2052.222–70 Nondiscrimination because of age.

As prescribed at 2022.901–70, insert the following clause in applicable solicitations and contracts:

Nondiscrimination Because of Age

It is the policy of the Executive Branch of the Government that:

(a) Contractors and subcontractors engaged in the performance of Federal contracts may not, in connection with the employment, advancement, or discharge of employees or in connection with the terms, conditions, or privileges of their employment, discriminate against persons because of their age except upon the basis of a bona fide occupational qualification, retirement plan, or statutory requirements; and

(b) That contractors and subcontractors, or person acting on their behalf, may not specify, in solicitations or advertisements for employees to work on Government contracts, a maximum age limit for employment unless the specified maximum age limit is based upon a bona fide occupational qualification, retirement plan, or statutory requirement.

(End of Provision)

2052.231–70 Precontract costs.

As prescribed in § 2031.109–70, insert the following clause in applicable solicitations and contracts:

Precontract Costs

Allowable costs under this contract must include such costs, incurred by the contractor in connection with the work covered by this contract during the period from * and including * to the effective data of this contract, as would have been allowable pursuant to the terms of this contract if this contract had been in effect during that period; provided, however, that the costs may not in aggregate exceed * which is included in the estimated cost of this contract.

*To be incorporated into any resultant contract

(End of Clause)

2052.235–70 Publication of research results.

As prescribed in 2035.70, insert the following clause in applicable solicitations and contracts:

Publication of Research Results

(a) The principal investigator(s)/contractor shall comply with the provisions of NRC Handbook 3.8 (formerly MC 3202) and NRC Manual Chapter 3206 regarding publication in refereed scientific and engineering journals or dissemination to the public of any information, oral or written, concerning the work performed under this contract. Failure to comply with this clause shall be grounds for termination of this contract.

(b) The principal investigator(s)/contractor may publish the results of this work in refereed scientific and engineering journals or in open literature and present papers at public or association meetings at interim stages of work, in addition to submitting to NRC the final reports and other deliverables required under this contract. However, such publication and papers shall focus on advances in science and technology and minimize conclusions and/or recommendations which may have regulatory implications.

(c) Prior to any such publication, the contractor shall submit the proposed publication to the NRC Contracting Officer and Project Officer for review and approval.

(End of Clause)

2052.235–71 Publication of research results—universities

As prescribed at § 2035–70 substitute the following paragraph (c) for paragraph (c) in 2052.235–70.

(c) The principal investigator(s) shall coordinate all such publications with, and transmit a copy of the proposed article or paper to, the NRC Contracting Officer or Project Officer, prior to publication. The NRC agrees to review and provide comments within thirty (30) days after receipt of a proposed publication. However, in those cases where the information to be published is:

(1) subject to Commission approval;

(2) has not been ruled upon, or

(3) disapproved by the Commission, the NRC reserves the right to disapprove or delay the publication. "Further, if the NRC disagrees with the proposed publication for any reason, it reserves the right to require that any publication not identify the NRC's sponsorship of the work and that any associated publication costs shall be borne by the contractor.

(End of Clause)

2052.235–72 Safety, Health, and Fire Protection.

As prescribed in 2035.70, insert the following clause in applicable solicitations and contracts:

Safety, Health, and Fire Protection

The contractor shall take all reasonable precautions in the performance of the work under this contract to protect the health and safety of its employees and of members of the public, including NRC employees and contractor personnel, and to minimize danger from all hazards to life and property and shall comply with all applicable health, safety, and fire protection regulations and requirements (including reporting requirements) of the Commission and the Department of Labor. In the event that the contractor fails to comply with these regulations or requirements, the contracting office may, without prejudice to any other legal or contractual rights of the Commission, issue an order stopping all or any part of the work; thereafter, a start order for resumption of work may be issued at the discretion of the contracting officer. The contractor shall make no claim for an extension of time or for compensation or damages by reason of, or in connection with, this type of work stoppage.

(End of Clause)

Dated at Rockville, Maryland this 9th day of December, 1992.

For the Nuclear Regulatory Commission.

Samuel J. Chilk,

Secretary of the Commission.

