting W, X, Y, or Z.



DIMENSIONS

L, M, and D are outside dimensions.

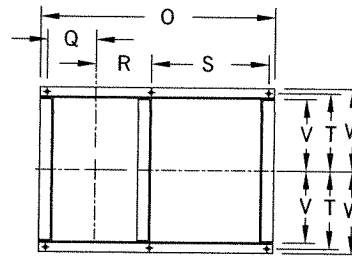
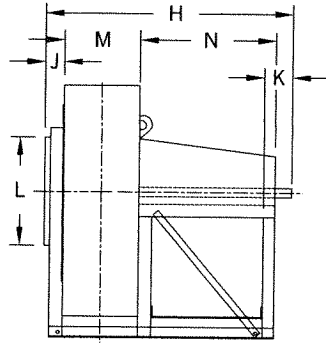
J is from housing side over inlet collar.

Tolerance: $\pm 1/8"$

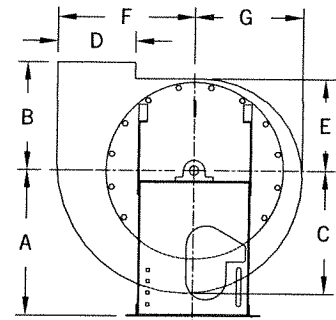
Dimensions not to be used for construction unless certified.

Refer to page 7 for maximum motor size limits.

SERIES 20, ARRANGEMENT 10



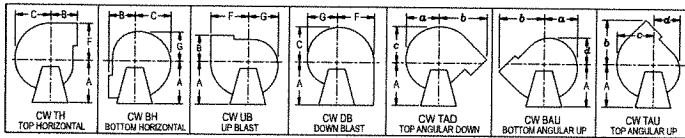
Inlet bracket is omitted on Sizes 144 and 174.



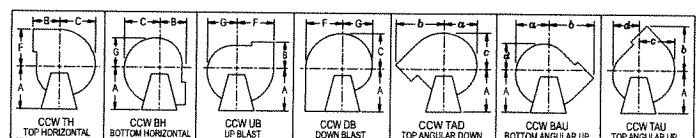
DIMENSIONS [INCHES]

Size	A	H	K	N	O	Q	R	S	T	V	W	Base Holes
144	15 1/2	30	2 1/2	20	19 7/8	—	5 7/8	16 3/8	7 3/8	6 1/2	8	9/16
174	17 1/2	34 1/8	3	22	21 7/8	—	6 5/8	18 3/8	8 7/8	8	9 1/2	9/16
194	21 1/4	36 3/8	3 1/2	22	33 7/8	6	7 1/4	17 3/8	9 3/8	8 1/4	10 1/4	9/16
224	25 1/2	41 3/8	4	26	38 7/8	6 1/2	8 1/4	20 3/8	10 7/8	9 3/4	11 3/4	9/16
264	28	44 1/2	4 1/2	26	41 1/2	7 7/8	9 3/8	19 7/8	12 1/4	11	13	3/4
294	32 1/2	48	5 1/2	26 7/8	44	8 5/8	10 1/8	20 3/4	13 5/8	11 3/4	14 3/4	3/4
334	39 1/2	53 1/8	6	29 7/8	48 5/8	9 3/8	11	23 3/4	16	14	17	3/4
364	39 1/2	56	6	30	50 3/8	10 1/4	11 7/8	23 3/4	16	14	17	3/4

FAN DISCHARGES – VIEWED FROM DRIVE SIDE

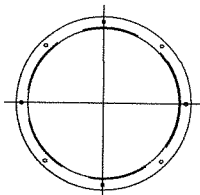


Clockwise—angular discharges at 45°



Counterclockwise—angular discharges at 45°

FLANGED INLET DETAILS



Furnished with holes starting on vertical centerline.

Inlet bar sizes:
Sizes 144-174

10 ga. x 1 1/4

Size 194

7 ga. x 1 1/2

Sizes 224-364

1/4 x 1 1/2

Sizes 404-854

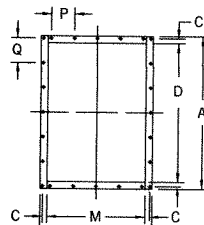
1/4 x 2

DIMENSIONS [INCHES]

Size	I.D.*	B.C.	O.D.	Holes	
				No.	Dia.
144	8 3/4	10 1/4	11 1/2	6	7/16
174	10 3/4	12 1/4	13 1/2	6	7/16
194	10 5/8	12 1/2	14	8	7/16
224	12 5/8	14 1/2	16	8	7/16
264	14 5/8	16 1/2	18	8	7/16
294	16 5/8	18 1/2	20	8	7/16
334	18 5/8	20 1/2	22	16	7/16
364	20 5/8	22 1/2	24	16	7/16
404	22 5/8	25	27	16	9/16
454	25 5/8	28	30	16	9/16
504	28 5/8	31	33	16	9/16
574	32 5/8	35	37	16	9/16
644	36 1/2	39	41	24	9/16
714	40 1/2	43	45	24	9/16
784	44 1/2	47	49	24	9/16
854	48 1/2	51	53	24	9/16

*Dimension shown is I.D. of inlet collar.

FLANGED OUTLET DETAILS



1. Mounted flush with edge of housing outlet.

2. Holes furnished on 4" centers on centerline.

Outlet flange angles:

Sizes 144-174

1 1/4 x 1 1/4 x 3/16

Sizes 194-364

1 1/2 x 1 1/2 x 3/16

Sizes 404-854

2 x 2 x 3/16

DIMENSIONS [INCHES]

Size	A	B	C	D*	M*	P	Q	Holes	
								No.	Dia.
144	10 3/4	10 3/8	3/4	8 1/4	7 7/8	27/16	—	12	7/16
174	12 5/8	12	3/4	10 1/8	9 1/2	—	—	12	7/16
194	13 1/8	12 3/4	7/8	10 1/8	9 3/4	—	—	12	7/16
224	16	13 3/4	7/8	13	10 3/4	—	3 3/8	16	7/16
264	18	15 3/8	7/8	15	12 3/8	—	—	16	7/16
294	19 7/8	17	7/8	16 7/8	14	—	—	16	7/16
334	21 3/4	18 5/8	7/8	18 3/4	15 5/8	25/16	—	20	7/16
364	23 3/4	20 1/4	7/8	20 3/4	17 1/4	—	37/32	24	7/16
404	26 7/8	23	1 1/8	22 7/8	19	—	—	24	9/16
454	29 3/4	25 3/8	1 1/8	25 3/4	21 3/8	—	—	24	9/16
504	32 3/4	27 7/8	1 1/8	28 3/4	23 7/8	27/16	3 1/2	32	9/16
574	36 5/8	31 1/8	1 1/8	32 5/8	27 1/8	—	—	32	9/16
644	40 5/8	34 1/2	1 1/8	36 5/8	30 1/2	13/4	37/16	40	9/16
714	44 3/8	37 5/8	1 1/8	40 3/8	33 3/8	39/16	—	40	9/16
784	48 3/8	40 7/8	1 1/8	44 3/8	36 7/8	—	35 1/16	44	9/16
854	52 1/4	44 1/8	1 1/8	48 1/4	40 7/8	29/16	—	48	9/16

*Dimension shown is inside flange, outside outlet. Deduct housing material thickness to determine inside dimension of discharge.

SERIES 20 ARRANGEMENTS 1, 9, AND 9E

SERIES 30 ARRANGEMENTS 1 AND 9

SIZES 144-364

SIZES 144-294

DIMENSIONS

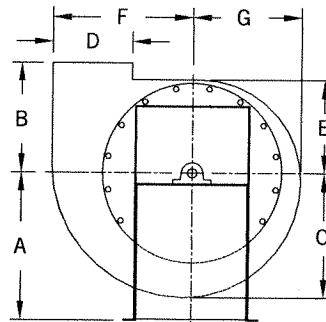
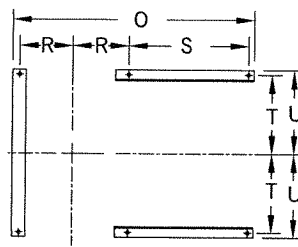
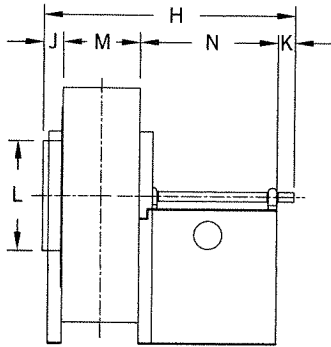
L, M, and D are outside dimensions.

