



HT Agitators

Reliable

Proven Performance



Proven Performance

The HT agitator is Chemineer's premium product offering that features a gear-box specifically designed for mixing applications. Available in both bottom and top entering designs, this rugged performer can be tailored to meet virtually any process from critical chemical reactor systems to routine storage applications. Its superior design offers high strength, low wear, quiet operation, and minimum maintenance.

The reliable and rugged HT agitator has provided long, trouble free service in harsh, demanding applications. For open or closed tanks, the HT agitator is the industry standard of reliability and technology in mixing.



Drive Features

Internal Shafting

- Low-speed internal shaft short bearing span reduces deflection and harmful gear misalignment
- Low-speed shafts have extra large cross sections for maximum rigidity

Protective Finish

External surfaces are protected with a catalyzed polyurethane finish suitable for indoor or outdoor installations.

Quiet Performance

The high quality of the gears and other internal components, and precise NC machining of the drive housing contribute to quiet performance well below maximum recommended noise levels of 85 dbA.

Positive Lubrication

- Splash lubrication continuously protects gearing and high-speed bearings
- A dry well low-speed shaft seal prevents oil leakage
- Lubrication options for high temperature service or low speed applications include an external oil pump and an oil cooling system
- Oil heaters are available for extremely low temperature environments

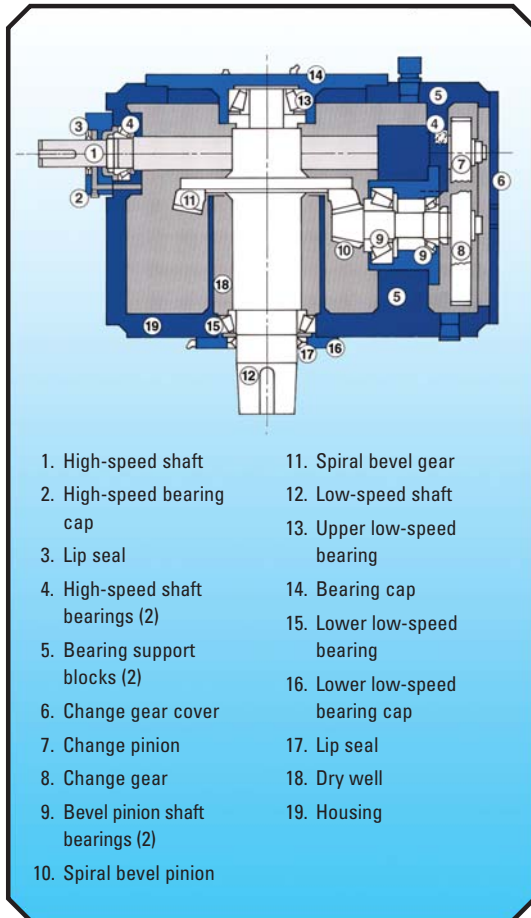
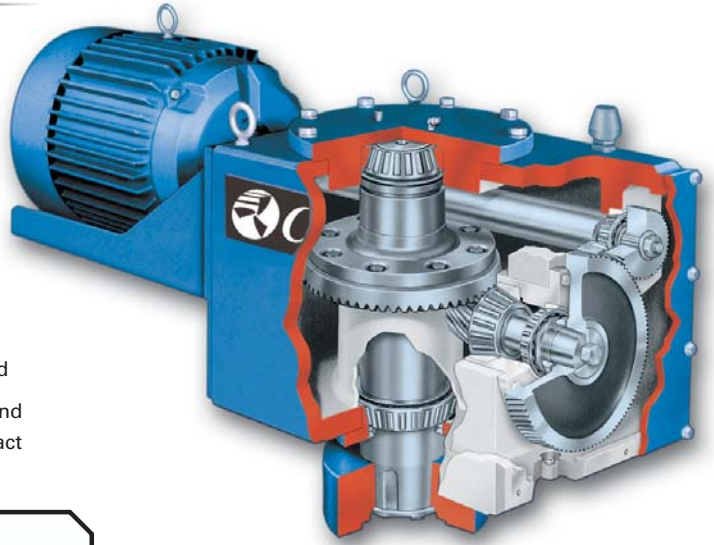
Extra-Capacity Tapered Roller Bearings

