



## High Ratio Double Reduction

Types A & AR, Sizes 405-485/Model C

Nominal Ratios 23.16 & 25.63/1750 & 1430 rpm

### How to Select

Before making any selections, refer to the Basic Information and Conditions Affecting Selections in [Selection Guide 131-110, Pages 5 and 6](#), and note in particular the paragraphs covering Gear Drive Ratings, Application Adjusted Thermal Rating and Speed Variation.

#### Horsepower method

1. Determine Mechanical Service Factor from [Selection Guide 131-110](#) for electric motor driven applications operating 3 to 10 or over 10 hours per day. The selections in this supplement are for 1750 and 1430 rpm electric motors only. Refer all other applications to Falk.
2. Calculate equivalent horsepower by multiplying the motor horsepower by the Service Factor. If momentary or peak loads exceed 200% of the rated load, refer to the introductory instructions on [Page 5 of Selection Guide 131-110](#).
3. For ratio, divide high speed shaft rpm by low speed shaft rpm.
4. Determine gear drive size and nearest nominal ratio from the Horsepower column of the selection table on [Page 2](#). Opposite the high speed shaft rpm, and the desired ratio and output speed, select a horsepower capacity equal to or in excess of the equivalent horsepower calculated in Step 2. If the motor horsepower **exceeds the maximum motor selection** shown, the drive size must be increased.  
Compare to A3 triple reduction selection in [Selection Guide 131-110](#) for the most economical selection.
5. Check the drive thermal rating. Type AR drives and drives with a backstop cannot be equipped with (2) two fans. Calculate thermal horsepower rating with (1) one fan. Use alternate cooling methods if required.
6. Check drive dimensions in [Selection Guide 131-110](#). Dimensions are identical to all other A2 ratios.

#### Torque selection method

Determine Service Factor, equivalent torque and drive selection by following the same procedures outlined for the horsepower method, but in Step 4, refer to Torque column of the selection table on [Page 2](#). If the motor horsepower **exceeds the maximum motor selection** shown, the drive size must be increased.

Convert the actual required torque to horsepower and check against the thermal ratings. To convert, use the torque (lb-in) and speed (rpm) at low speed shaft of the drive in the following formula:

$$\text{hp} = \frac{\text{torque} \times \text{output speed}}{63,000}$$

#### Selection Example

A uniformly loaded belt conveyor with a 450 hp 1750 rpm motor operates 16 hours per day at 75 rpm. Select a gear drive for a coupling connected application.

1. Service factor is 1.25 for a belt conveyor operating 16 hours per day. See service factors in [Selection Guide 131-110](#).
2. Equivalent hp =  $1.25 \times 450 = 562.5$
3. Required Ratio =  $1750 \div 75 = 23.3$   
Closest nominal ratio is 23.16. See selection table on [Page 2](#).
4. Drive Size is a 445A2 Double Reduction in the 1750 rpm section opposite 23.16 ratio and 75 rpm. Trace right to 590 (nearest hp exceeding equivalent hp) and then read Drive Size 445A2. The maximum allowable motor horsepower is 450.
5. The thermal capacity, at 1750 rpm is not satisfactory since the thermal rating is 212. The thermal rating is satisfactory with 2 fans, since the thermal capacity of 541 with 2 fans exceeds the actual motor (or bhp) load of 450.
6. There is no low speed overhung load since the gear drive is coupling connected. Refer to Falk coupling selection guides for coupling selections.

