

## CONDENSED GLOSSARY OF MOTOR AND GEARING TERMS

**Axial Movement** - Often called "endplay." The endwise movement of motor or gear shafts. Usually expressed in thousandths of an inch.

**Back Driving** - Driving the output shaft of a reducer — using it to increase speed rather than reduce speed. Worm gear reducers are not suitable for service as speed increasers.

**Backlash** - Rotational movement of the output shaft clockwise and counter clockwise, while holding the input shaft stationary. Usually expressed in thousandths of an inch and measure at a specific radius at the output shaft.

**Center Distance** - A basic measurement or size reference for worm gear reducers, measured from the centerline of the worm to the centerline of the worm wheel.

**Drip-Proof** - Venting in end frame and/or main frame located to prevent drops of liquid from falling into motor within 15 angle from vertical. Designed for use in areas that are reasonably dry, clean, and well ventilated (usually indoors). If installed outdoors, it is recommended that the motor be protected with a cover that does not restrict the flow of air to the motor.

**Efficiency** - A ratio of the input power compared to the output, usually expressed as a percentage.

**Explosion-Proof Motors** - These motors meet Underwriters Laboratories and Canadian Standards Association standards for use in hazardous (explosive) locations, as indicated by the UL label affixed to the motor. Locations are considered hazardous because the atmosphere does or may contain gas, vapor, or dust in explosive quantities.

**Flanged Reducer** - Usually used to refer to a reducer having provisions for close coupling of a motor either via a hollow (quill) shaft or flexible coupling. Most often a NEMA C face motor is used.

**Gear+Motor™** - LEESON's registered trademark for a separable gear and NEMA C face motor as opposed to an integral gearmotor. Integral gearmotors suffer from lack of application and availability constraints as well as having inherent service issues when one or the other component needs replacement.

**Input Horsepower** - The power applied to the input shaft of a reducer. The input horsepower rating of a reducer is the maximum horsepower the reducer can safely handle.

**Mechanical Rating** - The maximum power or torque a reducer can transmit. LEESON reducers typically have a safety margin equal to 200% or more of its mechanical rating allowing momentary overloads during start-up or other transient overload conditions.

**Motor Selection** - See the technical section of LEESON's Stock Motor Catalog 1050, request LEESON's book, Practical Motor Basics or contact LEESON's District Office for expert assistance.

**Mounting Position** - The relationship of the input and output shafts of a reducer relative to horizontal.

**Output Horsepower** - The amount of horsepower available at the output shaft of the reducer. Output horsepower is always less than the input horsepower due to the efficiency of the reducer.

**Overhung Load** - A force applied at right angles to a shaft beyond the shaft's outermost bearing. This shaft-bending load must be supported by the bearing. Overhung load ratings are listed for each reducer size and should not be exceeded.

**Prime Mover** - In industry, the prime mover is most often an electric motor. Occasionally engines, hydraulic or air motors are used. Special application considerations are called for when other than an electric motor is the prime mover.

**Self-Locking** - The inability of a reducer to be driven backwards by its load. As a matter of safety, no LEESON reducer should be considered self-locking.

**Service Factor for Gearing** - A method of adjusting a reducer's load carrying characteristics to reflect the application's load characteristics. AGMA (American Gear Manufacturer's Association) has established standardized service factor information.

**Service Factor for Motors** - Refers to a motor's ability to handle a load greater than the motor's rated HP on a continuous basis. Most LEESON motors have a continuous duty service factor of 1.15 or higher. This ability of the motor is intended to handle momentary or transient overloads or unusual service conditions and should not be utilized when sizing motors for continuous service. For assistance in motor selection please contact your LEESON's District Office.

**Thermal Rating** - The power or torque a reducer can transmit continuously. This rating is based upon the reducer's ability to dissipate the heat caused by friction.

**Thrust Load** - Force imposed on a shaft parallel to a shaft's axis. Thrust loads are often induced by the driven machine. Take care to be sure the thrust load rating of the reducer is sufficient that its shafts and bearings can absorb the load without premature failure.

**Totally Enclosed Non-Ventilated (TENV)** - No vent openings, tightly enclosed to prevent the free exchange of air, but not airtight. Has no external cooling fan and relies on convection for cooling. Suitable for use where exposed to dirt or dampness, but not for hazardous (explosive) locations.

**Totally Enclosed Fan Cooled (TEFC)** - Same as the TENV except has external fan as an integral part of the motor, to provide cooling by blowing air around the outside frame of the motor.

## WORM GEAR REDUCER SERVICE FACTORS

Proper determination of an application's service factor characteristics is critical for maximum reducer life and trouble free service. See the definition of service factor in the glossary.