- The tapered roller design handles both the radial and axial loads common to agitator drive service
- Standard tapered roller bearing service rating of over 100,000 hours L-10 life throughout the drive
- For simplified maintenance and prevention of housing wear, low-speed bearings are carrier mounted and can be replaced without special tools

Drive Internals

The first reduction helical change gears are spline or taper hub mounted for easy removal and replacement. Removing the change gear cover provides direct access to the change gears without the need to disturb other internal parts or the motor. Second reduction spiral bevel gearing offers low wear for long service, and provides class-leading efficiency for right-angle power transmission.

- Magnetic drain plug is included as standard
- Hardened helical gears precision hobbed and shaved to exact tolerances for proper contact and wear



- Spiral bevel gearing is precision generated, matched, lapped, and individually marked for accurate fit and alignment
- Easily accessible grease fittings lubricate low speed shaft bearings
- The chemical duty paint finish protects against water, acid, or caustic environments, and is extremely resistant to wear and abrasion
- Rugged, fabricated gear drive housing
- Dry well seal prevents process fluid contamination
- All shafts are precision turned on NC lathes for dimensional consistency and straightness

Additional Features

- Standard foot mounted motor
- Compact, high-efficiency, right-angle double reduction drive

Shaft Seals

Seal Mounting

Shaft seals attach directly to the integral ANSI mounting flange on pedestal-mounted agitators. All shaft seals are also available as auxiliary units with beam mounted gearbox.

Shut-Off Systems

Optional shaft shut-off systems allow seal change without the leakage of process fluid or pressure loss.

Types of Seals

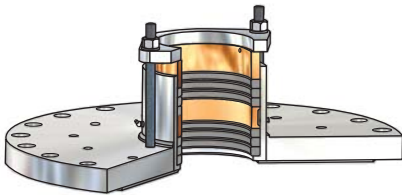
A wide selection of shaft seals is available for closed tank processes.

• Lip Seal

The spring-loaded elastomeric lip seal protects process fluid from dust or atmospheric contamination in low pressure, lower temperature applications.

• Stuffing Box

A six-ring stuffing box incorporates a lantern ring and grease fitting to maintain lubrication. A three-ring design is available for low-pressure applications.



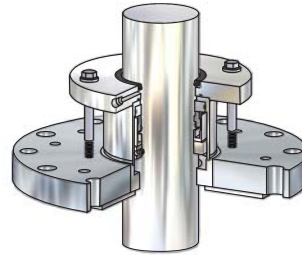
Stuffing Box

• Mechanical Seals

Mechanical seals are offered in materials selected for the process. The seals are supplied from well-known seal manufacturers. Special seals are available for high pressure and/or temperature applications.

–Single Mechanical Seal

The single dry-running mechanical seal is a suitable choice for applications where a pressurized barrier between the tank contents and the outside environment is not necessary.



Single Mechanical Seal

–Split Mechanical Seal

Split mechanical seals feature a two-piece design that simplifies installation and maintenance.

–Double Mechanical Cartridge Seal

Double mechanical seals can offer the most complete protection against leakage of hazardous or flammable fluids, as well as long life and minimum maintenance. Chemineer's standard cartridge includes an integral bearing in the cartridge to reduce shaft deflection and increase seal life.

The cartridge construction greatly simplifies seal removal and installation. The seal cartridge removes as a unit, without disturbing the agitator drive. The cartridge unit can be rebuilt and statically or dynamically bench tested prior to installation.



Double Mechanical Seal

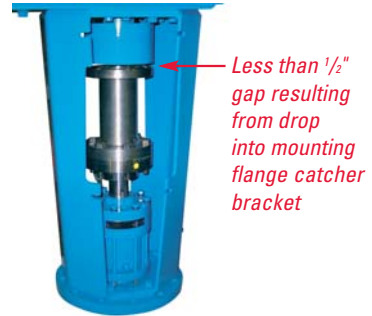
Seal Change Procedure

The double mechanical seal cartridge is removed in four simple steps requiring no special tools or blocking:

1. Unbolt the spacer spool between the reducer output and agitator extension shaft. The extension shaft drops less than $\frac{1}{2}$ " into a catcher bracket in the mounting flange to support the shaft and impeller weight.
2. Remove spacer spool.
3. Remove tapered shaft coupling half located above the seal cartridge.
4. Unbolt and slide the entire seal assembly off the extension shaft.

