



IMPERIAL
ELECTRIC
The Driving Force In Motion

Imperial DC Gearless Elevator Motors

Imperial's gearless machine consists of a slow speed DC motor, brake, sheave, and pedestal bearings mounted on a fabricated base.

The motor is designed for 230% of rated current at 70% rated speed, frequently repeated. The motor field can be forced for acceleration or deceleration. Class "B" insulation and 50 °C rise is standard. Standard lead locations are bottom.

The brake is spring-set, electrically released, and may be adjusted to a stopping or holding torque of up to 150% of the rated motor torque.

The traction sheave can be supplied with up to twelve "U" or six "V" grooves. Standard sheave diameters are 26, 30, and 33 inches.

The base is ready for penthouse installation. Most rope layouts can be accommodated with the standard base. The customer must supply reeving details to insure rope clearance.

Imperial manufactures a complete line of motor generator sets for use with our gearless machine. All machines are CSA listed and built Imperial tough.

Options:

- Breakdown Crating
- Class F Insulation
- Split Frame
- Basement Mount
- Side Mount
- Stub Shaft
- Encoder Mounting Kit

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10/17/2002 REV A



Gearless Elevator Motor Application Guide

The application of a DC Gearless elevator hoisting motor to an elevator system involves some nine variable specifications. With this many variables, almost every application is unique. These variable specifications are:

1. Rated elevator live load in lbs.
2. Rated elevator full load speed Ft./Min.
3. Percent of over counter balance.
4. Location of hoisting machine greatly effects the efficiency of the system. Typical locations are overhead, beside the elevator hatch, and basement.
5. 1:1 or 2:1 roping effects the speed and torque of the motor and the efficiency of the system.
6. Single or double wrap effects the mechanical load on the shaft by a factor of 2:1.
7. A smaller diameter sheave will result in a lower torque requirement decreasing the motor size. Smaller sheave diameter usually increases cable and sheave wear. Minimum sheave diameter is 40 x cable diameter per American Elevator Standards and 52 x cable diameter for installations with General Services Administration (GSA) specifications.
8. The average rate of acceleration effects the performance of the elevator system. Average rate of acceleration may be as low as 3 Ft/s² while 6 Ft/s² is considered the maximum for comfort level. The most common level of acceleration is in order of 4 to 5 Ft/s². The higher rate of acceleration may require a larger frame size motor with more torque.
9. Larger total suspended weight is a larger mass that must be accelerated or decelerated requiring a larger motor. Normally, the total suspended weight for a given live load rating will be larger for a tall building than for a lower building. Also, the suspended weight has a direct effect on the mechanical stress in the sheave and motor shaft combination.

To best expedite gearless requests, provide a completed copy of the attached survey form and a reeving diagram to an Imperial Electric representative.

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Gearless Elevator Survey Form

Job:			
Customer:			
Date:			
Surveyor:			
Quantity:			
Roping:			
# of Cables:			
Cable Size (In.):			
Cable Type:	<input type="checkbox"/> Traction Steel	<input type="checkbox"/> Extra High Strength Traction Steel	
Rated Live Load (Lbs):			
Full Load Speed (F.P.M.):			
Counter Weight (%):			
Motor Sheave Wrap:	<input type="checkbox"/> SINGLE	<input type="checkbox"/> DOUBLE	
Motor Sheave Groove:	<input type="checkbox"/> U	<input type="checkbox"/> V	
Motor Sheave Pitch Diameter (In.):	<input type="checkbox"/> 26"	<input type="checkbox"/> 30"	<input type="checkbox"/> 33"
Total Suspended Weight (Lbs):			
Deflector Sheave Position** (In.):	R2 _____	RR _____	RL _____
Deflector Sheave Diameter (In.):			
Motor Location:	<input type="checkbox"/> OVERHEAD	<input type="checkbox"/> BASEMENT OR SIDE	
Fully Compensated:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
Power Source:	<input type="checkbox"/> SCR	<input type="checkbox"/> MG SET	
Encoder/Tachometer:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
Split Frame Construction:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
Insulation Class:	<input type="checkbox"/> B	<input type="checkbox"/> F	
Breakdown Crating:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
Customer Remarks:			

