Dryer/Reactor Plow Blender

Equipment & Systems

- Blending/Mixing
- Low-Temperature Drying
- Vacuum Drying
- Reacting
- Cooling
- Heating
- Sterilization

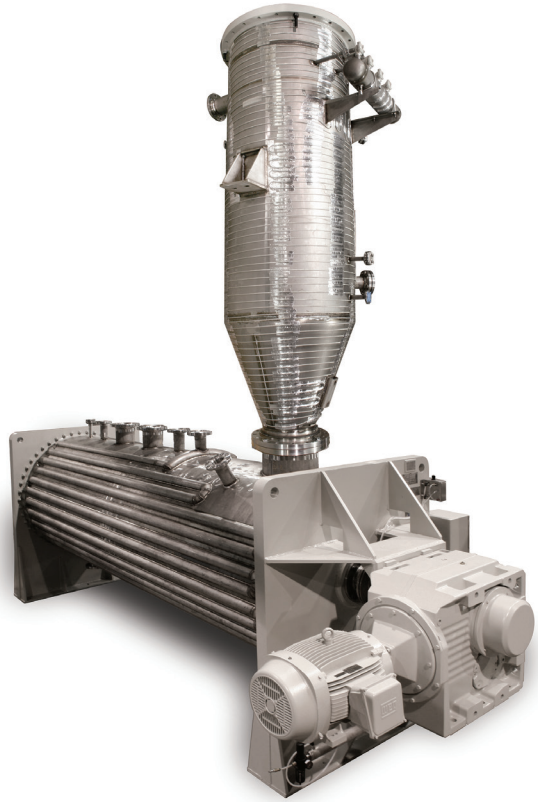
AMERICAN PROCESS SYSTEMS
EIRICH GROUP

The Pioneer in Material Processing®

Thermal Processing - Equipment & Systems

Eirich Machines offers custom thermal processing equipment for lab to high-volume production. Mixing, drying, reacting, heating, cooling, or any combination thereof can be achieved in a single, all-in-one mixer, eliminating the need to use multiple pieces of equipment to achieve the same result. We offer a wide variety of configurations suitable for the most demanding applications.

Dryers/Reactors from American Process Systems® (APS) are ideal for mixing solids to solids, liquids to solids, or even solids to liquids, in industries such as food and beverage, pharmaceutical, chemicals, and plastics. The vessel and jacketing are ASME certified for pressure and/or vacuum. We offer three different mixing tools to optimize your process: heat-transfer tool, fluidizing paddle, and plow. The heat-transfer tool is standard and its mechanical fluidizing action is independent of the particles' density, physical size, or shape. A product is typically heated (or cooled) through conduction with an ASME stamped dimpled jacket (indirect heating). The heating media can be water, steam, or a thermal oil. Heating with steam injection (direct heating) is also a standard process step in our dryer/reactor.



200 ft³ vacuum dryer/reactor with half-pipe jacketed mixing vessel, 2205 duplex stainless steel and electrically heated dust collector.

Vaccum Drying

Vacuum drying is a very efficient and cost-effective method of removing solvent(s) from a product at a reduced pressure. Applying vacuum to the vessel lowers the boiling point (vaporization point) of the solvent(s). Our batch vacuum dryer can be designed for full vacuum and/or up to 250 psig internal pressure.

The unit mechanically fluidizes the product. The fluidization individualizes the particles of the product to increase the available exposed surface of the product particle. High-speed choppers fitted to the side of the vessel can be incorporated to break agglomerates to facilitate exposure of the particle's surface area.

The increased surface exposure improves heat transfer, and combined with the lower boilng point, the vacuum dryer efficiently vaporizes the solvent(s) from the product. The vapor is then filtered through a pulsing chamber to retain solids within the vessel. The vapor is condensed downstream for further processing, if desired.

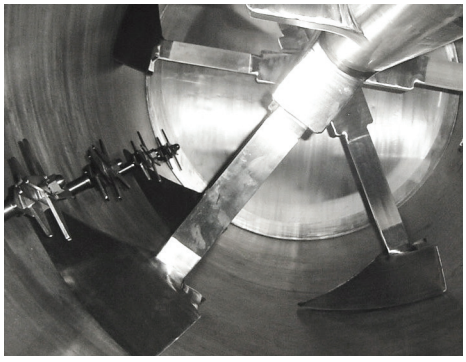
Reacting

Reacting is also a very efficient and cost-effective method for synthesizing/processing a product. A reaction conducted at elevated pressures and/or temperatures can drive the reaction faster with fewer side reactions.