Types A & AR, Sizes 405-485/Model C

# Horsepower, Torque, LSS Overhung Load Ratings & Exact Ratios/ Double Reduction

Nominal Ratios 23.16 & 25.63/1750 & 1430 rpm

High Speed Shaft rpm	Nominal Ratio	Approx. L.S. Shaft rpm	DRIVE SIZE	Maximum Motor Selection hp @1750 rpm input <sup>1</sup>	Drive Rating		L.S. Shaft Overhung Load <sup>2</sup>	Exact Ratio
					hp	Torque		
1750	23.16	75	405	200	261	213652	15000	22.73
			425	300	417	343305	18000	22.86
			445	450	590	487219	25000	22.93
			465	700	878	730423	33000	23.10
			485	1000	1365	1123199	36000	22.86
	25.63	68	405	200	261	233768	15000	24.87
			425	300	395	355635	18000	25.00
			445	400	540	484824	25000	24.93
			465	600	699	631605	33000	25.09
1430	23.16	60	405	200	216	216332	15000	22.73
			425	300	340	342377	18000	22.86
			445	450	483	487904	25000	22.93
			465	600	745	758180	33000	23.10
			485	900	1134	1141929	40000	22.86
	25.63	56	405	200	216	236613	15000	24.87
			425	300	322	354650	18000	25.00
			445	400	445	488815	25000	24.93
			465	500	574	634573	33000	25.09

<sup>1</sup> These are maximum allowable motor selections for coupling connected electric motor applications at 1750 and 1430 rpm. Contact Falk for all other applications.  
<sup>2</sup> Values listed are based on a location one shaft diameter outboard from seal cage. For all other load locations, refer to overhung load section of [Selection Guide 131-110](#) for a corresponding load location factor.

Types A & AR, Sizes 405-485/Model C

# Thermal Horsepower Ratings<sup>3</sup>/ Double Reduction

Nominal Ratios 23.16 & 25.63/1750 & 1430 rpm

Input rpm	Cooling Option	23.16:1					25.63:1			
		405	425	445	465	485	405	425	445	465
1750	No Aux. Cooling	135	154	212	295	304	130	146	204	289
	With 2 Shaft Fans	298	378	541	791	790	284	360	519	771
	With Electric Fan	457	551	826	1101	1157	440	525	798	1067
	With Cooling Tubes	331	623	858	1175	1592	307	584	817	1130
1430	No Aux. Cooling	128	150	205	285	296	122	142	197	280
	With 2 Shaft Fans	260	328	466	682	693	248	312	447	665
	With Electric Fan	427	515	773	1038	1094	411	490	746	1007
	With Cooling Tubes	302	565	782	1080	1469	279	530	744	1041

<sup>3</sup> Thermal power ratings are based on an ambient temperature of 80°F (27°C) at sea level. Thermal ratings for cooling tubes are based on an inlet water temperature of 70°F (21°C). For cooling beyond the range of values listed, refer to Falk.

## Thermal Horsepower Ratings with one fan

(Type A gear drives are only available with one fan when equipped with a backstop)

Calculate thermal horsepower rating for gear drives with one fan as follows:

Average the thermal hp rating **without auxiliary cooling** and the thermal hp rating **with 2 fans**.

Example: 425, A2, 23.16:1 ratio at 1750 rpm

Thermal hp rating WITHOUT AUXILIARY COOLING = 154

Thermal hp rating WITH 2 FANS = 378

$$\frac{154 + 378}{2} = 266.5 \text{ Thermal hp rating WITH 1 FAN}$$

## Thermal Rating Factors

Thermal horsepower ratings published herein are based on a 80°F (27°C) ambient temperature at sea level. For other conditions, the thermal horsepower rating may be multiplied by the factors shown in the tables at right.

Altitude		Temperature <sup>4</sup>	
Altitude-ft	Factor	Ambient Temperature	Factor w/o Aux. Cooling or w/Fan
0	1.0	50°F (10°C)	1.19
2,500	.95	60°F (16°C)	1.13
5,000	.90	70°F (21°C)	1.07
7,500	.85	80°F (27°C)	1.00
10,000	.81	90°F (32°C)	.93
12,500	.76	100°F (38°C)	.85
15,000	.72	110°F (43°C)	.78
17,500	.68	120°F (49°C)	.69

<sup>4</sup> Factors for other ambient temperatures can be interpolated.