Benefits

- The gearbox does not need to be removed or disturbed during a seal change
- The seal arrangement allows for a seal to be changed faster and more consistently than any other system, regardless of agitator size or age
- A Jacks-n-Rails system is available to simplify removal and installation of large cartridge seals
- Seal shut-off available
- Shaft will not disengage from steady bearing



Step 1



Step 2



Step 3

Mounting Options

Adaptable to Any Tank

HT agitators are adaptable to any vertical mounting configuration on open or nozzle mounted closed tanks.

On Open Tanks

Steel plate feet or mounting plates are included on the gear drive to mount the agitator to beams or other supporting structures.

On Closed Tanks

HT agitators can be supplied with a fabricated steel support pedestal to mount the agitator directly to the vessel nozzle.

- The pedestal design includes a standard ANSI 150 lb flange
- High pressure and custom flanges are available

Bottom entry applications can be flange mounted, or independently mounted with a separate seal assembly.



Model 6HTN-20 with double mechanical cartridge seal pedestal mounted to a closed tank

Shaft Design

Both process and mechanical considerations determine shaft design. Shafts are sized to resist torsional loads and bending moments induced by hydraulic forces acting on the impeller, as well as to avoid excessive vibration due to coincidence of critical frequencies and operating speed.

Shafting is straightened to tight tolerances – less than 0.003 inches total run out per foot of shaft length (0.25 mm per meter) – for long seal life and smooth operation.

Custom couplings, impellers, shafting, and steady bearings are available upon request, including sanitary designs.

Types

Shafting is supplied in a single piece design or in rigidly coupled sections for easy installation. For large diameter shafts, pipe shafting is a viable option with couplings and impeller hubs welded to the shafting.

Couplings

To facilitate assembly in the field, extension shafts are attached to the drive shaft with flanged rigid couplings, therefore shafts do not need to be installed through the gearbox. The couplings can either be removable tapered bore coupling halves or welded coupling halves. In-tank couplings simplify installation of long shafts.

Steady Bearings

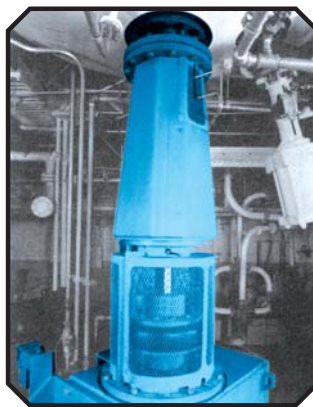
Steady bearings are available to help support extremely long shafts. Cup tripod, bracket, and pad-type steady bearings are standard design options.

Extended Keyways

Extended keyways for adjusting impeller location offer process and design flexibility.



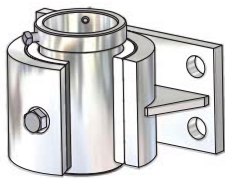
Standard top-entering shaft seal arrangement. Model HTN pedestal-mounted agitator.



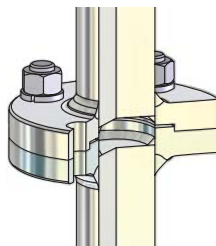
Bottom-entering shaft seal used with a flexibly coupled, independently mounted HBP drive.