Our batch reactor mixes the same way as the vacuum dryer. The mechanical fluidization gurantees intimate contact with the reactants. High-speed choppers mounted to the side of the vessel provide additional shear and mixing.

Reactions can be carried out in any combination of solid, liquid, and gas phases. The sealed unit eliminates lost solvents/reactants. The reaction can be performed in an inert atmosphere. Drying can be completed in the same unit upon completion of the reaction, if required. In fact, the reactor provides a complete solution for reactions, drying, pressure cooking, sterilization (heat and/or alcohol), or extractions.

45 ft³ vacuum dryer/reactor with jacketed mixing vessel, dust collector, and auto sampler.



Plow agitator with X-mas style choppers.

ASME certified dimpled jacket

Advantages Thermal Processing

Vacuum drying

- Faster drying at lower temperature
- Prevents degradation of temperature-sensitive products
- Prevents microbial growth
- Lower energy consumption
- De-aerates product to improve aesthetics or increase strength (eliminates voids)

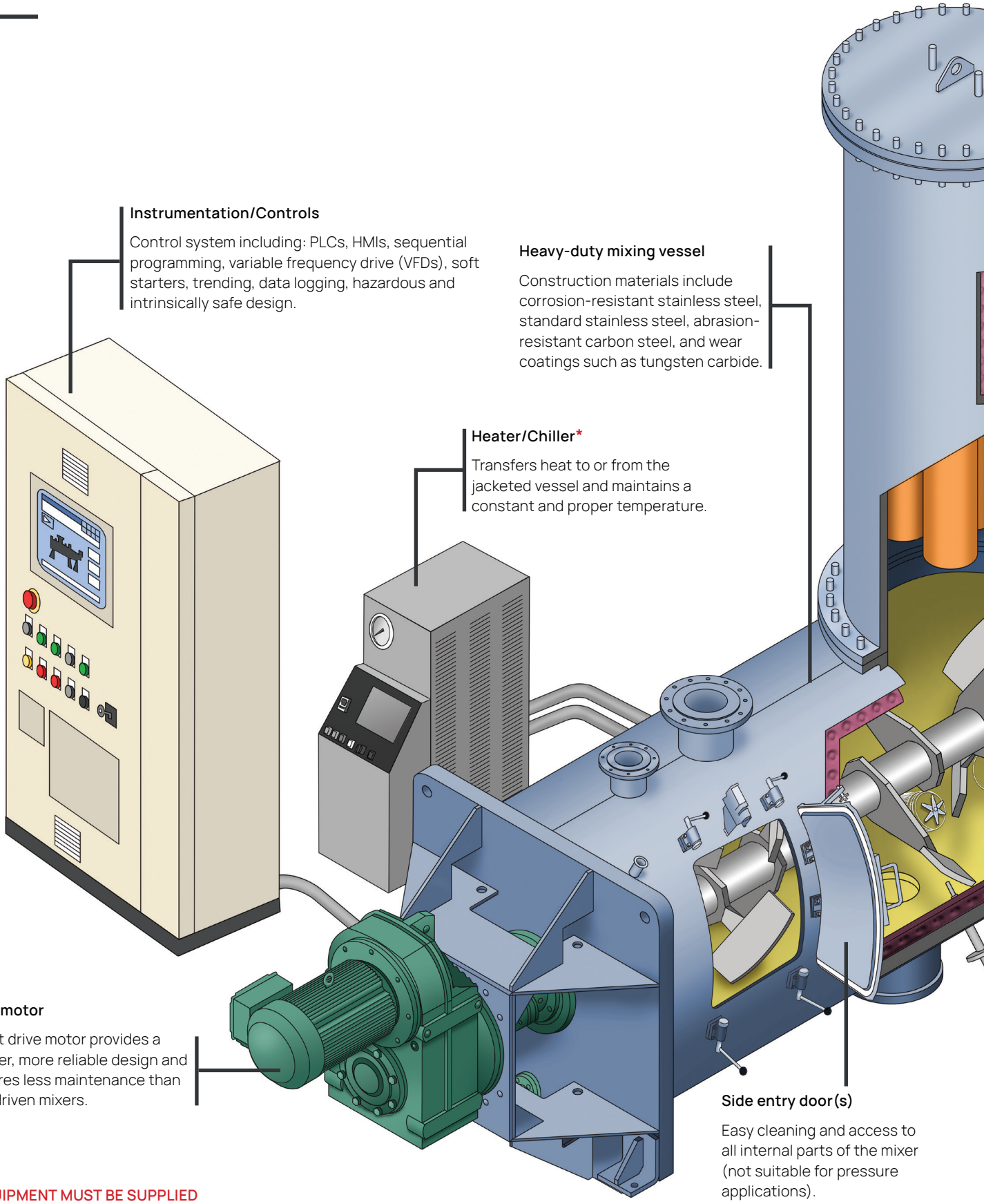
Reacting

- Faster reaction to completion
- Reduced competing side reactions
- Retention of volatile reactants