E-2334

** Reference Drawing 3-0090-0003

02/18/2003 REV B



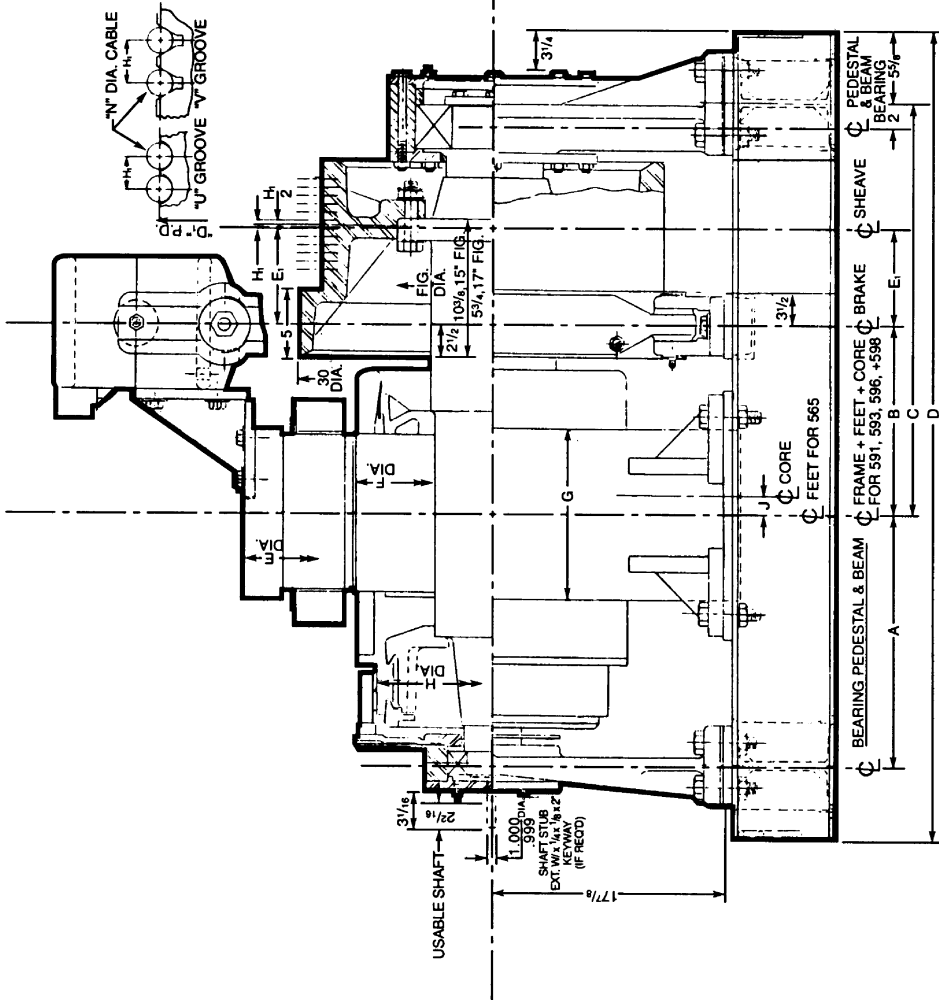
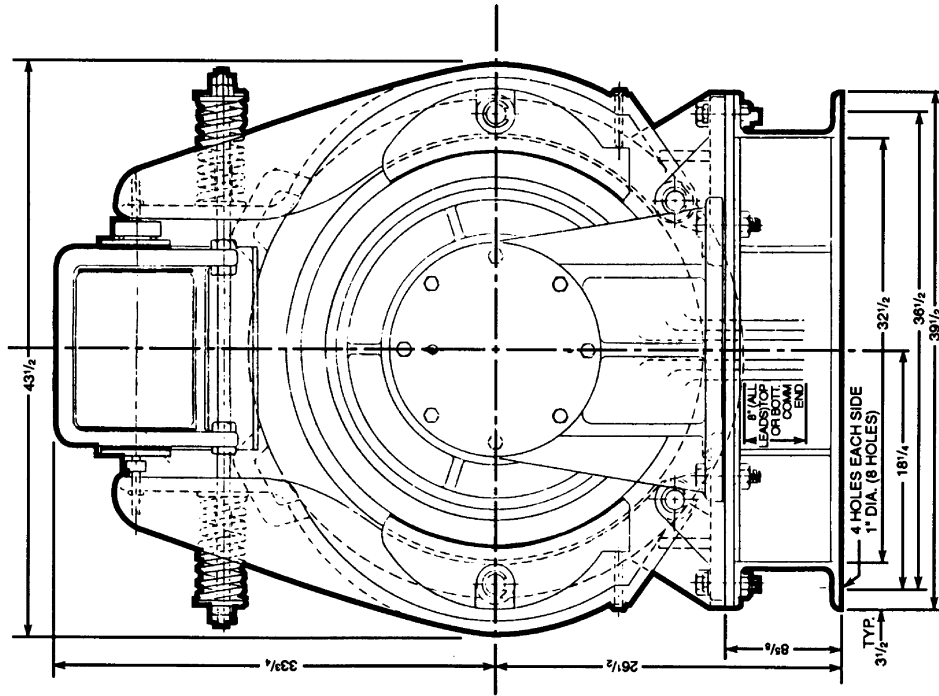
Imperial DC Gearless Elevator Motors Basic Ratings