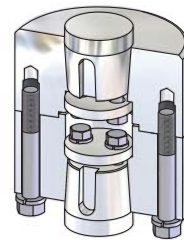
Cup Tripod Steady Bearing



Bracket Steady Bearing



Welded Coupling

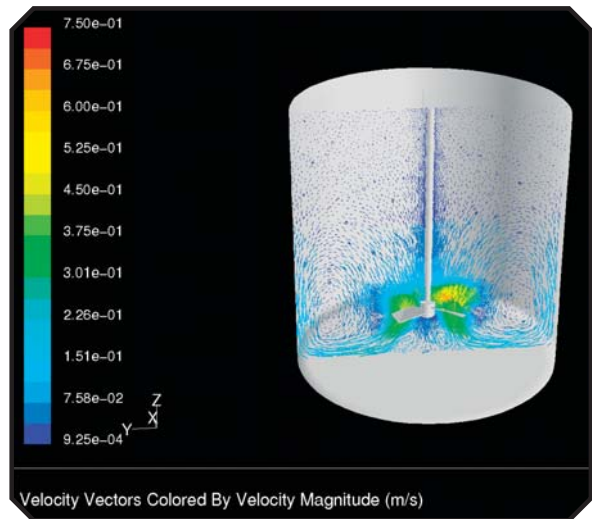
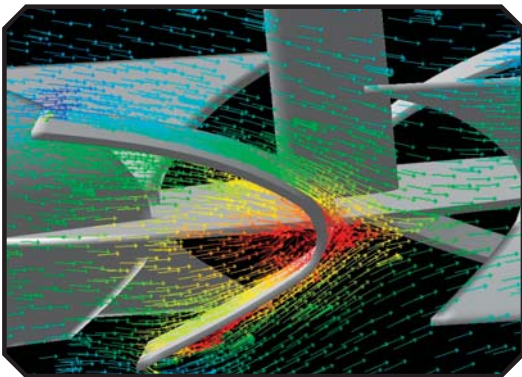


Removable Coupling

Process Technology & Innovation

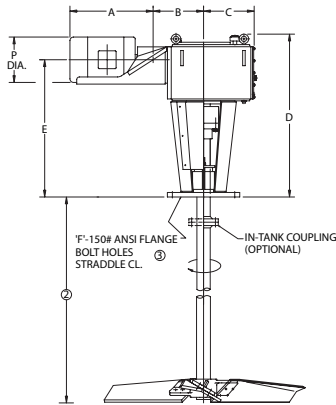
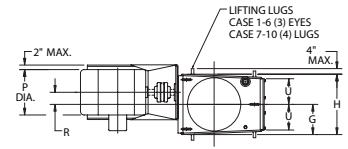
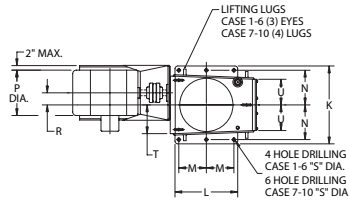
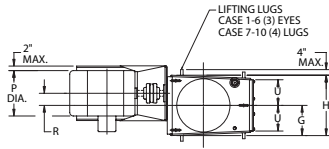
Chemineer brings proven technical expertise to each mixing solution, from basic mixer and impeller design through complex process application analysis. Combined with proprietary data evaluation methodology and extensive field experience, Chemineer provides the most accurate application evaluation possible. Let Chemineer optimize your process, saving you time and money, by applying our experience and state-of-the-art tools, such as:

- Chemineer's high-tech customer test lab offers the most advanced testing techniques in industry
- Computational Fluid Dynamics (CFD)—provides visual projections of mixer performance in the mixing tank by generating a series of mathematical models of fluid flows (Bulletin 750 is available with additional information.)
- Digital Particle Image Velocimetry (DPIV)—provides instantaneous flow visualization and quantitative measurement of the fluid velocity field in the mixing tank (Bulletin 755 is available with additional information.)
- Laser Doppler Anemometry (LDA)—corroborates time averaged DPIV data, especially for velocity fields in the vicinity of the impeller
- Laser Induced Fluorescence (LIF)—enables the user to gain a fundamental understanding of mixing by tracking the path and diffusion of injectants in agitated vessels and static mixers
- CEDS® (Chemineer Expert Design System)—the industry leader in agitator design and analysis software. This proprietary program suite optimizes process performance, in addition to mechanical integrity, strength, and reliability.
- ChemScale®—the industry standard method for effective mixer selection that helps to optimize the agitator design for your specific process needs
- The Chemineer Liquid Agitation series of articles is available with agitation process and mechanical details
- A library of Chemineer technical articles is available on the web site at www.chemineer.com/techarticles
- Capabilities bulletin, 712, is available with additional information