J is from housing side over inlet collar.

Tolerance: $\pm 1/8"$

Dimensions not to be used for construction unless certified.

Refer to page 7 for Arrangement 9, 9E and 9F motor limits.



SERIES 20 ARR. 1, 9, AND 9E SIZES 144-364 – DIMENSIONS [INCHES]

Size	A	H		K	N		O		R	S		T	U	Base Holes
		Arr. 1, 9	Arr. 9E		Arr. 1, 9	Arr. 9E	Arr. 1, 9	Arr. 9E		Arr. 1, 9	Arr. 9E			
144	15½	24	29⅞	3½	11	16⅞	21	26⅞	5⅞	8¾	137/8	8⅞	9½	9/16
174	17½	29⅞	337/8	4	14	18¾	25⅞	30¾	57/8	11¾	16½	9¾	10¼	9/16
194	21¼	347/8	367/8	4½	17½	19½	29¾	31¾	6	15¼	17¼	9¾	10¼	9/16
224	25½	37¾	42¾	5	18½	23½	31¾	36¾	6½	16¼	21¼	107/8	11¾	9/16
264	28	43½	48½	5½	21½	26½	37	42	77/8	18¼	23¼	12¼	13⅞	¾
294	32½	48⅞	50⅞	6	24	26½	41⅞	43⅞	8⅞	20¾	23¼	13⅞	14½	¾
334	32¾	51¾	54¾	6½	25½	28½	44¼	47¼	9½	22¼	25¼	15¾	16⅞	¾
364	36¼	58	–	7	28½	–	50	–	107/8	24	–	16½	17¾	¾

SERIES 30 ARR. 1 AND 9 SIZES 144-294 – DIMENSIONS [INCHES]

Size	A	H	K	N	O	R	S	T	U	Base Holes
144	157/8	24	3½	11	21	5⅞	8¾	8⅞	9½	9/16
174	18	29⅞	4	14	25⅞	57/8	11¾	9¾	10¾	9/16
194	21¼	40½	4½	23	347/8	6	207/8	9¾	10¼	9/16
224	25½	44⅞	5	25½	39¾	7	22¾	107/8	11¾	9/16
264	28	49¾	5½	27½	44	8¾	23¾	12¼	13⅞	¾
294	32½	517/8	6	27½	45⅞	9⅞	23¾	13⅞	14½	¾

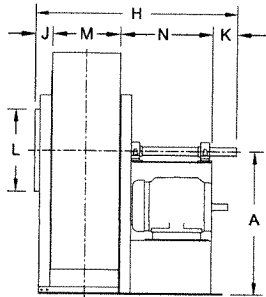
* See Page 8 for Arrangement 8 motor pedestal dimensions.

SERIES 20 ARRANGEMENTS 1, 9, AND 9F

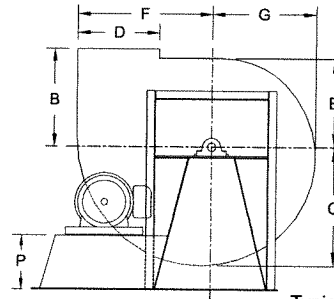
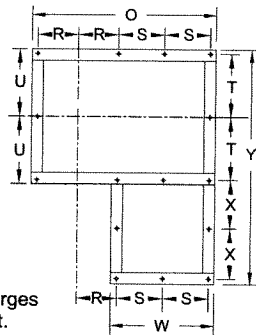
SIZES 404-574

SERIES 30 ARRANGEMENTS 1, 9, AND 9F

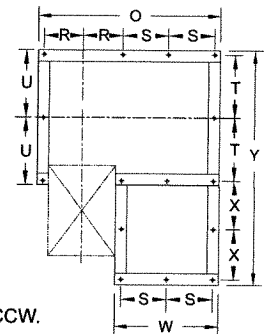
SIZES 334-454



Base for all discharges except Down Blast.



Typical Down Blast base shown CCW.



SERIES 20 ARR. 1, 9, AND 9F SIZES 404-574 – DIMENSIONS [INCHES]

Size	A	H		K	N		O		P	R	S		T	U	Arr. 9F			Base Holes
		Arr. 1, 9	Arr. 9F		Arr. 1, 9	Arr. 9F	Arr. 1, 9	Arr. 9F			Arr. 1, 9	Arr. 9F			W	X	Y	
404	40	59 ³ / ₄	65	7 ¹ / ₄	28 ¹ / ₄	33 ¹ / ₂	55 ¹ / ₄	60 ¹ / ₂	13 ¹ / ₂	11 ⁵ / ₈	14	16 ⁵ / ₈	18 ³ / ₈	20 ⁵ / ₈	37 ¹ / ₄	17	75 ¹ / ₈	7 ⁸ / ₁₆
454	45	64 ⁵ / ₈	68 ⁷ / ₈	7 ³ / ₄	30 ¹ / ₄	34 ¹ / ₂	59 ⁵ / ₈	63 ⁷ / ₈	15	12 ⁷ / ₈	15	17 ¹ / ₈	20 ¹ / ₄	22 ¹ / ₂	38 ¹ / ₄	17	78 ⁷ / ₈	7 ⁸ / ₁₆
504	50 ¹ / ₂	70 ⁷ / ₈	74 ⁵ / ₈	8 ¹ / ₂	32 ³ / ₄	36 ³ / ₄	64 ⁵ / ₈	68 ³ / ₈	17	14 ¹ / ₈	16 ¹ / ₄	18 ¹ / ₈	22 ¹ / ₄	23 ³ / ₄	40 ¹ / ₄	18 ¹ / ₂	84 ¹ / ₂	1
574	57 ¹ / ₂	77 ³ / ₈	80 ³ / ₈	8 ³ / ₄	34 ¹ / ₂	37 ³ / ₄	71 ⁵ / ₈	74 ⁵ / ₈	19	16 ¹ / ₄	17 ¹ / ₈	18 ⁵ / ₈	25	27 ³ / ₈	42 ¹ / ₄	18 ¹ / ₂	91 ³ / ₄	1

SERIES 30 ARR. 1, 9, AND 9F SIZES 334-454 – DIMENSIONS [INCHES]

Size	A	H		K	N		O		P	R	S		T	U	Arr. 9F			Base Holes
		Arr. 1, 9	Arr. 9F		Arr. 1, 9	Arr. 9F	Arr. 1, 9	Arr. 9F			Arr. 1, 9	Arr. 9F			W	X	Y	
334	32 ³ / ₄	52 ¹ / ₂	61	6 ¹ / ₂	26	34 ¹ / ₂	49 ³ / ₄	58 ¹ / ₄	11	9 ⁷ / ₈	13	17 ¹ / ₄	15 ⁷ / ₈	17 ⁵ / ₈	38 ¹ / ₂	17	69 ¹ / ₄	3 ⁴ / ₁₆
364	36 ¹ / ₄	56 ¹ / ₄	65	7	26 ¹ / ₂	35 ¹ / ₄	54	62 ³ / ₄	12	11 ¹ / ₄	13 ¹ / ₄	17 ⁵ / ₈	17 ¹ / ₂	19 ³ / ₄	40 ¹ / ₄	17	73 ¹ / ₂	7 ⁸ / ₁₆
404	40	60 ¹ / ₂	69 ¹ / ₄	7 ¹ / ₂	28 ¹ / ₂	37 ¹ / ₄	57 ³ / ₄	66 ¹ / ₂	13 ¹ / ₂	12 ¹ / ₈	14 ¹ / ₄	18 ⁵ / ₈	19 ³ / ₈	21 ⁵ / ₈	42 ¹ / ₄	18 ¹ / ₂	80 ¹ / ₈	7 ⁸ / ₁₆
454	45	65 ³ / ₈	72 ¹ / ₈	8	30 ¹ / ₂	37 ¹ / ₄	62 ¹ / ₈	68 ⁷ / ₈	15	13 ³ / ₈	15 ¹ / ₈	18 ¹ / ₂	21 ¹ / ₄	23 ¹ / ₂	42 ¹ / ₄	18 ¹ / ₂	83 ⁷ / ₈	7 ⁸ / ₁₆

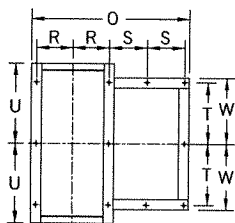
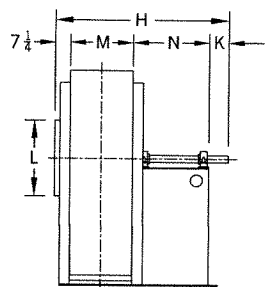
* See Page 8 for Arrangement 8 motor pedestal dimensions.