All LEESON reducers and Gear+Motors™ are sized for applications having an AGMA defined service of 1.0, unless otherwise stated. (Alternately, 1.0 service factor is sometimes expressed as "Class I Service".) Reducers in such applications operate on a continuous duty basis, for 10 hours per day or less, and are free of recurrent shock loads. When operating characteristics are different than noted, the input horsepower and torque ratings listed must be divided by the service factor selected from the table below. This table applies to reducers with an electric or hydraulic motor input.

## SPECIAL APPLICATION CONSIDERATIONS

**CAUTION** : Please contact LEESON for assistance in applications not listed or for applications with unusual characteristics. Including the following:

- Input speeds not listed in catalog
- Frequent starting or repetitive shock applications
- Selection of reducers for man lifts or people moving equipment
- High energy loads, including stalling

### WORM REDUCERS:

- Starting or momentary overloads exceeding 200% of gear reducer mechanical capacity (100% overload)

## SERVICE FACTOR TABLE

Duration of Service (Hours per day)	Uniform Load	Moderate Shock	Heavy Shock	Extreme Shock
Occasional 1/2 Hour	—*	—*	1.00	1.25
Less than 3 Hours	1.00	1.00	1.25	1.50
3 - 10 Hours	1.00	1.25	1.50	1.75
Over 10 Hours	1.25	1.50	1.75	2.00

\* Unspecified service factors should be 1.00 or as agreed upon by the user and manufacturer.

When a single or multi-cylinder engine is the input power, the service factor selected from the table above should be increased by multiplying the value by the factor selected from the table below.

### Service Factor Conversion Table for Engine Driven Applications.

Hydraulic or Electric Motor	Single Cylinder Engines	Multi-Cylinder Engines
1.00	1.50	1.25
1.25	1.75	1.50
1.50	2.00	1.75
1.75	2.25	2.00
2.00	2.50	2.25

On the next page, AGMA standardized service factor data is listed for a wide variety of applications operating 3 to 10 hours per day and for 10 hours or more per day.

## A.G.M.A. SERVICE FACTORS

Application	Service Factor	
	3-10 Hours	Over 10 Hours
<b>AGITATORS</b>		
Pure Liquids	1.00	1.25
Liquids & Solids	1.25	1.50
Liquids-Variable Density	1.25	1.50
<b>APRON CONVEYORS</b>		
Uniformly Loaded or Fed	1.00	1.25
Heavy Duty	1.25	1.50
<b>APRON FEEDERS</b>	1.25	1.50
<b>ASSEMBLY CONVEYORS</b>		
Uniformly Loaded or Fed	1.00	1.25
Heavy Duty	1.25	1.50
<b>BARGE HAUL PULLERS</b>	1.50	1.75
<b>BARKING</b>		
Drums (Coupling Connected)		1.75
Mechanical		1.75
<b>BAR SCREENS (Sewage)</b>	1.00	1.25
<b>BELT CONVEYORS</b>		
Uniformly Loaded or Fed	1.00	1.25
Heavy Duty	1.25	1.50
<b>BELT FEEDERS</b>	1.25	1.50
<b>BLOWERS</b>		
Centrifugal	1.00	1.25
Lobe	1.25	1.50
Vane	1.00	1.25
<b>BOLTING MACHINERY</b>	1.00	1.25
<b>BREWING &amp; DISTILLING</b>		
Bottling Machinery	1.00	1.25
Brew Kettles, Cont. Duty	1.00	1.25
Can Filling Machines	1.00	1.25
Cookers-Cont. Duty	1.00	1.25
Mash Tubs-Cont. Duty	1.00	1.25
Scale Hoppers-Frequent Starts	1.25	1.50
<b>BUCKET</b>		
Conveyors Uniform	1.00	1.25
Conveyors Heavy Duty	1.25	1.50
Elevators Cont.	1.00	1.25
Elevators Uniform	1.00	1.25
Elevators Heavy Duty	1.25	1.50
<b>CALENDARS</b>		
Rubber		1.50
Textile	1.25	1.50
<b>CANE KNIVES</b>		1.50
<b>CAN FILLING MACHINES</b>	1.00	1.25
<b>CAR DUMPERS</b>	1.50	1.75
<b>CAR PULLERS</b>	1.25	1.50
<b>CENTRIFUGAL</b>		
Blowers, Compressors, Discharge Elevator, Fans or Pumps	1.00	1.25
<b>CHAIN CONVEYORS</b>		
Uniformly Loaded or Fed	1.00	1.25
Heavy Duty	1.25	1.50
<b>CLARIFIERS</b>	1.00	1.25
<b>CLASSIFIERS</b>	1.25	1.50
<b>CLAY WORKING INDUSTRY</b>		
Brick Press	1.75	2.00
Briquelette Machines	1.75	2.00
Clay Working Machinery	1.25	1.50
Plug Mills	1.25	1.50
<b>COMPRESSORS</b>		
Centrifugal	1.00	1.25
Lobe	1.25	1.50
Reciprocating:		
Multi-Cylinder	1.25	1.50
Single Cylinder	1.50	1.75
<b>CONCRETE MIXERS</b>		
Continuous	1.25	1.50
Intermittent	1.25	1.50
<b>CONVEYORS-Uniformly Loaded or Fed</b>		
Apron, Assembly, Belt, Bucket, Chain, Flight, Oven, Screw	1.00	1.25
<b>CONVEYORS-Severe Duty</b>		
Live Roll		Contact Factory
Reciprocating, Shaker	1.50	1.75
<b>COOLING TOWER FANS</b>		Contact Factory
<b>CRANES</b>		
Dry Dock Cranes		Contact Factory
Main Hoist	1.00	1.25
Bridge and Trolley Travel		Contact Factory
<b>CRUSHERS</b>		
Ore or Stone	1.50	1.75
Sugar		1.50
<b>DISC FEEDERS</b>	1.00	1.25