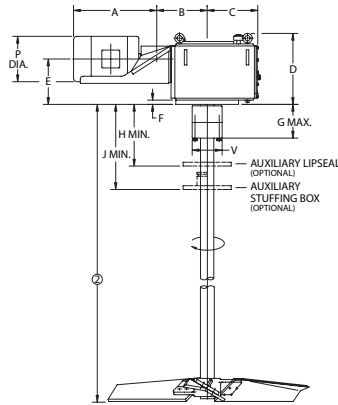


Examples of CFD Modeled Flow Fields

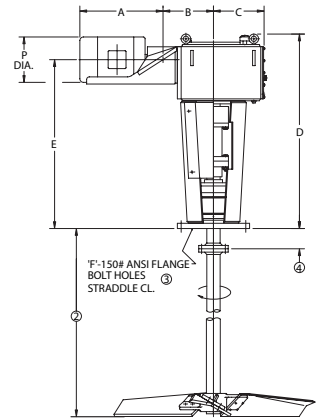
Dimensions



HTA



HTD

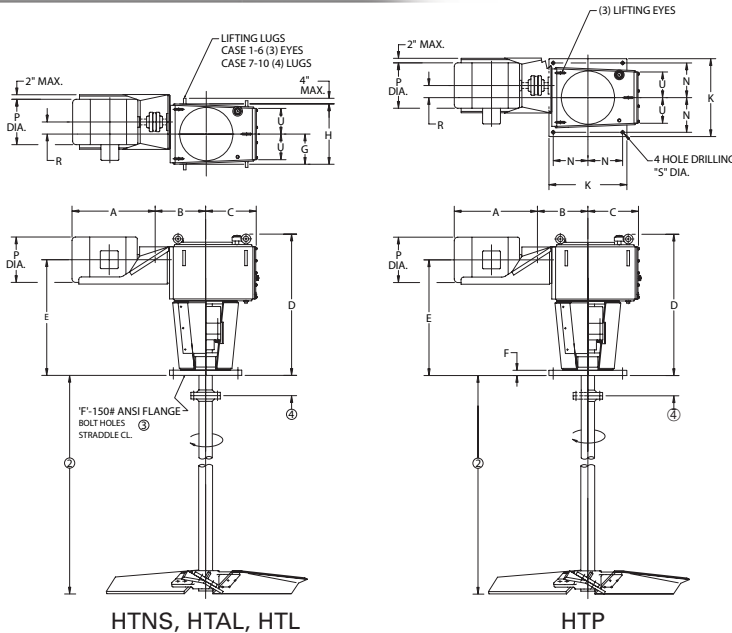


HTN

Dimensions

CASE SIZE	1					2					3					4					5				
	HTA	HTD	HTN	HTNS, HTAL, & HTL	HTP	HTA	HTD	HTN	HTNS, HTAL, & HTL	HTP	HTA	HTD	HTN	HTNS, HTAL, & HTL	HTP	HTA	HTD	HTN	HTNS, HTAL, & HTL	HTP	HTA	HTD	HTN	HTNS, HTAL, & HTL	HTP
B	7-1/2" for all models					9" for all models					10-1/2" for all models					14" for all models					15" for all models				
C	9" for all models					10" for all models					11-1/2" for all models					13-1/2" for all models					15-1/2" for all models				
D	31-1/2"	13"	40"	25-1/2"	25-1/2"	35"	15"	43-1/2"	29-1/2"	29-1/2"	39-1/2"	16-1/2"	47-1/2"	32-1/2"	32-1/2"	43"	19"	51-1/2"	37-1/2"	37-1/2"	46-1/2"	20-1/2"	55-1/2"	40-1/2"	40-1/2"
E	26"	7-1/2"	35"	20-1/2"	20-1/2"	29"	9"	38"	23-1/2"	23-1/2"	33"	10-1/2"	41-1/2"	26-1/2"	26-1/2"	37"	12"	45"	31-1/2"	31-1/2"	39-1/2"	13-1/2"	48"	33-1/2"	33-1/2"
F	8"	3/4"	10"	8"	1"	8"	1"	10"	8"	1"	8"	1"	10"	8"	1"	12"	1-1/8"	12"	12"	1-1/4"	12"	1-1/8"	12"	12"	1-1/4"
G	5"	6"	5"	5"	-	6-1/2"	7"	6-1/2"	6-1/2"	-	7"	8-1/2"	7"	7"	-	8"	10"	8"	8"	-	9-1/2"	11"	9-1/2"	9-1/2"	-
H	10"	10"	10"	10"	-	12-1/2"	11"	12-1/2"	12-1/2"	-	14"	12"	14"	14"	-	16"	13"	16"	16"	-	18-1/2"	14"	18-1/2"	18-1/2"	-
J	-	17"	-	-	-	-	18-1/2"	-	-	-	-	21-1/2"	-	-	-	-	23"	-	-	-	-	25"	-	-	-