SERIES 20 ARRANGEMENTS 1 AND 9

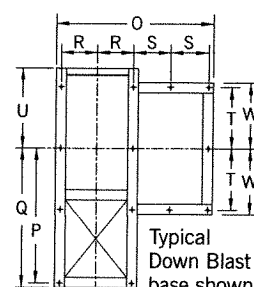
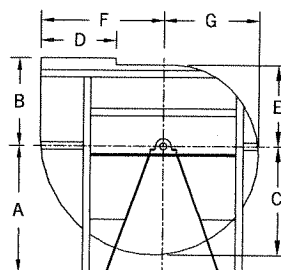
SERIES 30 ARRANGEMENTS 1 AND 9

SIZES 644-854

SIZES 504-644



Base for all discharges except Down Blast.



Typical Down Blast base shown CCW.

SERIES 20 ARR. 1 AND 9 SIZES 644-854 – DIMENSIONS [INCHES]

Size	A							H	K	N	O	P	Q	R	S	T	U	W	Base Holes
	TH	BH	UB	DB	TAD	BAU	TAU												
644	49	64 1/2	55 1/2	43	45	59	52	84 1/4	9 1/2	37	77 1/8	62 5/8	65 1/8	17 3/4	18 1/2	30	39 1/8	32 1/4	1
714	54	71	61 1/2	47 1/2	50	65	57 1/2	90 7/8	10	40	83 1/4	68 7/8	71 3/8	19 3/8	20	33 1/2	43 1/2	35 3/4	1
784	59	77	67	52	54 3/4	71	63	98 5/8	10 1/2	44	90 1/2	75 1/2	78	21	22	36 1/2	47	38 3/4	1
854	64	83	73	57	60	78 1/2	69	106 3/8	11	48	97 3/4	82	84 1/2	22 5/8	24	39 1/2	50 1/2	41 3/4	1

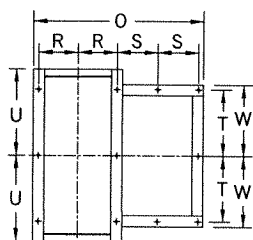
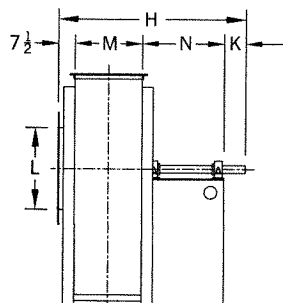
SERIES 30 ARR. 1 AND 9 SIZES 504-644 – DIMENSIONS [INCHES]

Size	A	H	K	N	O	P	Q	R	S	T	U	Base Holes
504	50 1/2	71 1/8	8 1/2	32 1/2	64 3/8	49 1/4	51 1/4	14	16 1/4	22 1/4	31 3/8	1
574	57 1/2	77 5/8	9	34 1/4	71 3/8	56 1/8	58 5/8	16 1/8	17 1/8	25	35 3/4	1
644	64	84 1/2	9 1/2	37	77 1/2	62 5/8	65 1/8	17 3/4	18 1/2	30	39 1/8	1

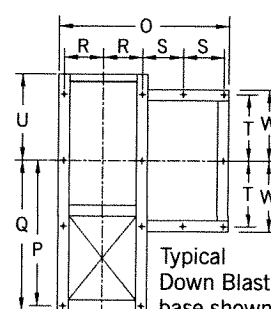
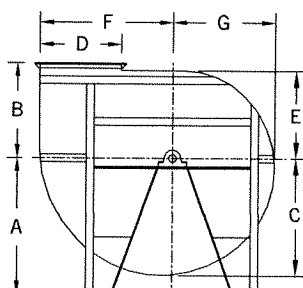
* See Page 8 for Arrangement 8 motor pedestal dimensions.

SERIES 30 ARRANGEMENTS 1 AND 9

SIZES 714-854



Base for all discharges except Down Blast.



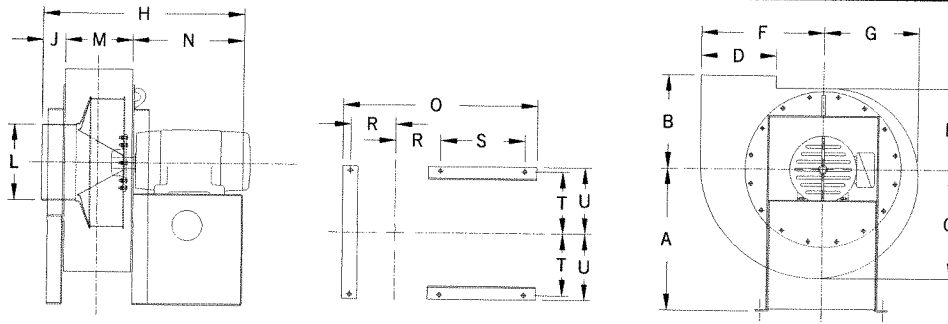
Typical Down Blast base shown CCW.

SERIES 30 ARR. 1 AND 9 SIZES 714-854 – DIMENSIONS [INCHES]

Size	A							H	K	N	O	P	Q	R	S	T	U	W	Base Holes
	TH	BH	UB	DB	TAD	BAU	TAU												
714	54	71	61 1/2	47 1/2	50	65	57 1/2	91 1/8	10	40	83 1/4	69	71 1/2	19 3/8	20	33 1/2	43 1/2	35 3/4	1
784	59	77	67	52	54 3/4	71	63	98 7/8	10 1/2	44	90 1/2	75 1/2	78	21	22	36 1/2	47	38 3/4	1
854	64	83	73	57	60	78 1/2	69	106 5/8	11	48	97 3/4	82	84 1/2	22 5/8	24	39 1/2	50 1/2	41 3/4	1

* See Page 8 for Arrangement 8 motor pedestal dimensions.

DIMENSIONS ARRANGEMENT 4



SERIES 20 SIZES 144-364 AND SERIES 30 SIZES 194-364 ARR. 4 – DIMENSIONS [INCHES]

Size	A	R		T		U		Base Holes
		Ser. 20	Ser. 30	Ser. 20	Ser. 30	Ser. 20	Ser. 30	
144	15½	6¼	–	8⅝	–	9½	–	9/16
174	17½	6⅞	–	9¾	–	10¼	–	9/16
194	21¼	7	–	9¾	–	10¼	–	9/16
224	25½	7½	–	10⅞	–	11¾	–	9/16
264	28	8⅝	–	12¼	–	13⅞	–	¾
294	32½	9⅛	–	13⅝	–	14½	–	¾
334	32¾	9⅝	–	15¾	15⅞	16⅝	17⅝	¾
364	36¼	10⅜	11⅝	16½	17½	17¾	19¾	7/8

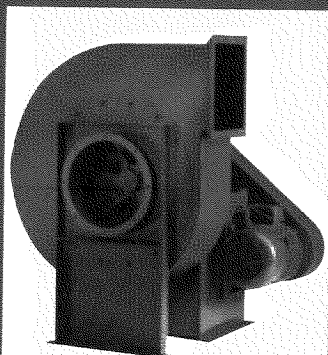
SERIES 20 SIZES 144-364 AND SERIES 30 SIZES 194-364 ARR. 4 – DIMENSIONS [INCHES]