[FR Doc. 92–30419 Filed 12–22–92; 8:45 am]

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Part III

Department of Labor

Mine Safety and Health Administration

30 CFR Parts 7 et al.

Electric Motor Assemblies; Electric Cables, Signaling Cables and Cable Splice Kits; Final Rules

DEPARTMENT OF LABOR

Mine Safety and Health Administration

30 CFR Parts 7 and 18

RIN 1219–AA61

Electric Motor Assemblies

AGENCY: Mine Safety and Health Administration (MSHA), Labor.

ACTION: Final rule.

SUMMARY: This final rule establishes the specific requirements for MSHA approval of certain explosion-proof electric motor assemblies intended for use in approved equipment in underground mines. It will primarily affect manufacturers of equipment intended for use in underground mining. Applications for approval or extensions of approval submitted three years after the effective date of this rule will be required to be in compliance with subpart J of part 7. Those motors that incorporate features not specifically addressed in subpart J of part 7 will continue to be evaluated under part 18.

EFFECTIVE DATE: This regulation is effective February 22, 1993. The incorporation by reference in § 7.304(g) of the final rule is approved by the Director of the Federal Register as of February 22, 1993.

FOR FURTHER INFORMATION CONTACT: Patricia W. Silvey, Director, Office of Standards, Regulations and Variances (703) 235–1910.

SUPPLEMENTARY INFORMATION:

I. Background

On June 22, 1988, with the promulgation of part 7, MSHA implemented new procedures and requirements for testing and approving certain products used in underground mines (53 FR 23486). As explained in that rulemaking, products approved under part 7 are required to be tested by the applicant or tested by a third party selected by the applicant. All testing is to be conducted using MSHA specified test procedures with certification of test results by the applicant. In addition, the Agency has the right to observe all product testing. When requesting approval, the applicant is required to submit certain product information. This includes, for example, drawings and specifications to document compliance with the technical requirements. Based upon an evaluation of the technical documentation, MSHA observations of product testing, and a review of the certification statements, MSHA will issue an approval or notice denying approval of the product.

Once a product is approved under part 7, an approval holder is required to inspect or test critical characteristics of the product as part of its quality assurance program. Under the provisions of subpart A of part 7, the approval holder must report to MSHA any knowledge that a product has been distributed with critical characteristics not meeting required specifications. Upon receiving such a report, MSHA will work with the approval holder to implement appropriate corrective action. As critical characteristics are features of a product which, if not built to specification, can create a hazard, immediate notification is necessary. MSHA performs periodic audits of products approved under part 7 to ensure that they are being manufactured as approved. If a product fails to meet the technical requirements of part 7 or creates a hazard related to its use, MSHA will take immediate action to address the problem, including revocation of the approval if necessary. Although MSHA's experience with existing subparts to part 7 is limited, primarily due to delayed effective dates, this transition has been positively received by manufacturers and applied without complications.

On March 12, 1991 (56 FR 10464), MSHA published a proposed rule that addressed specific requirements for MSHA approval of certain explosion-proof motor assemblies intended for use in approved equipment in underground mines. Written comments were required to be submitted by June 14, 1991. The agency received written comments from all segments of the mining industry, and the final rule addresses these comments.

As a new subpart J to part 7, this final rule specifies the technical requirements and test procedures for the approval of electric motor assemblies. The rule is derived from existing part 18 and MSHA policies. It provides objective criteria for applicant or third party testing and replaces subjective technical requirements with performance-oriented tests. The tests are based on MSHA's engineering experience with the subjective criteria in the existing approval requirements. They are not intended to introduce more stringent testing methods, but rather to more explicitly state the tests used in MSHA's current testing program which have proven to be effective. Under the rule, manufacturers will use these test procedures to measure, evaluate, and certify compliance of their product with the requirements of subpart J of part 7 in order to receive an MSHA approval.

One commenter suggested that all testing should continue to be performed by MSHA. This commenter believed that the testing procedures would not be strictly adhered to and that there would be no health and safety benefit from applicant or third-party testing. As stated previously, the applicant must certify to product testing and performance, as required, and meet all of the applicable quality assurance requirements, including inspection or testing of the product's critical characteristics. False certifications are subject to criminal sanctions under section 110(f) of the Federal Mine Safety and Health Act of 1977 (Mine Act). MSHA will take immediate action to address any problems identified during product audits, including revocation of the approval if necessary.