Overall

- Greater process control flexibility
- Prevents oxidation of sensitive products
- Dust-free end product
- Low PPM gas-assisted drying

Typical Dryer/Reactor System



Instrumentation/Controls

Control system including: PLCs, HMIs, sequential programming, variable frequency drive (VFDs), soft starters, trending, data logging, hazardous and intrinsically safe design.

Heavy-duty mixing vessel

Construction materials include corrosion-resistant stainless steel, standard stainless steel, abrasion-resistant carbon steel, and wear coatings such as tungsten carbide.

Heater/Chiller*

Transfers heat to or from the jacketed vessel and maintains a constant and proper temperature.

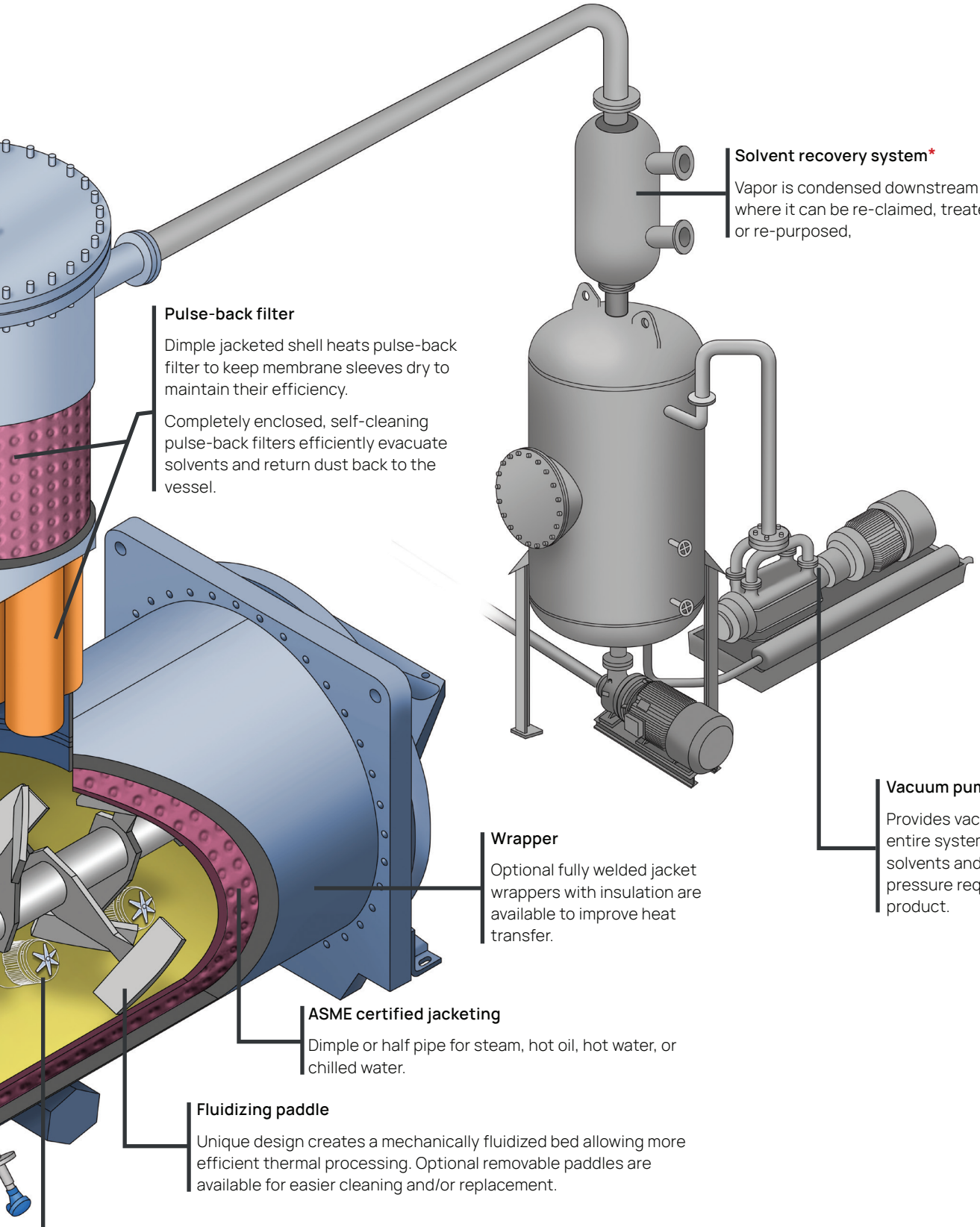
Gear motor

Direct drive motor provides a quieter, more reliable design and requires less maintenance than belt driven mixers.

Side entry door(s)

Easy cleaning and access to all internal parts of the mixer (not suitable for pressure applications).

* EQUIPMENT MUST BE SUPPLIED



Solvent recovery system*

Vapor is condensed downstream where it can be re-claimed, treated, or re-purposed,

Pulse-back filter

Dimple jacketed shell heats pulse-back filter to keep membrane sleeves dry to maintain their efficiency.

Completely enclosed, self-cleaning pulse-back filters efficiently evacuate solvents and return dust back to the vessel.

Vacuum pump*

Provides vacuum to the entire system, Evacuates solvents and reduces the pressure required to dry the product.

Wrapper

Optional fully welded jacket wrappers with insulation are available to improve heat transfer.