Size	Motor Frame	H*		N		O		S	
		Ser. 20	Ser. 30	Ser. 20	Ser. 30	Ser. 20	Ser. 30	Ser. 20	Ser. 30
144	143/5	21	–	11½	–	21¼	–	7½	–
	182/4	22	–	12½	–	22¼	–	8½	–
	213/5	24¼	–	14¾	–	24½	–	10¾	–
174	182/4	23⅝	–	12½	–	23⅞	–	8½	–
	213/5	25⅞	–	14¾	–	26⅞	–	10¾	–
	254/6	29⅝	–	18½	–	29⅞	–	14½	–
	284/6	31⅞	–	20	–	31¾	–	15⅝	–
194	182/4	25⅝	–	12½	–	24½	–	8½	–
	213/5	27⅝	27⅞	14¾	–	26¾	–	10¾	–
	254/6	31¾	31⅝	18½	–	30⅞	–	14½	–
	284/6	32⅞	33⅞	20	–	31⅝	–	15⅝	–
	324/6	34¾	34⅝	21½	–	33⅞	–	17½	–
224	182/4	26¾	–	12½	–	25⅞	–	8½	–
	213/5	28⅝	28⅞	14¾	–	27¾	–	10¾	–
	254/6	32¾	32⅝	18½	–	31⅞	–	14½	–
	284/6	33⅞	34⅞	20	–	32⅝	–	15⅝	–
	324/6	35¾	35⅝	21½	–	34⅞	–	17½	–
264	213/5	31¼	31½	14¾	–	30	–	10¾	–
	254/6	35	35¼	18½	–	33¾	–	14½	–
	284/6	36½	36¾	20	–	35¼	–	15⅝	–
	324/6	38	38¼	21½	–	36¾	–	17½	–
	364/5	–	39½	–	22¾	–	38½	–	17⅞
294	254/6	36⅝	36⅞	18½	–	35¾	–	14½	–
	284/6	38⅞	38¾	20	–	36⅞	–	15⅝	–
	324/6	39⅝	39⅞	21½	–	38¾	–	17½	–
	364/5	–	40¾	–	22¾	–	40⅞	–	17⅞
334	284	39¾	37⅞	20	–	38¾	–	15⅝	–
	286	–	39⅞	–	17⅞	–	41⅞	–	8⅞
	324	–	40¾	–	19⅞	–	42⅞	–	9⅞
	326	41¼	40¾	21½	–	40¼	–	17½	–
	364	–	41⅞	–	21⅞	–	43¾	–	9⅝
	365	42⅞	41¼	22¾	–	41⅞	–	17⅞	–
	404	–	42¼	–	21¼	–	41	–	8⅞
	405	44¾	43⅞	24⅝	–	43¾	–	20⅞	–
364	284	42⅞	40¾	20⅞	–	41½	–	15⅝	–
	286	–	41⅞	–	17⅞	–	44¾	–	8⅞
	324	–	43⅞	–	19⅞	–	46¼	–	9⅞
	326	44⅞	44⅞	21⅞	–	43	–	17⅞	–
	364	–	44	–	21¼	–	48⅞	–	10⅞
	365	44⅞	45	22⅞	–	43⅞	–	17⅞	–
	404	–	45⅞	–	22¼	–	43⅞	–	8⅞
	405	47¾	47⅞	24⅞	–	46⅞	–	20⅞	–
	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–

* H is with slip inlet for Series 20, and flanged inlet for Series 30

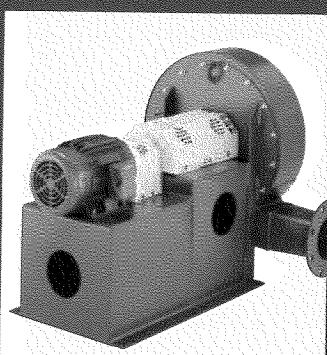
COMPLETE SELECTION OF AIR-MOVING EQUIPMENT

The New York Blower Company offers thousands of different types, models, and sizes of air-moving equipment. Contact your nyb representative for assistance in identifying the best fan for your application.



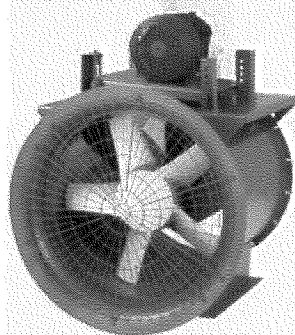
DUST/MATERIAL HANDLING

Wide range of duty available with unique fan lines capable of handling light dust to heavy material. Typical applications include dust-collection and high-pressure process along with material-conveying.



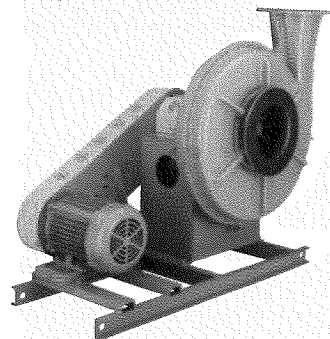
AIR-HANDLING [CENTRIFUGAL]

Designed for clean to moderately dirty gas streams. Commercial and industrial HVAC, process cooling, light material-conveying, heat removal, and dryer exhaust are just a few of the numerous sample applications.



AIR-HANDLING [AXIAL]

For the ideal handling of clean to moderately dirty airstreams. Commercial and industrial HVAC, drying and cooling systems, fume extraction, and process-heat removal are typical applications.

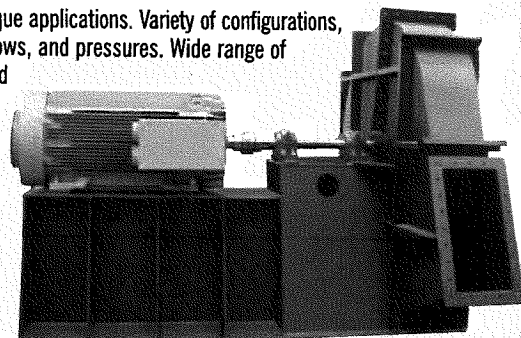


FIBERGLASS REINFORCED PLASTIC [FRP]

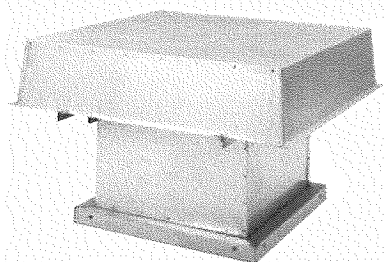
Choice of performance and duty for corrosive gas streams. Applications include chemical process, wastewater treatment, laboratory hood exhaust, and tank aeration.

CUSTOM PRODUCTS

Designed for unique applications. Variety of configurations, temperatures, flows, and pressures. Wide range of modifications and accessories are available to meet the most demanding specifications.

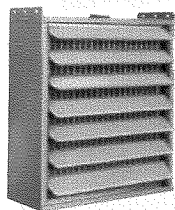
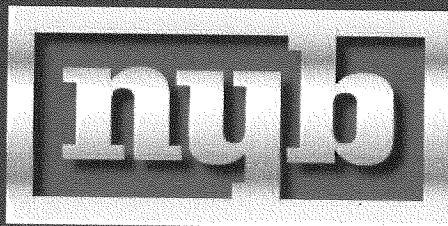


Leading the industry forward since 1889



ROOF VENTILATORS

Including both hooded and upblast ventilators, propeller fans, and centrifugal roof exhausters. These units are ideal for industrial, commercial, and institutional applications.



HEATING PRODUCTS

Industrial-duty steam unit heaters with steam heating coils are available for facility heating and process-heat transfer.



PROCESS/FAN COMPONENTS

Plug fans, plenum fans, wheels, inlet cones, and housings for a wide variety of OEM applications. Process/fan components are used in air-handling units, ovens, dryers, freezer tunnels, and filtration systems.