R	2" for all models					2-1/2" for all models					3" for all models					3-1/2" for all models					4" for all models				
T	-	5"	-	-	-	-	6-1/2"	-	-	-	-	7"	-	-	-	-	8"	-	-	-	-	9-1/2"	-	-	-
U	4-1/2" for all models					6" for all models					6-1/2" for all models					7-1/2" for all models					8-1/2" for all models				
V	-	5-1/2"	-	-	-	-	6-1/2"	-	-	-	-	7-1/2"	-	-	-	-	8"	-	-	-	-	9"	-	-	-

Dimensions



H.P.		FRAME	A ^①	P ^① DIA.
1150 RPM	1750 RPM			
1	---	145T	13"	7-3/4"
1-1/2	3	182T	14-3/8"	9-1/4"
2	5	184T	15-3/8"	
3	7-1/2	213T	18"	11"
5	10	215T	19-1/2"	
7-1/2	15	254T	22-7/8"	12-3/4"
10	20	256T	24-5/8"	
15	25	284T	26-5/8"	14-1/2"
20	30	286T	28-1/8"	
25	40	324T	29-5/8"	16-7/8"
30	50	326T	31-1/8"	
40	60	364TS	30-3/4"	18-1/2"
50	75	365TS	31-3/4"	
75	100	405TS	35"	20-7/8"
100	125	444TS	38-1/2"	
125	150	445TS	40-1/2"	23-7/8"
150	200	447TS	47-1/2"	
200	250	447TS		
250	300	449TS	51-1/2"	29"

Mounting Dimensions

MOUNTING DIMENSIONS																
CASE SIZE	1HTD	1HTP	2HTD	2HTP	3HTD	3HTP	4HTD	4HTP	5HTD	5HTP	6HTD	6 HTP	7HTD	8HTD	9HTD	10HTD
K	13"	16-1/2"	16"	16-1/2"	18"	16-1/2"	20-1/2"	25"	22-1/2"	25"	25"	16"	34"	38-1/2"	41"	45"
L	8"	---	10"	---	11-1/2"	---	16-1/2"	---	16-1/2"	---	18-1/2"	---	21"	22"	26"	33"
M	3-1/4"	---	4-1/4"	---	4-3/4"	---	7-1/4"	---	7-1/4"	---	8-1/4"	---	9-1/4"	9-1/2"	11-1/2"	15"
N	5-5/8"	7-1/4"	7"	7-1/4"	8"	7-1/4"	9-1/8"	11-1/4"	10"	11-1/4"	11-1/4"	18"	15-3/4"	17-3/4"	19"	21"
S	5/8"	3/4"	5/8"	3/4"	3/4"	3/4"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	1"	1-1/8"	1-1/8"	1-1/8"