ASME certified jacketing

Dimple or half pipe for steam, hot oil, hot water, or chilled water.

Fluidizing paddle

Unique design creates a mechanically fluidized bed allowing more efficient thermal processing. Optional removable paddles are available for easier cleaning and/or replacement.

Chopper(s)

High-speed choppers break aggloermates to facilitate exposure of the particle's surface area.

* EQUIPMENT MUST BE SUPPLIED

Applications

Fine & specialty chemicals

- Drying minerals for flame retardants
- Drying solvents to wash inks
- Drying solvents to extend shelf life of adhesives
- Mixing, cooling, and thermal reacting of multiple components

Nutraceutical / Pharmaceutical

- Coating medications to control release dosage
- Coating medications to improve taste
- Crystallization active pharmaceutical ingredients (API's)
- Mixing and agglomerating dietary supplements
- Mixing milk powders for infant formula, supplement drinks, and protein powders

Food / Beverage

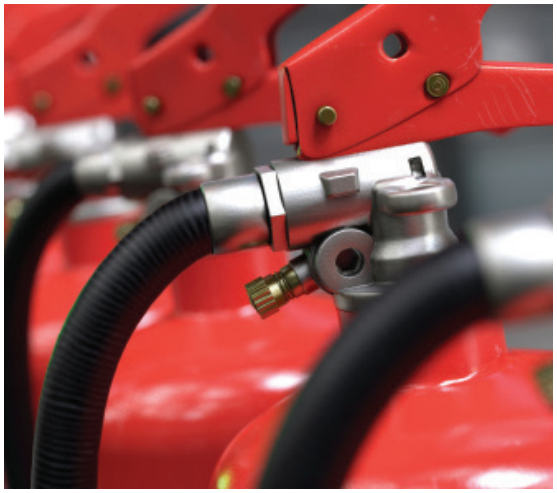
- Sterilizing contaminated spices and herbs to remove bacteria and mold
- Alkalizing "dutching" cocoa powder to increase darkness and remove bitterness
- Extracting pure vanilla extract from vanilla pods
- Sterilizing plant soil for mushroom production

Plastic / Rubber/ Ceramic

- Drying plastic powders
- Coating plastic granules

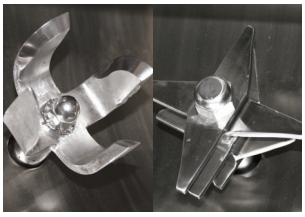
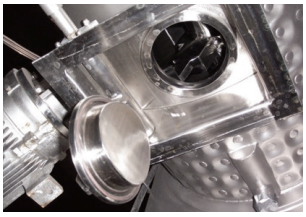
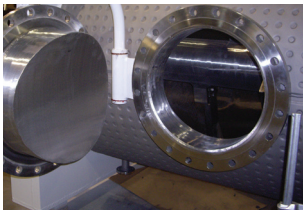
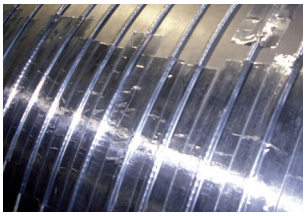
Environment