ATTACHMENT 3

Emission Inventory and Calculations

Sunnyside Equipment Inventory

[illegible]

Sunnyside Equipment Inventory

Equipment Type	Equipment ID	Equipment Name	Maximum Production Throughput (lb product/hr)	Air Flow Rate (ACFM)	Temperature (°F)	Air Flow Rate (SCFM)	Grain Loading (gr/scf)	Emissions Control Equipment
Boilers								
Boiler	BLR3	Johnston	NA	NA	NA	NA	NA	Low NOx Burner
Boiler	BLR1	Cleaver Brooks	NA	8,968	NA	6,203	NA	Low NOx Burner
Economizer	EBLR1	Boiler 1 Economizer	NA	NA	Design and Max: 600	NA	NA	NA
Boiler	BLR2	Cleaver Brooks	NA	8,968	NA	6,203	NA	Low NOx Burner
Economizer	EBLR2	Boiler 2 Economizer	NA	NA	Design and Max: 600	NA	NA	NA
Damrow Dryer (Dryer 1)								
Spray Dryer	DRY1	Damrow Dryer (Dryer 1)	9000	NA	NA	NA	NA	6 Cyclones & Filtermat
Dryer Burner	PBRN1	Damrow Upper Primary Burner (12')	NA	NA	NA	NA	NA	CYC1-6
Dryer Burner	PBRN2	Damrow Lower Primary Burner (20')	NA	NA	NA	NA	NA	CYC1-6
Dryer Burner	SBRN1	Damrow Secondary Burner (7')	NA	NA	NA	NA	NA	CYC1-6
Filtermat	FM1	Damrow Filter mat	NA	NA	NA	NA	NA	CYC1-6
Auger	AG1	Auger	9000	NA	NA	NA	NA	RBGH1
Pneumatic Conveyor	CNV1	Conveyor 1	9000	NA	NA	NA	NA	RBGH1
Cyclone 1	CYC1	Cyclone 1	NA	94,400	122	79,100	0.008	Equipment = Control Device
Cyclone 2	CYC2	Cyclone 2	NA					Equipment = Control Device
Cyclone 3	CYC3	Cyclone 3	NA					Equipment = Control Device
Cyclone 4	CYC4	Cyclone 4	NA					Equipment = Control Device
Cyclone 5	CYC5	Cyclone 5	NA					Equipment = Control Device
Cyclone 6	CYC6	Cyclone 6	NA					Equipment = Control Device
Primary Receiver Baghouse	RBGH1	Primary Receiver Baghouse	NA					Equipment = Control Device
Heat Exchanger	HE1	Heat Exchanger	NA	NA	NA	NA	NA	NA
Tote Bin/Filler	TBIN1	Tote Bin/Filler	NA	NA	NA	NA	NA	uncontrolled/ indoor
Powder Bin	BIN1	Powder Bin 1 (Shared with Niro)	4,567	NA	NA	NA	NA	Bin 1 Bin Vent
Powder Bin	BIN2	Powder Bin 1 (Shared with Niro)	4,567	NA	NA	NA	NA	Bin 2 Bin Vent
Powder Bin	BIN3	Powder Bin 1 (Shared with Niro)	4,567	NA	NA	NA	NA	Bin 3 Bin Vent
Pneumatic Conveyor	CNV2	Conveyor 2	13,700	NA	NA	NA	NA	RBGH2, DCBGH1
Baghouse	RBGH2	Packaging Receiver Baghouse	NA	NA	NA	NA	NA	DCBGH1
Dust Collector Baghouse	DCBGH1	Packaging Dust Collector	NA	5,200	Ambient	5,200	0.01	Equipment = Control Device
Dust Collector Baghouse Fan	DCBGH1F	Packaging Dust Collector Fan	NA					
Packager	PAK1	Packager	13,700	NA	NA	NA	NA	DCBGH1

Key:
MMBTU/hr: million British Thermal Units per hour
TBD: To Be Determined
UK: Unknown
NA: Not Applicable

Sunnyside Equipment Inventory

[illegible]

Table 1. Potential Emission Summary

Emission Point	Annual Emission Rate (tpy)							
	PM ₁₀	PM _{2.5}	SO ₂	NO _x	VOC	CO	HAPs	CO ₂ e ^f
GEA Dryer ^a	21.75	21.75	0.08	3.25	0.72	39.46	0.01	15,649
Johnston Boiler ^b	1.19	1.19	0.09	1.74	0.86	5.88	0.01	18,662
Niro Dryer ^c	26.63	26.63	0.03	5.15	0.28	4.33	4.15E-03	6,155
Damrow Dryer ^d	26.54	26.54	0.05	8.37	0.46	7.03	0.01	10,001
800HP Boiler 1 ^e	1.53	1.42	0.12	13.13	0.77	10.56	0.02	18,548
800HP Boiler 2 ^e	1.53	1.42	0.12	13.13	0.77	10.56	0.02	18,548
New 1200HP Boiler ^g	2.93	2.89	0.14	3.90	1.14	4.16	0.02	25,333
Facility-Wide Potential Emissions	82.09	81.85	0.63	48.67	5.01	81.98	0.09	112,896

^a The PTE from the GEA dryer includes emissions from dryer burner, dryer baghouses, packaging dust collector and fugitive emissions from the new packaging line. The NO_x and CO emissions are based on vendor guarantee of 20 ppm and 400 ppm at 3% O₂ provided in the dryer application.

^b The PTE from Johnston Boiler is re-evaluated with NO_x and CO ppm limits in NSRP-22-DI-07, not the tpy limits based on AP-42 emission factors. The heat input is also updated based on the boiler plate information. See specific Johnston boiler emission calculation table.

^c The PTE from the Niro Dryer is from the NSR Application for the Niro Dryer submitted to YRCAA on June 4, 2015. The emissions are from all emission units associated with the Niro Dryer.

^d The PTE from the Damrow Dryer includes emissions from the dryer burners, dryer cyclones and associated emission units at the packaging line, which is shared between the Niro Dryer and the Damrow Dryer. ✕

^e The two 800HP Boilers were installed in 1994, as noted in NOC_ATF_WFF_01. These two boilers were permitted to use No.2 fuel oil as auxiliary fuel. PTE from these two boilers were estimated to be the "worst case scenario" considering firing natural gas and No. 2 fuel oil and based on the AP-42 emission factors and vendor specifications (60 ppm NO_x and 100 ppm CO at 3% O₂).

^f CO₂ equivalent emissions are estimated based on the emission factors and weighted by global warming potentials from 40 CFR Part 98.

^g The NSR application for the new 1200HP boiler is submitted under a separate cover in which the detailed emission calculations are provided.

Table 2. Potential Emissions from the Damrow Dryer Burner

Operating Hours	8,760	hr/year
Dryer Capacity	9,000	lb powder/hr
Natural Gas Heating Value ^a	1,020	Btu/scf
Maximum Heat Input Capacity ^b	19.50	MMBtu/hr

Pollutant		Natural Gas	Exhaust Gas	Emission Rate	
		Emission Factor (lb/MMscf)	Emission Factor (lb/MMBtu)	(lb/hr)	(tpy)
Condensable PM	c, d	5.7	5.59E-03	0.11	0.48
SO ₂	d	0.6	5.88E-04	1.15E-02	0.05
NO _x	d	100	0.10	1.91	8.37
VOC	d	5.5	5.39E-03	0.11	0.46
CO	d	84	0.08	1.61	7.03
HAPs					
Benzene	e	2.1E-03	2.06E-06	4.01E-05	1.76E-04
Formaldehyde	e	7.5E-02	7.35E-05	1.43E-03	6.28E-03
Toluene	e	3.4E-03	3.33E-06	6.50E-05	2.85E-04
CO₂e					
CO ₂	g	--	116.98	2,281.05	9,991.02
N ₂ O	g	--	2.20E-04	4.30E-03	0.02
CH ₄	g	--	2.20E-03	4.30E-02	0.19

^a The natural gas heating value uses a typical heating value from AP-42.

^b This Damrow dryer has Maxon NP-I burners, consisting of two primary burners (PBRN1 and PBRN2) and a secondary burner (PBRN3). The NP-I burners have a capacity of 0.5 MMBtu/hr/ft burner length. The length of PBRN1 is 12 ft, of PBRN2 is 20 ft, and of SBRN1 is 7 ft. Therefore, the heat input of the Damrow dryer burners is determined to be 19.5 MMBtu/hr.

^c Only condensable PM emissions are evaluated here. Table 2 presents the particulate emissions based on source test on emission point DEP1, which includes the exhaust from the dryer burners. Therefore, the filterable particulate emissions from the natural gas combustion are evaluated in Table 2.

^d Emission factors from natural gas combustion are obtained from Table 1.4.1 and Table 1.4.2, AP-42 Chapter 1.4, Natural Gas Combustion. It is assumed that all condensable particulates from natural combustion have a size smaller than 1 µm. Uncontrolled NO_x emission factor is used.