Chart

6					7				8			9			10		
HTA	HTD	HTN	HTNS, HTAL, & HTL	HTP	HTA	HTD	HTN	HTNS, HTAL, & HTL	HTA	HTD	HTN	HTA	HTD	HTN	HTA	HTD	HTN
16" for all models					18-1/2" for all models				21-1/2" for all models			23-1/2" for all models			26-1/2" for all models		
18" for all models					22-1/2" for all models				25" for all models			28-1/2" for all models			36" for all models		
48-1/2"	21-1/2"	58-1/2"	42-1/2"	42-1/2"	56-1/2"	28"	67-1/2"	50-1/2"	59"	30"	72"	68"	32"	78-1/2"	74"	37"	88-1/2"
41"	14"	51"	35"	35"	45-1/2"	17-1/2"	57-1/2"	40-1/2"	48-1/2"	19-1/2"	61-1/2"	52-1/2"	22"	68"	61"	24"	75-1/2"
12"	1-1/4"	12"	12"	1-1/4"	16"	1-1/2"	16"	16"	16"	1-3/4"	16"	20"	1-3/4"	20"	24"	1-3/4"	24"
10-1/2"	11"	10-1/2"	10-1/2"	---	12-1/2" for all models				14-1/2"	13-1/2"	14-1/2"	16-1/2"	14-1/2"	16-1/2"	18-1/2"	17-1/2"	18-1/2"
20-1/2"	15"	20-1/2"	20-1/2"	---	24-1/2"	16"	24-1/2"	24-1/2"	29"	17"	29"	32-1/2"	18"	32-1/2"	37"	21"	37"
---	25-1/2"	---	---	---	---	27"	---	---	---	28"	---	---	29-1/2"	---	---	35-1/2"	---
4" for all models					5" for all models				5-1/2" for all models			6-1/2" for all models			7-1/2" for all models		
---	10-1/2"	---	---	---	---	12-1/2"	---	---	---	14-1/2"	---	---	16-1/2"	---	---	18-1/2"	---
8-1/2" for all models					11" for all models				13" for all models			14-1/2" for all models			16-1/2" for all models		
---	9-1/2"	---	---	---	---	10"	---	---	---	11"	---	---	12"	---	---	13-1/2"	---

- ① Dimensions are for totally enclosed and explosion-proof motors.
- ② Agitator output speed, shaft diameter and extension, impeller design and other optional features to suit application.
- ③ Larger and smaller flanges available, however in most cases, the smaller than standard flange dictates on centerline bolt holes and studs.
- ④ Varies per case and shaft diameter selection. Refer to certified assembly drawing for actual dimension.

Aftermarket & Technical Support

Quality Assurance

HT agitators are manufactured in the Chemineer factory, providing us with total control of product design and quality. Every drive is run tested, then opened for a complete internal inspection. Gears are individually examined, tooth contact is checked for compliance with strict engineering standards, and are inspected to AGMA Quality 10 standards.

Sales

Chemineer's extensive network of representatives is on call, ready to assist you with all of your agitation needs, including installation, maintenance, and modifications.

Installation

Chemineer offers expert help on installation, whether your application requires one or multiple HT agitators. Our sales or field service engineers can quickly and efficiently supervise the installation and start-up of your agitator installation.

Maintenance

Chemineer engineers can provide seminars to thoroughly review procedures recommended for installation, operation, and maintenance of our agitators. We can help make your maintenance task easier and more efficient.

Troubleshooting

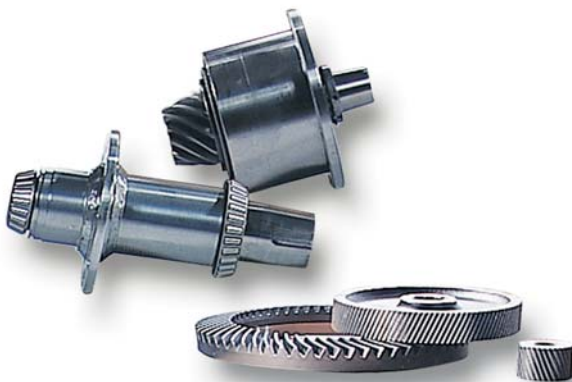
A Chemineer engineer can be made available for troubleshooting your HT agitator. The engineer will know your equipment and through years of experience and technical expertise can pinpoint problems quickly, saving you downtime and labor.

Parts

Our large inventory supports your stock and provides quick fulfillment of maintenance and repair needs. Emergency parts are shipped from our stock within 24 hours. In addition to a wide selection of standard replacement items such as bearings, seals, and motors, we stock complete drives and internal sub-assemblies. Our drive exchange program offers a replacement drive for rapid conversion.