Imperial Frame Size	Rated Torque (Ft-Lb)	Wk ² Armature & 26" Sheave (Lb-Ft ²)	Armature Volts per RPM (V/RPM)	Armature Amps (A)	Armature Resistance Hot (Ω)	Armature Circuit Inductance (H)	Field Voltage (V)	Field Amps (A)	Field Resistance (Ω)	L/R Field Time Constant (S)
DGR-591	1,725	1,149	1.346	180	0.117	7.17	195	8.35	23.41	0.94
DGR-593	2,300	1,232	1.790	180	0.132	9.56	183	10.50	17.40	1.08
DGR-596	2,875	1,315	2.236	180	0.138	11.79	195	11.00	17.73	1.16
DGR-598	3,250	1,438	2.915	180	0.146	15.53	198	13.20	15.02	1.29

Typical Rating Requirements for Imperial Gearless	
Roping	2:1 1:1
Counter Weight (%)	40 40
Acceleration Rate (Ft/s ²)	4 4
Live Loads (Lb)	2,000 to 8,500 2,000 to 4,500
Speeds (F.P.M.)	400 to 700 500 to 1,000
Total Suspended Weight (Lb)	15,400 to 32,000 15,400 to 19,000

Sheave Data	
Diameter (In)	WK ² (Lb-Ft ²)
26	762
30	1,012
33	1,332

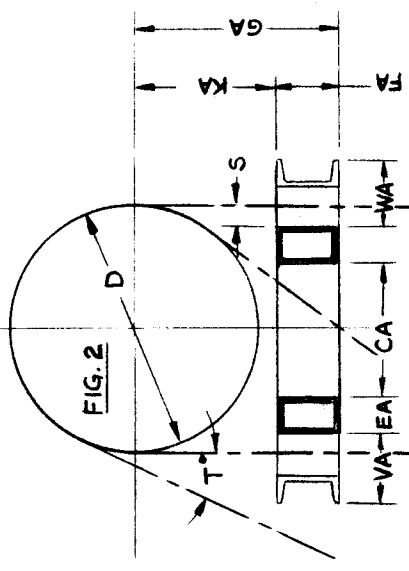
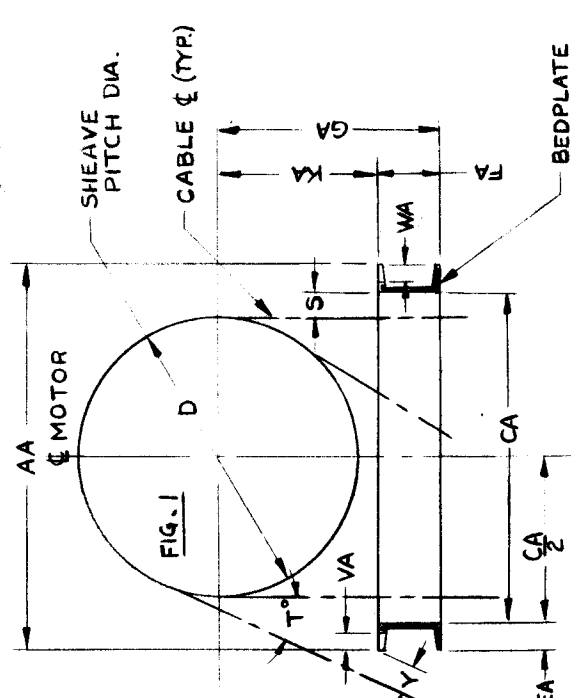
DC GEARLESS MACHINES