^e HAP emission factors are obtained from Table 1.4.3, AP-42 Chapter 1.4, Natural Gas Combustion. Only the species with emission factor ratings of C or higher are used to determine HAP and TAP emission rates from natural gas combustion.

^f The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

CO ₂	1
N ₂ O	298
CH ₄	25

^g The emission factors are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2, and converted to values in lb/MMBtu.

Table 3. Potential PM₁₀/PM_{2.5} Emissions from DEP1 and DEP3

Emission Point	Capacity (acfm)	Exhaust Temperature ^c (°F)	Flow Rate ^c (scfm)	Emission Factor ^d (gr/dscf)	Emission Rate	
					(lb/hr)	(tpy)
DEP1 ^a	94,400	126	79,100	0.008	5.46	23.91
DEP3 ^b	5,200	Ambient	5,200	0.01	0.45	1.95

^a The six cyclones (CYC1-6) controlling the Damrow Dryer and dryer burners, and the Primary Receiver Baghouse (RBGH1) emit through a common stack DEP1 at the top of the Damrow dryer building. DEP1 emissions are based on total air flow and grain loading rate out the stack. Pollutants from natural gas combustion at the burners are evaluated in Table 2.

^b The Packaging Dust Collector (DCBGH1) has its own stack (DEP3).

^c The flow rate and temperature at DEP1 is the maximum flow rate and corresponding temperature for that run from the source test conducted in May 1999. The flow rate for the Packaging Dust Collector (DCBGH1) is based on the capacity of the fan, which is a NYB GI type 224 DH fan with a capacity of 5,200 cfm. The Packaging Dust Collector exhausts at ambient temperature.

^d The grain loading is obtained from source test result conducted on the emission point DEP1 in May, 1999. The average of two test results (0.008 gr/dscf and 0.0081 gr/dscf) is used. A conservative grain loading of 0.01 is used for the Packaging Dust Collector, which is a conservative engineering estimate.

Table 4. Powder Bin Vents Emissions at Emission Point DEP2

Pollutant	Emission Factor ^a (lb/ton)	Throughput ^b (lb/hr)	Control Efficiency ^c	Emission Rate	
				(lb/hr)	(tpy)
PM ₁₀ /PM _{2.5}	0.0063	13,700	99%	4.32E-04	1.89E-03

^a The emission factor is obtained from Table 9.9.1-1 for Storage bin (vent), AP-42, which is the best available emission factor to represent the uncontrolled emissions from bin vents. It is conservatively assumed that the emission factor for PM_{2.5} is the same as PM₁₀.

^b The throughput is the sum of capacity of the Niro Dryer and Damrow Dryer, because the three Powder Bins are shared between the two dryers. The Niro Dryer has a capacity of 4,700 lbs powder per hour and Damrow is 9,000 lbs powder per hour.

^c The material of the bin vent filter is polyester membrane, and the manufacturer data shows the control efficiency of 99.99% for particles with sizes greater than 1 micron. Therefore a conservative control efficiency of 99% is used. It is also conservatively assumed this is the overall control efficiency for PM₁₀ and PM_{2.5}.

Table 5. Fugitive Emissions - Tote Bin

Pollutant	Emission Factor ^a (lb/ton)	Throughput ^b (lb/hr)	Emission Rate	
			(lb/hr)	(tpy)
PM ₁₀ /PM _{2.5}	0.01	9,000	0.05	0.20

^a The tote bin (TBIN1) could be filled by gravity through the auger (AG1), which is located on the end of the filtermat. The tote bin is contained within the Damrow Dryer building and the fugitive emissions are expected to be contained indoors. The worst-case fugitive emissions from the gravity feeding at the tote bin are estimated according to Equation 1 of AP-42, Chapter 13.2.4.

Particle size multiplier k is conservatively assumed to be 1 for both PM₁₀ and PM_{2.5} for milk powder.

Mean wind speed U 1.3 mph, which is conservatively assumed to be the lower range that's applicable to Equation 1

Moisture content M 0.25 %, which is conservatively assumed to be the lower range that's applicable to Equation 1.

^b The throughput is conservatively assumed to be the Damrow Dryer production capacity.

Table 6. Emissions Summary

Pollutant	DEP1 ^a (tpy)	DEP2 ^b (tpy)	DEP3 ^c (tpy)	Tote Bin Fugitive (tpy)	Total (tpy)
PM ₁₀	24.38	1.89E-03	1.95	0.20	26.54
PM _{2.5}	24.38	1.89E-03	1.95	0.20	26.54
SO ₂	0.05	--	--	--	0.05
NO _x	8.37	--	--	--	8.37
VOC	0.46	--	--	--	0.46
CO	7.03	--	--	--	7.03
HAPs	6.74E-03	--	--	--	0.01
CO _{2e}	10,001	--	--	--	10,001

^a DEP1 includes emissions from Damrow dryer burners, Damrow dryer cyclones and primary receiver baghouse.

^b DEP2 includes emissions from bin vents at the top of three Powder Bins.

^c DEP3 includes emissions from the packaging dust collector (DCBGH1).

Table 7. Potential Emissions from Each 800HP Boiler - Natural Gas Combustion

Operating Hours		8,760	hr/year			
Natural Gas Heating Value ^a		1,020	Btu/scf			
Maximum Heat Input Capacity ^b		32.66	MMBtu/hr			
Pollutant		Natural Gas Emission Factor (lb/MMscf)	Exhaust Gas Emission Factor (lb/dry 10 ⁶ scf)	Emission Factor (lb/MMBtu)	Emission Rate (lb/hr) (tpy)	
PM ₁₀	^c	7.6	--	7.45E-03	0.24	1.07
PM _{2.5}	^c	7.6	--	7.45E-03	0.24	1.07
SO ₂	^c	0.6	--	5.88E-04	0.02	0.08
NO _x	^d	--	8.36	0.07	2.38	10.42
VOC	^c	5.5	--	5.39E-03	0.18	0.77
CO	^d	--	8.47	0.07	2.41	10.56
<u>HAPs</u>						
Benzene	^e	2.1E-03	--	2.06E-06	2.58E-03	1.13E-02
Formaldehyde	^e	7.5E-02	--	7.35E-05	6.72E-05	2.95E-04
Toluene	^e	3.4E-03	--	3.33E-06	2.40E-03	1.05E-02
CO ₂ e	^f				1.09E-04	4.77E-04
CO ₂	^g	--	--	116.98	3,824.24	16,750.19
N ₂ O	^g	--	--	2.20E-04	3,820.30	16,732.90
CH ₄	^g	--	--	2.20E-03	7.20E-03	0.03
					0.07	0.32

^a The natural gas heating value uses a typical heating value from AP-42.

^b The two 800HP natural gas boilers were constructed in 1994 and installed in 1998 to replace two 500HP natural gas boilers at the facility according to NOC_ATF_WFF_01. The heat input is confirmed by the boiler plate (32,658,500 Btu/hr each).

^c Emission factors for small boilers (<100 MMBtu/hr) are obtained from Table 1.4.1 and Table 1.4.2, AP-42 Chapter 1.4, Natural Gas Combustion.

^d The boilers have 60 ppm NO_x and 100 ppm CO at 3% O₂ according to the vendor specifications. The emission factors are converted from ppm to lb/MMscf using EPA Method 19 using the equations below. A conversion fuel factor of 8,710 dscf/MMBtu is used to determine the emission factor in lb/MMBtu.

$$\text{NO}_x \text{ EF (lb/MMscf)} = \text{NO}_x \text{ concentration (ppm)} \times 1.194 \times 10^{-7} \text{ (lb/scf)} / (\text{ppm-NO}_x) \times 20.9\% / (20.9\% - 3\%) \times 10^6$$

$$\text{CO EF (lb/MMscf)} = \text{CO concentration (ppm)} \times 1.660 \times 10^{-7} \text{ (lb/scf)} / (\text{ppm-SO}_2) \times 28.0101 \text{ (g/mol SO}_2) / 64.066 \text{ (g/mol CO)} \times 20.9\% / (20.9\% - 3\%) \times 10^6$$

^e HAP emission factors are obtained from Table 1.4.3, AP-42 Chapter 1.4, Natural Gas Combustion. Only the species with emission factor ratings of C or higher are used to determine HAP emission rates from natural gas combustion.