<b>DOUBLE ACTING PUMPS</b>			
2 or more Cylinders	1.25	1.50	
Single Cylinder			Contact Factory
<b>DRAW BENCH (Metal Mills)</b>			
Carriage & Main Drive	1.25	1.50	
<b>DREDGES</b>			
Cable Reels, Conveyors	1.25	1.50	
Cutter Head & Jig Drives	1.75	2.00	
Maneuvering Winches, Pumps	1.25	1.50	
Screen Drives	1.50	1.75	
Stackers, Utility Winches	1.25	1.50	
<b>ELEVATORS</b>			
Bucket-Uniform Load	1.00	1.25	
Bucket-Heavy Duty	1.25	1.50	
Bucket-Continuous	1.00	1.25	
Centrifugal Discharge	1.00	1.25	
Escalators			Not Approved
Freight			Not Approved
Gravity Discharge	1.00	1.25	
Man Lifts, Passenger			Not Approved
<b>EXTRUDERS (Plastic)</b>			
Film Sheet, Coating, Rods, Pipe Tubing	1.25	1.25	
Blow Molders, Pre-plasticizers			1.50
<b>FANS</b>			
Centrifugal	1.00	1.25	
<b>COOLING TOWERS</b>			Contact Factory
Forced Draft			1.25
Induced Draft	1.25	1.50	
Large (Mine, etc.)	1.25	1.50	
Large Industrial	1.25	1.50	
Light (Small Diameter)	1.00	1.25	
<b>FEEDERS</b>			
Apron, Belt	1.25	1.50	
Disc	1.00	1.25	
Reciprocating	1.75	2.00	
Screw	1.25	1.50	
<b>FLIGHT</b>			
Conveyors, Uniform	1.00	1.25	
Conveyors, Heavy	1.25	1.50	
<b>FOOD INDUSTRY</b>			
Beet Slicers	1.25	1.50	
Bottling, Can Filling Mach.	1.00	1.25	
Cereal Cookers	1.00	1.25	
Dough Mixers, Meat Grinders	1.25	1.50	
<b>HAMMER MILLS</b>	1.50	1.75	
<b>HOISTS</b>			
Heavy Duty	1.75	2.00	
Medium Duty	1.25	1.50	
Skip Hoist	1.25	1.50	
<b>INDUCED DRAFT FANS</b>	1.25	1.50	
<b>LAUNDRY WASHERS AND TUMBLERS</b>	1.25	1.50	
<b>LINE SHAFTS</b>			
Driving Processing Equipment	1.25	1.50	
Other Line Shafts, Light	1.00	1.25	
<b>LUMBER INDUSTRY</b>			
Barkers-Spindle Feed	1.25	1.50	
Barkers-Main Drive	1.75	1.75	
Carriage Drive			Contact Factory
<b>CONVEYORS</b>			
Burner	1.25	1.50	
Main or Heavy Duty	1.50	1.50	
Main Log	1.75	2.00	
Re-saw Merry-Go-Round	1.25	1.50	
Slab	1.75	2.00	
Transfer	1.25	1.50	
Chains-Floor	1.50	1.50	
Chains-Green	1.50	1.75	
Cut-Off Saws-Chain & Drag	1.50	1.75	
Debarking Drums	1.75	2.00	
Feeds-Edger	1.25	1.50	
Feeds-Gang	1.50	1.50	
Feeds-Trimmer	1.25	1.50	
Log Deck	1.50	1.50	
Log Hauls-Incline Well Type	1.50	1.50	
Log Turning Devices	1.50	1.50	
Planer Feed	1.25	1.50	
Planer Tilting Hoist	1.50	1.50	
Rolls-Live-Off Bearing-Roll			1.50
Cases	1.50	1.50	
Sorting Table, Tipple Hoist	1.25	1.50	
Transfers-Chain & Craneway	1.50	1.75	
Tray Drives	1.25	1.50	
Veneer Lathe Drives			Contact Factory
<b>MACHINE TOOLS</b>			
Auxiliary Drives	1.00	1.25	
Bending Rolls	1.25	1.50	
Main Drives	1.25	1.50	
Notching Press (Belted)			Contact Factory
Plate Planers	1.50	1.75	
Punch Press (Geared)	1.50	1.75	
Tapping Machines	1.50	1.75	

