

SCOPE

- I ↗ 1.1 This practice covers application of motors.
- I 1.2 **An asterisk (*)** indicates that additional information is required. If a job is contracted, this additional information is furnished in the Job Specification.
- I ↗ 1.3 The following references are synonymous: BP and IP.

SUMMARY OF ADDITIONAL CODES AND STANDARDS

- I ↗ *2.1 **Applicable standards** of manufacture and test for motors are given in the practices listed in **Table 1**. For other conditions of purchase and use, motors shall conform to nationally recognized codes and standards which are approved by the Owner's Engineer and which are acceptable within the country where the motors will be used.

TABLE 1

PRACTICES	
IP 16-9-1	Low Voltage A-C Motors Up to 200 HP (150 kW)
IP 16-9-2	A-C Motors: Medium Voltage and Low Voltage Over 200 HP (150 kW)
IP 16-14-1	Standard LV Variable Frequency Drives
IP 16-14-2	Additional Requirements for Variable Frequency Drives Driving a Special Purpose Machinery Train

DEFINITIONS

- I ↗ 3.1 **Acceptable and Preferred Practices.** Where this practice lists more than one type of equipment or method as acceptable or preferred, the contractor shall make the selection based on optimum cost benefits. Optimum cost benefits may be achieved by reducing maintenance and operating expense through initial added investment. Economic basis for calculating optimum cost benefits will be specified in the design documents.

SELECTION

- S 4.1 **Table 2** lists the **Enclosure Selection Guidelines**.
- R ↗ *4.2 **Modifications to Table 2** shall be made, with the Owner's Engineer's approval, where special conditions make this necessary. For example:
 - a. Filters may be required for drip-proof or weather-protected motors in locations that have large quantities of air borne contaminants, dirt, sand, or other solid particles in the air.
 - b. Totally-enclosed fan-cooled or totally-enclosed water-air-cooled motors may be required:
 - 1. When filters cannot provide effective separation because of small size and/or quantity of solid particles in the air **or**
 - 2. In locations having marine exposure to prevent contamination of windings due to high salt content in the air.
- S ↗ *4.3 **Transient rotor temperature** shall be checked for non-explosion-proof motors driving fans and other high-inertia loads in Division 2 locations. Calculated rotor temperature during a **normal** start from design operating temperature must not exceed 80% of the autoignition temperature in °C of the gas or vapor involved. Owner's Engineer shall be advised of any situation requiring modification to vendor's standard design.
- C,R ↗ *4.4 **Transient rotor over-temperature** during locked-rotor or repeated-start conditions is classed as an abnormal occurrence. Special protection shall not be provided against this condition. Specifically, specially designed motors such as "increased safety" types, and associated fast overcurrent relays, shall not be used unless required by local standards.
- R 4.5 **3-phase motors** shall be used in all critical services, such as process units or boiler plants, 1/2 hp (0.37 kW) and larger.

IP 16-7-1		Motor Application	EXXON INTERNATIONAL PRACTICE
Page 2 of 3			
Rev. 0	June 1997		

DESIGN

- R 5.1 **When resistance temperature detectors are provided in the stator winding**, a minimum of three of the six or more detectors furnished shall be connected to an external monitoring system. This can be accomplished via remote data logging or PLC. If the system is local to the motor location, detectors shall be connected through a selector switch to a temperature indicator-controller with double-throw high alarm contacts. The detectors connected to the switch shall be spaced uniformly around the circumference of the stator. The system shall operate as follows:
- The alarm contact shall have an adjustable set point.
 - Indicator shall be capable of reading at least 68°F (20°C) above controller set point.
 - Two resistors shall be provided, preferably mounted in the indicator, so as to test the alarm operation and the calibration of the indicator.
 - The selector switch shall permit switching among detectors and have test and calibrate positions. The contacts shall be arranged to prevent alarm actuation during switching.
- S 5.2 **Ventilating air** for totally-enclosed pipe-ventilated and forced-ventilated motors shall be drawn from a clean, non-hazardous air source. Air shall be filtered if necessary.
- O,R 5.3 **Auxiliary fan motors** for totally-enclosed forced-ventilated motors shall be supplied via individual feeders, connected to separate power sources if possible. Fan motor starters shall have time-delay undervoltage release. Loss of auxiliary fan shall be alarmed.
- R 5.4 **Control** of totally-enclosed forced-ventilated motors shall be arranged to prevent starting of main motor unless one of the auxiliary fans is operating. Control stations for fan motors shall be located adjacent to the control station for the main motor. Each fan control station shall have a pilot light which shall indicate when the fan motor is energized.
- R 5.5 **Double tube coolers** are required for totally-enclosed water-air-cooled motors having the coolers mounted within the motor enclosure. Annular spaces between tube walls shall be drained to an inspection point outside the motors.
- An enclosed float switch and collecting pan shall be provided mounted externally on the motor housing to sense water draining from the tube annulus and to operate a water leakage alarm.
- C,R * 5.6 **Single tube coolers** may be used for totally-enclosed water-air-cooled motors if the coolers are mounted below the motor in a design, approved by the Owner's Engineer, which provides the following:
- Baffling against leaks impinging directly on windings.
 - Vertical sections in paths from cooler to fan inlets with design air velocity under 600 fpm (3 m/s).
 - Indication of water leaks.
 - Access to cooler for maintenance and its removal without moving the motor.
 - Running with once-through ventilation if the cooler is out of service (not applicable for pressurized design).
- R 5.7 **High and low flow devices** shall be provided in the cooling water circuit of totally-enclosed water-air-cooled motors. The high flow device shall operate an alarm and the low flow device shall operate an alarm immediately and then trip the motor after a time delay through a hand-reset lockout relay.
- S 5.8 **Power for excitation auxiliary circuits of synchronous motors** shall be powered such that the auxiliary circuits are safely deenergized when the motor controller is removed from service.

Revision Memo

9/68
1/72
6/75
1/76
12/92
6/97

Original Issue of Basic Practice
Revision 1
Revision 2
Revision 3
Revision 4

Revision 0 - Original Issue of International Practice.

Purpose Codes added throughout. The following paragraphs contained in BP 16-7-1 Rev. 4 have been deleted: 4.1, 4.2, 4.7, 4.9-13, 5.8. Par. 1.1 wording was revised. Par. 1.3 BP/IP reference was added. Par. 2.1 revised to be consistent with motor and VFD practices and added Table 1 listing of applicable IPs. Par. 3.1 life cycle costs added. Par. 4.2b combines Old Subpars. b & c and clarifies wording. Par. 4.3 added OE notification. Par. 4.4 added local standards comment. Par. 5.1 remote temperature monitoring was added. Par. 5.2 deleted information covered in IP 16-9-2. Par. 5.3 added alarm. Table 2 zones and equivalent motor enclosures were added.

© Exxon Research and Engineering Company, 1992, 1997



Documents

Document Sharing Hub

THIS INFORMATION FOR AUTHORIZED COMPANY USE ONLY
EXXON RESEARCH AND ENGINEERING COMPANY — FLORHAM PARK, N.J.