E1=7 1/2"

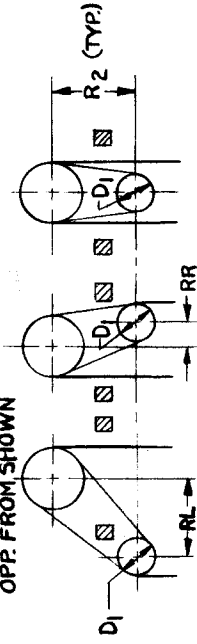
FRAME	A	B	C	D	E	F	G	H	J	Arm + Sheave + Solenoid	Other	Total Weight
598	22 7/8	18 1/4	35 7/16	69 1/2	38 5/8	21 1/4	20 1/2	18 3/4	0	3857	1624	9759
596	20 5/8	16	33 3/16	65	38 3/8	21 1/4	16	18 3/4	0	3382	1604	8358
593	19 1/8	14 1/2	31 11/16	62	38 5/8	21 1/4	13	18 3/4	0	3069	1591	7467
591	17 5/8	13	30 3/16	59	38 5/8	21 1/4	10	18 3/4	0	2753	1579	6579

FRAME	FIG.	D	D ₁	CONDITION	R ₂	RR	RL	CA	EA	FA	GA	KA	VA	WA	S	T°
560	1	26						32½	3½	8	26½	18½			¾	21.2
590		30						32½	3½	8	26½	18½			¾	16.3
560	2	33						25½	4	8	26½	18½	4	4	¾	21.5
590																



NOTES:
 1. ON FIG. 1, BASE TOP FLANGE ON (T°) SIDE MAY BE BURNED OUT (DIM. VA OR WA) FOR CLEARANCE. SEE CERTIFIED DIM. DWG. ON FIG. 2, BASE IS FABRICATED TO PRODUCE VA & WA INDENTS.

- CONDITIONS: (VIEW FROM SHEAVE END)**
 1. SWUNG LEFT 3. SWUNG R. OR L.
 2. SWUNG RIGHT 4. AS SHOWN
 OPP. FROM SHOWN



VIEWS FROM SHEAVE END

REF: DIMENSION DWG. 7-2090-0007

TITLE: DIMENSION DWG.
 ROPE CLEARANCE OUTLINE
 (FOR PEDESTAL GEARLESS MOTORS)

FRAME NO. DGR-560/590
 NO. NO.
 OLD DWG. NO.

IMPERIAL ELECTRIC CO.
 AKRON-MIDDLEPORT, OHIO

DWG. NO. 3-0090-0003

SCALE: N.T.S.

DESIGN REF. 3-0089-0011
 7-2090-0007

DRAWN W.H. COPSEY 3-3-82

CHEK'D. DATE

DATE

CERTIFIED ONLY FOR

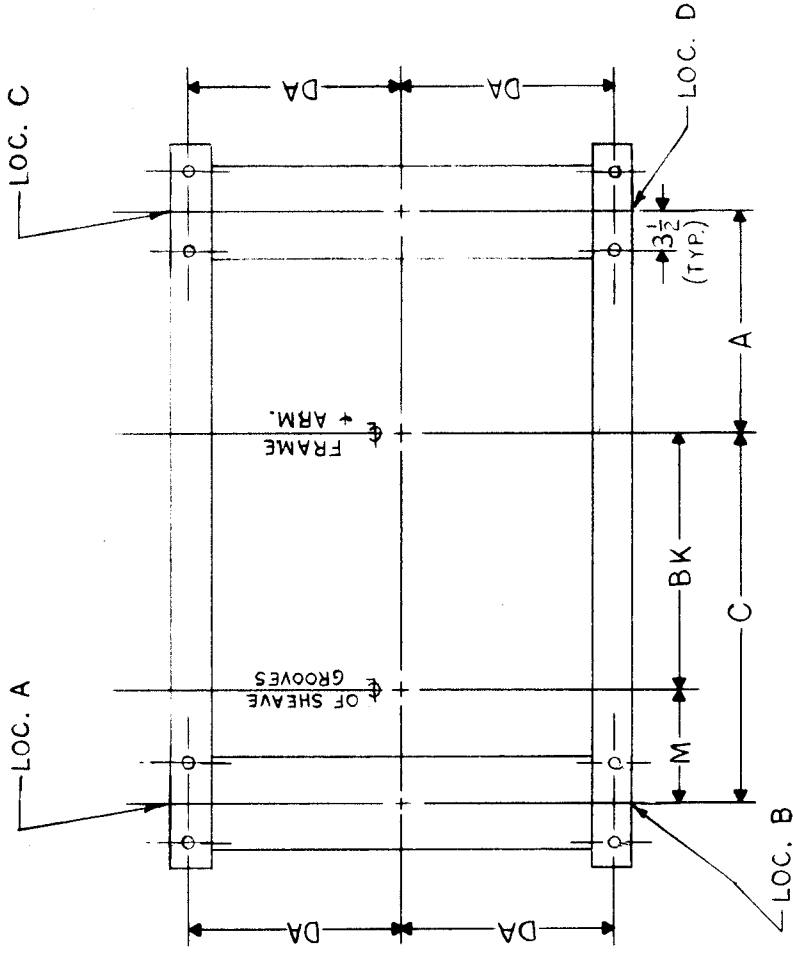
CUSTOMER _____
 CUSTOMER ORDER NO. _____
 IMPERIAL ORDER NO. _____