^f The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

CO ₂	1
N ₂ O	298
CH ₄	25

^g The emission factors are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2, and converted to values in lb/MMBtu.

Table 8. Potential Emissions from Each 800HP Boiler - Fuel Oil Combustion

Operating Hours ^a		2,367	hr/year	
No.2 Fuel Oil Limit ^a		552,000	gal/yr	
No.2 Fuel Oil Heating Value ^b		140	MMBtu/Mgal	
Maximum Heat Input Capacity ^b		32.66	MMBtu/hr	
	Fuel Oil Emission Factor	Emission Factor	Emission Rate	
Pollutant	(lb/Mgal)	(lb/MMBtu)	(lb/hr)	(tpy)
PM ₁₀ ^c	2.72	0.02	0.63	0.75
PM _{2.5} ^c	2.34	0.02	0.55	0.65
SO ₂ ^c	0.2	1.52E-03	0.05	0.06
NO _x ^c	20	0.14	4.67	5.52
VOC ^c	0.2	1.43E-03	0.05	0.06
CO ^c	5	0.04	1.17	1.38
HAPs			7.96E-03	9.42E-03
Formaldehyde ^d	3.3E-02	2.36E-04	7.70E-03	9.11E-03
Naphthalene ^d	1.1E-03	8.07E-06	2.64E-04	3.12E-04
CO ₂ e ^e			5,343.36	6,323.87
CO ₂ ^f		163.05	5,325.09	6,302.24
N ₂ O ^f		0.001	0.04	0.05
CH ₄ ^f		0.007	0.22	0.26

^a The number of operation hours is determined based on the fuel oil limit per NOC_ATF_WFF_01 based on total FO usage for both 800 HP boilers. The usage has been split equally across both boilers for purposes of these emission calculations. This includes operations during gas curtailment period and period testing, which should not exceed 48 hours based on definition of "gas-fired boiler" under 40 CFR 63 Subpart JJJJJJ.

^b The maximum heat input of fuel oil is assumed to be the same as that of natural gas. The heating value of No.2 fuel oil is obtained from default AP-42 value in Chapter 1.3.

^c Emission factors for small boilers (<100 MMBtu/hr) are obtained from Table 1.3-1 and Table 1.3-3, AP-42 Chapter 1.3, Fuel Oil Combustion. The PM emission factors include both filterable and condensable PM. The filterable PM is determined using the filterable PM emission factor from Table 1.3.1, then multiplying by the particle size distribution factor from Table 1.3-4. The condensable PM emission factor is obtained from Table 1.3-2.

^d HAP emission factors are obtained from Table 13-9, AP-42 Chapter 1.3. Only the species with noticeable amount (greater than 1E-03) and with emission factor ratings of C or higher are used to determine HAP emission rates from fuel oil combustion.

^e The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

CO ₂	1
N ₂ O	298
CH ₄	25

^f The emission factors are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2, and converted to values in lb/MMBtu.

Table 9. Potential Emissions from Each 800HP Boiler - Worst Case^a

Pollutant	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
PM ₁₀	0.63	1.53
PM _{2.5}	0.55	1.42
SO ₂	0.05	0.12
NO _x	4.67	13.13
VOC	0.18	0.77
CO	2.41	10.56
HAPs	0.01	0.02
CO ₂ e	5343.36	18,548.06

^a The worst-case hourly emission rates are the greater emission rates from firing natural gas only and fuel oil only. The worst-case annual emission rates are the greater emission rates from firing natural gas for 8,760 hours and from firing fuel oil up to the limit (i.e., 2,367 hours) and firing natural gas for the remaining hours.

Table 10. Potential Emissions from the Johnston Boiler

Operating Hours		8,760	hr/year		
Natural Gas Heating Value ^a		1,020	Btu/scf		
Maximum Heat Input Capacity ^b		36.386	MMBtu/hr		
Pollutant	Emission Factor (lb/MMscf)	Emission Factor (lb/dry 10 ⁶ scf)	Emission Factor (lb/MMBtu)	Emission Rate (lb/hr) (tpy)	
PM ₁₀ ^c	7.6	--	7.45E-03	0.27	1.19
PM _{2.5} ^c	7.6	--	7.45E-03	0.27	1.19
SO ₂ ^c	0.6	--	5.88E-04	0.02	0.09
NO _x ^d	--	1.25	1.09E-02	0.40	1.74
VOC ^c	5.5	--	5.39E-03	0.20	0.86
CO ^d	--	4.24	0.04	1.34	5.88
<u>HAPs</u>				2.87E-03	1.26E-02
Benzene ^e	2.1E-03	--	2.06E-06	7.49E-05	3.28E-04
Formaldehyde ^e	7.5E-02	--	7.35E-05	2.68E-03	1.17E-02
Toluene ^e	3.4E-03	--	3.33E-06	1.21E-04	5.31E-04
<u>CO₂e</u> ^f				4,260.73	18,661.98
CO ₂ ^g	--	--	116.98	4,256.33	18,642.73
N ₂ O ^g	--	--	2.20E-04	8.02E-03	0.04
CH ₄ ^g	--	--	2.20E-03	0.08	0.35

^a The natural gas heating value uses a typical heating value from AP-42.

^b The maximum heat input capacity is obtained from boiler plate, which is slightly lower than the heat input (36.7 MMBtu/hr) listed in NSRP-22-DI-07.

^c Emission factors are obtained from Table 1.4.2, AP-42 Chapter 1.4, Natural Gas Combustion. It is assumed that all particulates have a size smaller than 1 µm.

^d corrected to 3% oxygen, respectively. The emission factors are converted from ppm to lb/MMscf using EPA Method 19 using the equations below. A conversion fuel factor of 8,710 dscf/MMBtu is used to determine the emission factor in lb/MMBtu.

$$\text{NO}_x \text{ EF (lb/MMscf)} = \text{NO}_x \text{ concentration (ppm)} \times 1.194 \times 10^{-7} \text{ (lb/scf)} / (\text{ppm-NO}_x) \times 20.9\% / (20.9\% - 3\%) \times 10^6$$

$$\text{CO EF (lb/MMscf)} = \text{CO concentration (ppm)} \times 1.660 \times 10^{-7} \text{ (lb/scf)} / (\text{ppm-SO}_2) \times 28.0101 \text{ (g/mol SO}_2) / 64.066 \text{ (g/mol CO)} \times 20.9\% / (20.9\% - 3\%) \times 10^6$$

^e HAP emission factors are obtained from Table 1.4.3, AP-42 Chapter 1.4, Natural Gas Combustion. Only the species with emission factor ratings of C or higher are used to determine HAP emission rates from natural gas combustion.