<b>METAL MILLS</b>			
Draw Bench Carriages & Main Drives	1.25	1.50	
Pinch, Dryer and Scrubber			Contact Factory
Rolls Reversing			1.25
Slitters	1.25	1.50	
Table Conveyors Non-Reversing			1.25
Group Drives	1.25	1.50	
Individual Drives	1.50	1.75	
Reversing Wire Drawing & Flattening			1.25
Machines	1.25	1.50	
Wire Winding Machines	1.25	1.50	
<b>MILLS, ROTARY</b>			
Ball and Rod Mills with Spur Ring Gear			1.75
with Helical Ring Gear			1.50
Direct Connect			1.50
Cement Kilns, Dryers, Coolers, Pebble, Plain & Wedge Bar Mills			1.50
Tumbling Barrels	1.50	1.75	
<b>MIXERS (Also see Agitators)</b>			
Concrete, Cont. & Int.	1.25	1.50	
Constant Density	1.00	1.25	
Variable Density	1.25	1.50	
<b>OIL INDUSTRY</b>			
Chillers	1.25	1.50	
Oil Well Pumping			Contact Factory
Paraffin Filter Press	1.25	1.50	
Rotary Kilns	1.25	1.50	
<b>PAPER MILLS</b>			Contact Factory
<b>PASSENGER ELEVATORS</b>			Contact Factory
<b>PLATE PLANERS</b>	1.50	1.75	
<b>PRINTING PRESSES</b>			Contact Factory
<b>PUMPS</b>			
Centrifugal	1.00	1.25	
Proportioning	1.75	1.50	
Reciprocating			1.25
Single Act, 3 or more Cyl.	1.25	1.50	
Double Act, 2 or more Cyl.	1.25	1.50	
Single Act, 1 or 2 Cyl.			Contact Factory
Double Act, 1 Cyl.			Contact Factory
Rotary: Gear, Lobe, Vane	1.00	1.25	
<b>PUNCH PRESSES (Gear Driven)</b>	1.50	1.75	
<b>RUBBER &amp; PLASTIC INDUSTRIES</b>			
Calendars			1.50
Crackers			1.75
Laboratory Equipment	1.25	1.50	
Mills (2 on line)	1.50	1.50	
Mills (3 on line)	1.25	1.50	
Mixing Mills	1.50	1.50	
Refiners			1.50
Sheeters			1.50
Tire Building & Machines			Contact Factory
Tire & Tube Press Openers			Contact Factory
Tubers & Strainers			1.50
Warming Mills			1.50
<b>SCREENS</b>			
Air Washing	1.00	1.25	
Rotary-Sand or Gravel	1.25	1.50	
Traveling Water Intake	1.00	1.25	
<b>SEWAGE DISPOSAL</b>			
Bar Screens	1.00	1.25	
Chemical Feeders	1.00	1.25	
Collectors	1.00	1.25	
Dewatering Screens	1.25	1.50	
Scum Breakers	1.25	1.50	
Slow or Rapid Mixers	1.25	1.50	
Thickeners	1.25	1.50	
Vacuum Filters	1.25	1.50	
<b>SKI TOWS &amp; LIFTS</b>			Not Approved
<b>STOKERS</b>	1.00	1.25	
<b>STONE CRUSHERS</b>	1.50	1.75	
<b>SUGAR INDUSTRY</b>			
Cane Knives, Crushers, Mills			1.50
<b>TABLE CONVEYORS (Non-Reversing)</b>			
Group Drives	1.25	1.50	
Individual Drives	1.50	1.75	
Reversing			Contact Factory
<b>TEXTILE INDUSTRY</b>			
Batchers, Calendars	1.25	1.50	
Card Machines	1.25	1.50	
Dry Cans, Dryers	1.25	1.50	
Dyeing Machinery	1.25	1.50	
Knitting Machinery			Contact Factory
Looms, Mangles, Nappers, Pads	1.25	1.50	
Range Drives			Contact Factory
Slashers, Soapers, Spinners	1.25	1.50	
Tenter Frames, Washers, Winders	1.25	1.50	
<b>TUMBLING BARRELS</b>	1.50	1.75	
<b>VANE BLOWERS</b>	1.00	1.25	
<b>WINDLASS</b>			Contact Factory
<b>WIRE</b>			
Drawing Machines	1.25	1.50	
Winding Machines	1.25	1.50	