- Moistening of fly ash from power plants for disposal
- Extracting mercury from natural gas
- Removing contaminants from waste water
- Mixing, heating, and extracting glycerin from waste vegetable oils fats to produce bio fuels
- Conditioning of sludges from sewage treatment plants
- Conditioning of radioactive waste from nuclear power plants



Specifications

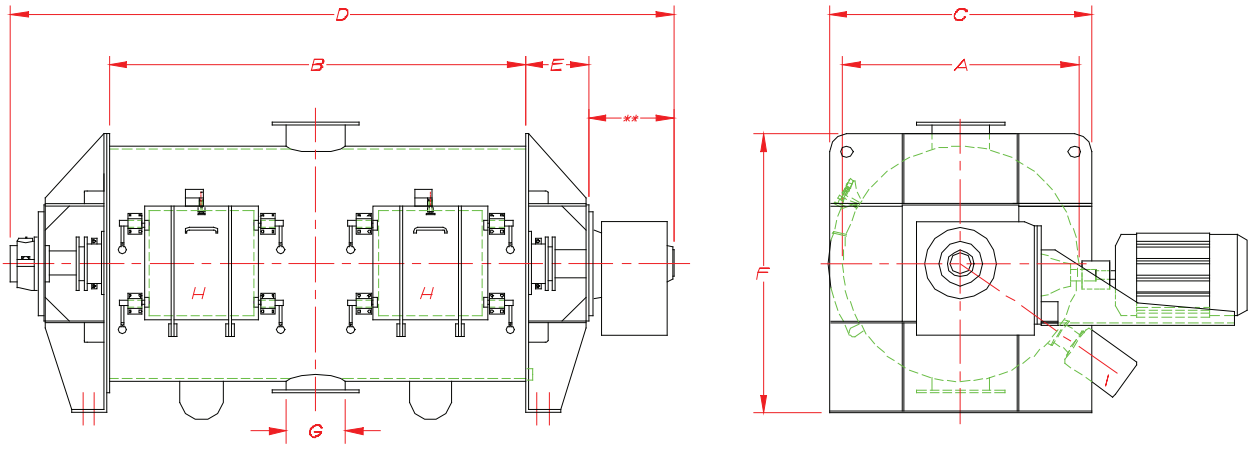
Feature	Standard	Optional
Vessel		
Configuration	Horizontal, cylindrical configuration	Tailor engineered design
Mixing operation	Heat-transfer tool	Fluidized paddle agitator, plow (fixed or removable)
Materials of construction	304L SS	316L SS, AR 200, Hastelloy, Inconel, monel, 2205 alloy, carbon steel
Working capacity	3 ft³ (85 liter) to 350 ft³ (9,910 liter)	Up to 1,200 ft³
Shaft sealing features	Braided teflon packing gland w/ split housing	Mechanical and semi-mechanical seals
Finish		
Interior finish	Mill finish, welds ground smooth	#4 polished (RA 24-40) #4A polished (RA 40-60)
Exterior finish	Mill finish, 2B Mill finish	Sand blasted, glass bead blasted, primed and painted
Vacuum/Pressure		
Vacuum / Pressure (ASME)	Atmospheric	-14.7 psi to 250 psi (-1 bar to 18 bar)
Heating/Cooling		
Operating temperature	-20°F (-29°C) to 350°F (177°C)	Up to 450°F (232°C)
Heat transfer	Dimple jacket	Shell on shell, half pipe, electric heater bands, heated or cooled agitator shaft
Various media	Direct: Liquid CO_2 Indirect: Steam	Steam, gas, air Brine, water, oil, electric
Options		
Choppers	None	Chopper heads: X-mas tree style, tulip style
Coatings/Linings	None	Plastic (Halar, Kynar®), rubber, tungsten carbide
Controls	None	Controls, engineered per application requirements
Certifications	ASME certified vessels and jackets	Sanitary options including USDA and FDA available

Dimensions & Drawings - CPB

Cylindrical Plow Blender

The CPB is suitable for blending-only applications. It is slightly shorter than a CLH but has a larger vessel diameter, which gives it a smaller footprint.