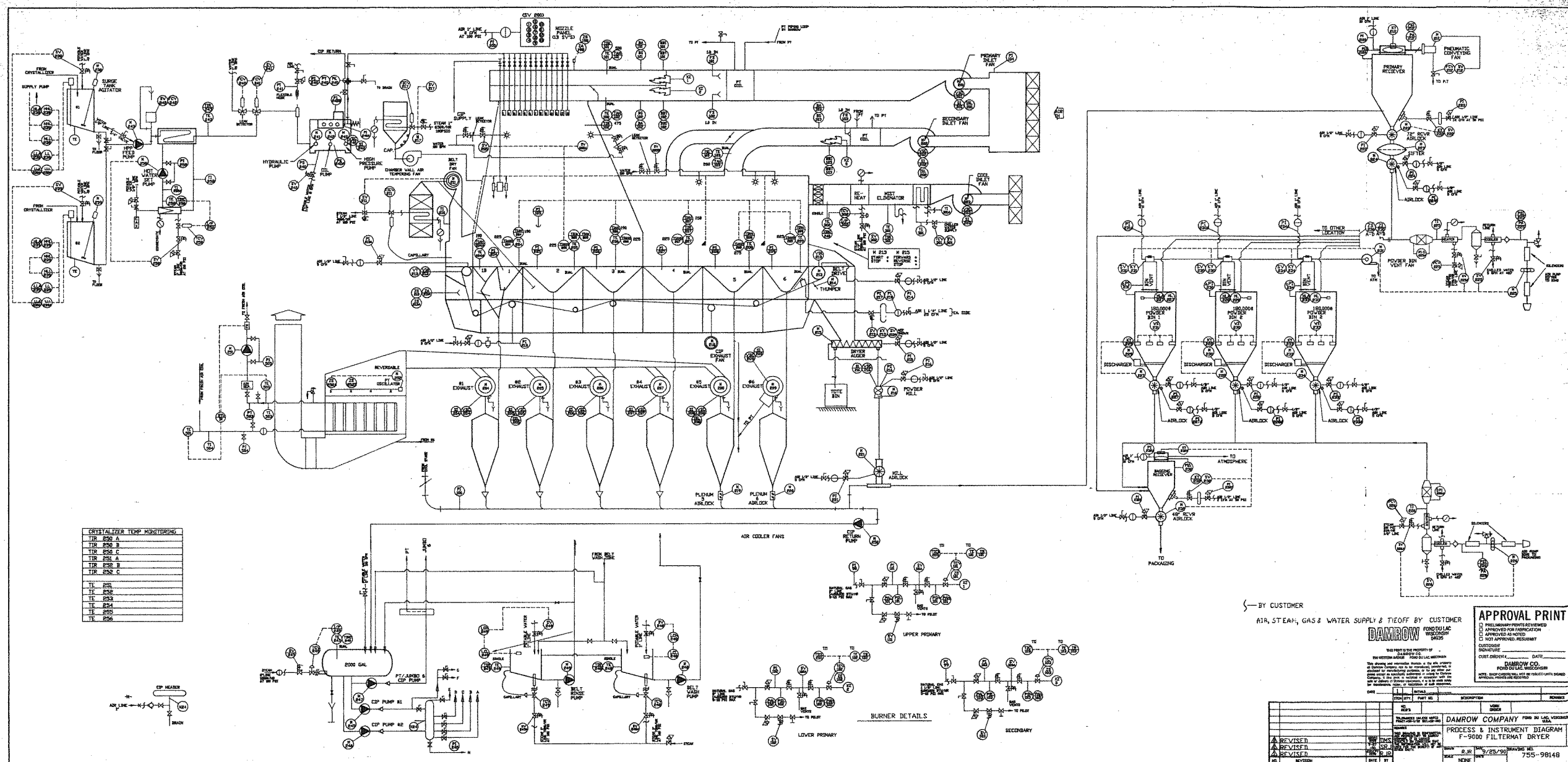
^f The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

CO ₂	1
N ₂ O	298
CH ₄	25

^g The emission factors are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2, and converted to values in lb/MMBtu.

ATTACHMENT 4

Drawing 755-98148



Hasan Tahat

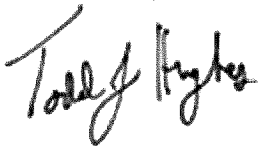
From: Hughes, Todd <Todd.Hughes@darigold.com>
Sent: Friday, June 26, 2015 11:30 AM
To: Hasan Tahat; Ashley Jones
Cc: Hui Cheng (hcheng@trinityconsultants.com); Pettinger, Doug
Subject: Darigold Damrow Dryer Application

Hasan,

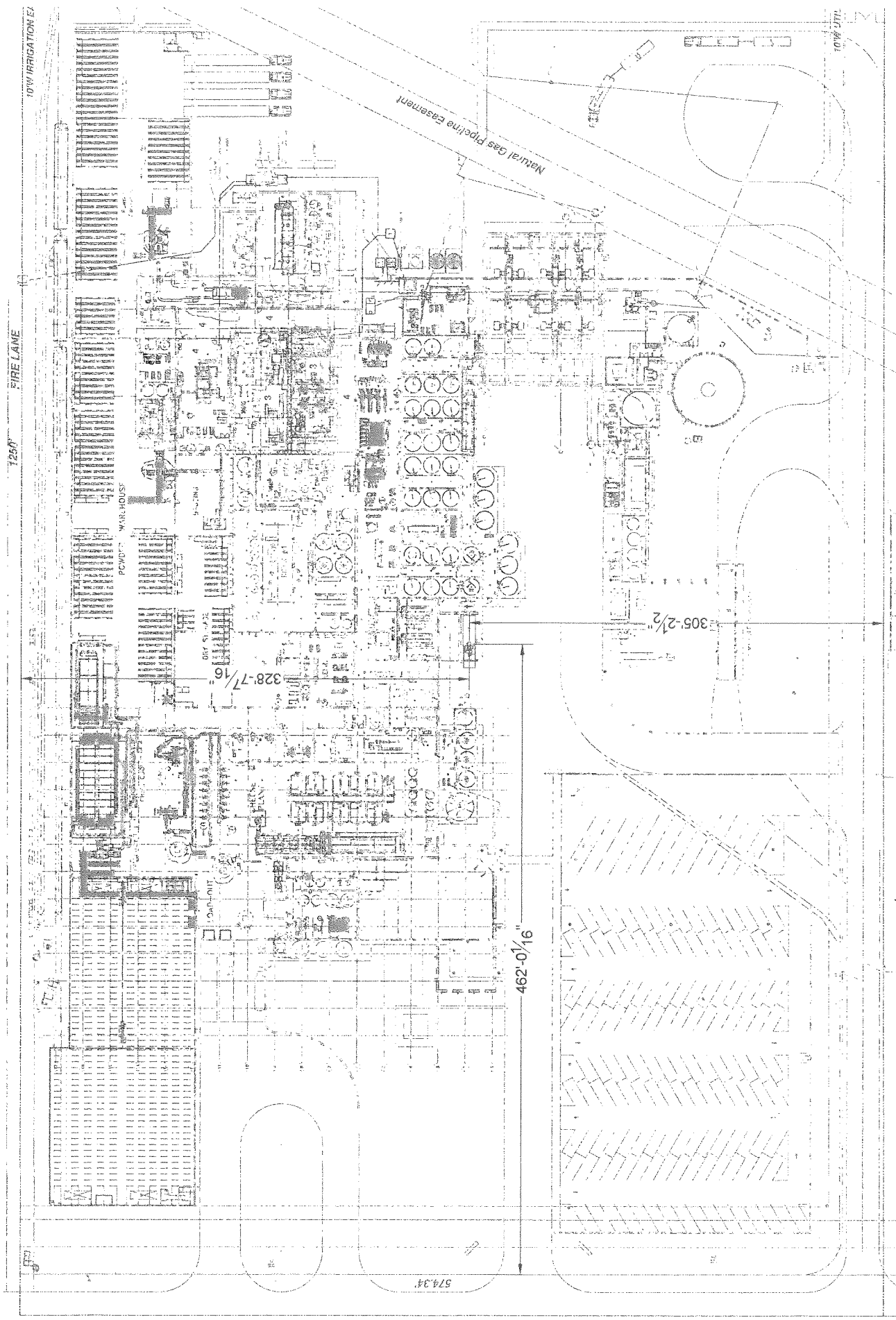
Per our conversation earlier about the Damrow Dryer NSR Application, I believe the specifications for the 800 hp boilers was included in Attachment 2 due to our request on page 5 of the letter where we are asking to update the permit language to indicate that fuel oil is only used in periods of gas curtailment, startup, and 48 hours per year for testing to demonstrate that the boiler is exempt from 40 CFR 63 Subpart JJJJJ and 40 CFR 63.11195(e). Please see that excerpt in the screenshot below. Is this indeed the case Ashley? Hasan was wanting to know why the 800 hp boiler specifications were included in Attachment 2.

Additionally, NOC_ATF_WFF_01 sets the No.2 oil usage limit of 1,104,000 gallons per year for the existing two 800 horsepower (hp) boilers (BLR1 and BLR2). Darigold would like to update the permit language to indicate that the fuel oil authorized in NOC_ATF_WFF_01 is only used in periods of gas curtailment, startup, and 48 hours per year for testing in order to demonstrate the boiler is exempt from 40 CFR 63 Subpart JJJJJ per 40 CFR 63.11195(e).

Respectfully,



Todd J. Hughes
Senior Environmental, Health, and Safety Analyst
Darigold, Inc.
p: 208-324-5390 ext. 304
c: 208-329-0945



1250' FIRE LANE

10W IRRIGATION

WAR HOUSE

POW

328-7 1/16

305-2 1/2

462'-0 1/16"

574.34

Natural Gas Pipeline Easement