FRAME _____ BY _____ DATE _____

A

FRAME	WT. MOTOR	(d)				(e)				(f)				
		A	BK	C	M	DA	LOC. A	LOC. B	LOC. C	LOC. D	LOC. A	LOC. B	LOC. C	LOC. D
565	6395	22 ⁷ / ₈	22	31 ¹ / ₁₆	9 ¹ / ₁₆	18 ¹ / ₄	18,190	5,007	1,025	1,475				
566	6796	22 ⁷ / ₈	22	31 ¹ / ₁₆			18,302	5,096	1,150	1,650				
591	6545	17 ⁵ / ₈	20 ¹ / ₂	30 ³ / ₁₆			17,702	5,570	1,250	2,150				
593	7418	19 ¹ / ₈	22	31 ¹ / ₁₆			18,167	5,542	1,700	2,800				
596	8297	20 ⁵ / ₈	23 ¹ / ₂	33 ³ / ₁₆		▼	18,607	5,542	2,150	3,450				
598	9674	22 ⁷ / ₈	25 ³ / ₄	35 ¹ / ₁₆		▼	19,250	5,600	2,600	4,200				

B



NOTES:

- a. THE BASE STATIC LOADS SHOWN ARE BASED ON THE WEIGHT A COMPLETE GEARLESS MOTOR AND A MAXIMUM SHEAVE LOAD OF 40,000 LBS. THE DYNAMIC LOAD DUE TO ACCELERATION AND DECELERATION OF CAR ETC., IS INCLUDED IN THE 40,000 LB. MAXIMUM SHEAVE LOAD AND IS ACCOUNTED FOR IN THE STATIC LOAD COLUMN.
- b. THE DYNAMIC LOAD COLUMN GIVES THE ADDITIONAL DYNAMIC LOADS DUE TO STATOR AND BRAKE.
- c. DIMENSIONS SAME AS ON DIM. PRINT 5-2090-0007.
- d. WEIGHTS SHOWN ARE FOR 30" BRAKE DRUM, 26" P.D. SHEAVE. FOR 30" P.D. SHEAVE, ADD 115 LBS.. FOR 33" P.D. SHEAVE, ADD 245 LBS..

