

# Chapter 13

## Mechanical Power Transmission Systems

### SUMMARY

The purpose of this section is to describe world standards<sup>1</sup> for the most commonly used power source in industry — the electric motor — and some of the important power transmission components, such as transmission chains and sprockets, endless belt drives, metric module gearing, splines and serrations, and keys and keyways. Some standards for these items have been based on the metric measuring system, and the others on the customary inch system. The main differences will be pointed out in this chapter to facilitate worldwide interchangeability of parts. A number of ISO and IEC standards have been issued on the subject, and some of the most important standards, as well as the ISO technical committee organizing the technical work behind each standard, are listed at the end of the chapter. Note that the technical committees are designated by the letters TC, followed by the appropriate committee number.

Information presented in ISO and IEC standards and draft proposals have been included, but since they are subject to change, care should be exercised with some of the material presented.

<sup>1</sup>For information about the term “standard” as used in this book, please see p.12.

### ELECTRIC MOTORS

#### INTRODUCTION

The material presented in this chapter is intended to give a brief introduction into standards related to the usage of electric motors; IEC has published several important standards on this subject and is active in developing standards for rotating electrical machines through its IEC/TC2 working groups and committees.

#### ROTATING SPEEDS

North America uses alternating electrical current with 60 Hz frequency, but most of the world uses 50 Hz power supply.

The synchronous rotating speed for induction motors is calculated by using the following formula:

$$n = \frac{F \bullet 120 \text{ (rpm)}}{p} = \frac{\text{frequency} \bullet 120 \text{ (rpm)}}{\text{number of poles}} \quad (13-1)$$

Electric motors (other than dc) rotate with speeds depending on the frequency of the power supply, and the most commonly used output speeds produced for industry are shown in Table 13-1.

#### POWER OUTPUT RATINGS

The nominal power outputs in kilowatts (kW) are specified in IEC 72-1 and shown in Table 13-2 for output ratings from 0.06 to 250 kW.

Preferred output powers for larger electric motors in a size range from 280 to 1000 kW are specified in IEC 72-1.

**TABLE 13-1 NOMINAL SYNCHRONOUS OUTPUT SPEEDS (rpm) FOR MOTORS OPERATING ON A 50 Hz OR 60 Hz ac SUPPLY**

SPEED (rpm)		
POLES	50 Hz	60 Hz
2	3000	3600
4	1500	1800
6	1000	1200
8	750	900
10	600	720