Warranty

For added peace of mind the HT agitator is backed by a comprehensive two-year product warranty.



How is the Chemineer HT Gearbox Superior?

Output Shaft Requirements

Commercial gearboxes usually have smaller output shafts that are poorly suited for agitator duties, leading to higher gear deflections, more noise, and lower reliability. For optimum mechanical integrity, it is beneficial to design the low speed shaft so that the shaft diameter between the bearings is large and the distance between the bearings is small. Commercial units tend to use smaller shaft diameters that can result in the need to

select larger and more expensive gearboxes to handle the bending moments associated with large overhung loads.

AGMA Ratings when Applied to Agitators

AGMA established a general purpose standard intended to be able to be applied to gearboxes used in a wide range of industrial applications. Agitators have particular duties that make reliance on AGMA service factors inappropriate. A standard commercial gearbox tends to use smaller shafts and larger bearing spans that result in deflection, wear, and shorter lifespan. To obtain adequate drive life a high service factor must be applied.

The Chemineer HT gearbox is unique and superior because it is designed specifically for agitator duties. In comparison with a general purpose gear-drive of the same nominal AGMA torque rating, it has much longer bearing and gear lives, which translate lower maintenance costs and greater productivity. It also has a very substantial output shaft with sealing by a true dry well to avoid the risk of leaking lubricant down the shaft.



Refurbished Mixer Gearbox Program

Chemineer stocks refurbished HT gearboxes for an economical, quick replacement for units in disrepair. All refurbished gearboxes meet the same high quality standards as new Chemineer gearboxes. Additional features of the refurbished mixer gearbox program include:

- Delivery on HT gearboxes in 24 hours or less
- High quality refurbishments built in-house to Chemineer and AGMA standards
- A credit toward the purchase of any refurbished gearbox upon returning your old gearbox
- Accepting worn out gearboxes from any original mixer manufacturer
- One-year warranty against material defects and workmanship



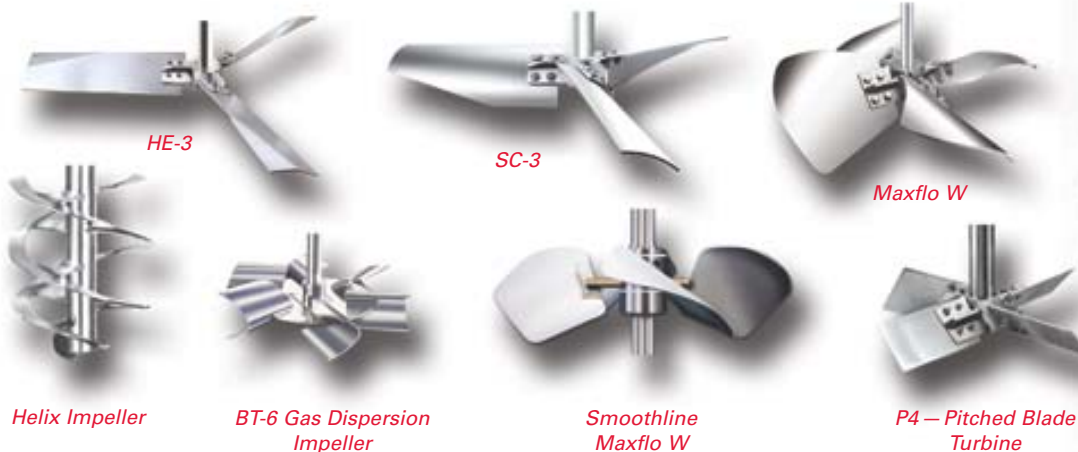
Impeller Technology

Chemineer's impeller technology is effectively applied across your spectrum of applications ensuring successful, repeatable results from lab scale to full scale operations.

Chemineer's mixing expertise includes high flow, low shear liquid-liquid/solids blending, gas dispersion,

high shear blending and viscous mixing. Whether it is R&D or production phase, we have the expertise to solve your mixing challenges.

Impeller bulletin, 710, is available with additional information.



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