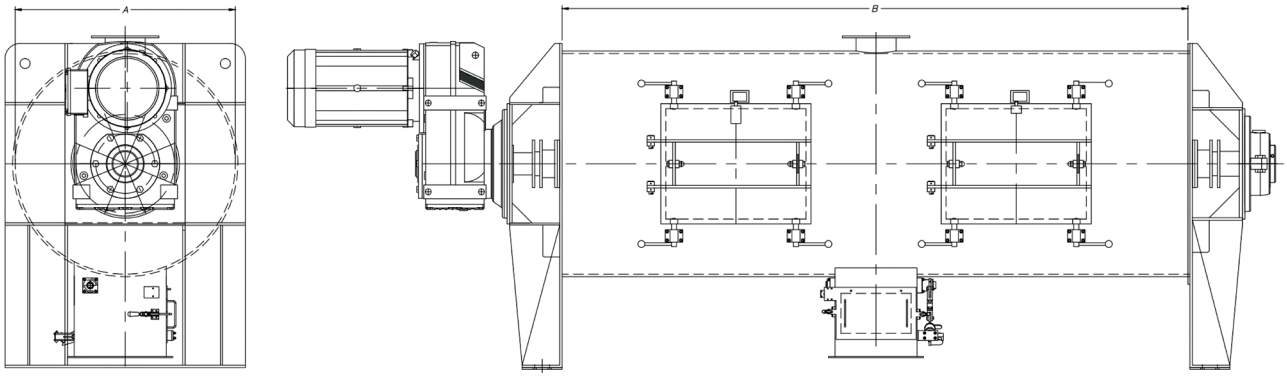
SIZE	TANK DIA. INCHES (A)	TANK LENGTH INCHES (B)	WORKING CAPACITY ft³*	WORKING CAPACITY LITERS	WORKING CAPACITY GALLONS	TOTAL ft³	ACCESS DOORS	CHOPPERS
CPB-3	20	32	4	107	28	5	0	0
CPB-6	24	40	7	193	51	9	1	1
CPB-12	30	48	13	361	95	18	1	2
CPB-20	33	60	19	547	144	27	2	2
CPB-30	38	72	31	870	230	43	2	2
CPB-45	46	78	49	1,381	365	68	2	3
CPB-60	46	96	60	1,699	449	83	3	3
CPB-90	54	108	93	2,635	696	129	3	4
CPB-135	58	140	139	3,940	1,041	193	3	4
CPB-175	62	156	177	5,017	1,325	245	4	6
CPB-350	84	180	375	10,625	2,807	520	4	6

Ask us which blender size best fits your needs

Dimensions & Drawings - CLH

Cylindrical Long Blender

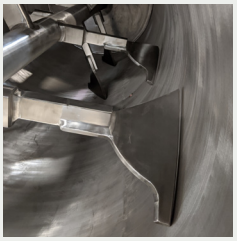
The CLH is suitable for heating/cooling applications. The vessel is longer which makes it more efficient.



SIZE	TANK DIA. INCHES (A)	TANK LENGTH INCHES (B)	WORKING CAPACITY ft³*	WORKING CAPACITY LITERS	WORKING CAPACITY GALLONS	TOTAL ft³	ACCESS DOORS	CHOPPERS
CDB-3	20	32	4	107	28	5	0	0
CLX-6	20	60	7	201	53	10	1	1
CLX-12	24	72	12	347	92	17	1	2
CLX-20	30	84	22	632	167	31	2	2
CLX-30	33	96	31	875	231	43	2	2
CLX-45	38	108	46	1,305	345	64	2	3
CLX-60	42	120	63	1,771	468	87	3	3
CLX-90	46	144	90	2,549	673	125	3	4
CLX-135	54	162	140	3,952	1,044	193	3	4
CLX-175	58	180	179	5,066	1,338	248	4	6
CLX-350	72	234	358	10,148	2,681	496	4	6

*Working capacity based on 65% of total capacity.

KEY:	X Denotes Agitator Configuration
CLH:	Cylindrical Long Heat-transfer tool
CLF:	Cylindrical Long Fluidizing paddle
CLP:	Cylindrical Long Plow


Heat-transfer tool


Fluidizing paddle agitator


Plow agitator

AMERICAN PROCESS SYSTEMS
EIRICH GROUP

Eirich Machines, part of worldwide Eirich Group, is an international supplier of machinery, systems, and services for material processing. With the two product lines EIRICH and American Process Systems® (APS), we offer the most comprehensive range of mixers, blenders, pelletizers, dryers, and grinding mills. Eirich Machines is your one-stop shop for all material processing needs with sales, test lab, engineering, production, and customer support in one location.

Our APS product line includes:

- Fluidizing Paddle Blenders
- Ribbon Blenders
- Paddle-Ribbon Blenders
- Paddle Blenders
- Plow Blenders
- Dryers/Reactors

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