CERTIFIED ONLY FOR

CUSTOMER _____ CUSTOMER ORDER NO. _____
 IMPERIAL ORDER NO. _____ FRAME _____ DATE _____
 BY _____

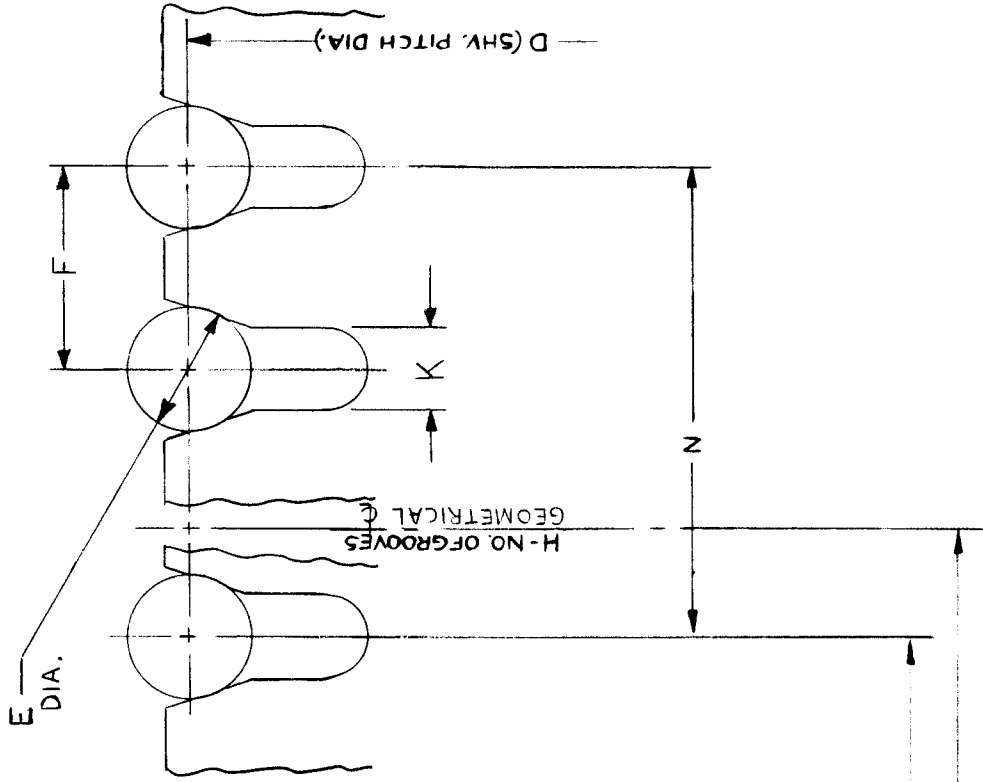
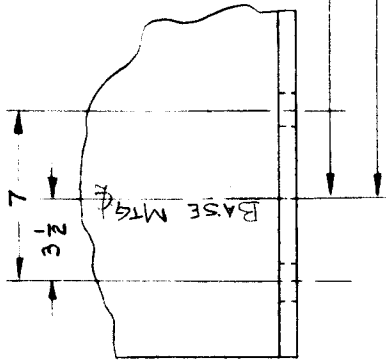
SCALE 3/32" = 1" FOR 593		TITLE WEIGHT DISTRIBUTION		FRAME NO. ALL
DESIGN 5-2090-0007		DRAWN DATE 3-4-82 R.F.		NO. GEARLESS
REVISED	DATE	INSPECTION	DATE	M. NO. OLD DWG. NO.
ORIGINAL				
IMPERIAL ELECTRIC CO. AKRON-MIDDLEPORT, OHIO			DWG. NO. 3-0090-0004	PAGE NO. 9

A

B

FRAME	D*	E*	F	H*	K	M	N*	P*
560		$\frac{1}{2}$	$\frac{13}{16}$		$\frac{3}{8}$	$\frac{9}{16}$		
590		$\frac{5}{8}$	$\frac{7}{8}$		$\frac{7}{16}$			
			$\frac{13}{16}$		$\frac{3}{16}$			
		$\frac{1}{2}$	$\frac{13}{16}$		$\frac{3}{16}$			
		$\frac{5}{8}$	$\frac{7}{8}$		$\frac{7}{16}$			

* REF. ONLY.
SEE CERTIFIED DIM. DWG.
FOR ACTUAL CONTRACT
DETAILS.



11,477	1-1-74
11,333	9-9-93
REVISION	

SCALE	N.T.S.	TITLE	FRAME DGR 560/590
DESIGN REF.	3-0090-0005	GEARLESS MOTOR SHEAVE GROOVING	
DRAWN DATE	2-27-92 R.F.	V-GROOVES FOR SINGLE WRAP DRIVE	
CHK'D DATE		IMPERIAL ELECTRIC CO.	DWG NO. 3-0090-0006
INSP DATE		ARRON-MIDDLEPORT, OHIO	
CERTIFIED ONLY FOR			
CUSTOMER	IMPERIAL ELEC.		
ORDER NO.	ORDER NO.		
FRAME	BY	DATE	