The part 7 approach, when fully implemented, will allow the Agency to reallocate resources to product audit activities and the evaluation of technological improvements in mining products submitted for approval. MSHA continues to believe that implementation will result in improved quality assurance and more rapid introduction of technological improvements into the mines, thereby improving miner safety.

This commenter further expressed the opinion that the protections offered by the Mine Act under section 110(h) would not be guaranteed if the testing occurred outside the United States. The responsibilities of the applicant under this section are not affected by this change in approval procedure. The issue of product testing conducted outside the United States is addressed by 30 CFR 7.4(d), a general provision of part 7 which restricts such testing to where it is specifically required by international agreement.

Commenters also suggested that MSHA use consensus standards as the basis for approval of explosion-proof motors. The intent of part 7 is to provide objective technical subparts based on current MSHA regulations. The testing procedures incorporated into part 7 subparts are procedures that the Agency has used successfully for a number of years and for which objective criteria have been established. While these criteria may be revised and modified to clarify existing subjective requirements, they are not intended to introduce new technological requirements. Consensus standards have not been incorporated in this subpart because their use is inconsistent with this intent and was not an objective of this rulemaking.

This final rule is consistent with the Mine Act, Executive Order 12291, the Regulatory Flexibility Act, and the Paperwork Reduction Act and is issued under the authority of section 508 of the Mine Act (30 U.S.C. 957).

II. Discussion of Final Rule

The following section-by-section analysis discusses each provision of subpart J and each revision to part 18 and addresses comments received in response to the proposed rule.

A. Section-by-Section Discussion of Part 7

Section 7.301 Purpose and Effective Date

This section, derived in part from existing § 18.1, revises and simplifies the statement of purpose and requires that certain electric motor assemblies be approved under part 7. The final rule establishes the specific requirements for approval of explosion-proof motor assemblies intended for use on-board approved equipment. Those motor assembly designs that contain devices not provided for under subpart J, such as devices for ventilation, pressure relief and drainage, will continue to be evaluated under existing part 18. In addition, designs incorporating parts common to explosion-proof enclosures other than conduit boxes and those incorporating new technology will also be addressed under part 18. These designs are not being covered under subpart J because their acceptance by MSHA requires an individual evaluation of design and performance tests. Designs incorporating parts common to explosion-proof enclosures other than conduit boxes and those incorporating new technology would also require evaluation on an individual basis.

MSHA specifies a three-year phase-in period for the implementation of subpart J. This three-year phase-in period will allow industry time to fully develop testing facilities. During the phase-in period, MSHA will accept applications for certification and extension of certification under existing part 18 or applications for approval under subpart J of part 7. After three years, all motor assemblies submitted for approval, except those with designs not covered under subpart J, will be required to be submitted under subpart J and meet its requirements.

One commenter questioned the availability of competent third-party test facilities within the proposed two-year phase-in period. The commenter also suggested the MSHA continue to provide testing for applicants under subpart J until cost-competitive test facilities are available. The Agency has reconsidered the length of time that may be needed for this implementation period and has increased the phase-in period to three years in the final rule. Some facilities are currently available to provide third-party testing, and the Agency estimates that full implementation can be accomplished within three years.

Section 7.302 Definitions

The following definitions apply to the approval of electric motor assemblies. Most are derived from existing § 18.2, although some are new. In order to address the specific requirements for motor assemblies, some of these definitions have been modified. All of these definitions are designed to clarify the requirements of subpart J.

Afterburning. The combustion of any flammable mixture that is drawn into an enclosure after an internal explosion in the enclosure. This definition clarifies the definition in § 18.2 by stating that afterburning is determined through detection of secondary pressure peaks occurring subsequent to the initial explosion. This phenomenon is characterized by the development of secondary pressure peaks following a negative or zero pressure at the termination of the preceding pressure peak.

Cylindrical joint. This definition is the same as that in § 18.2 and is a joint comprised of two contiguous, concentric, cylindrical surfaces.

Explosion-proof enclosure. The rule modifies the existing definition in § 18.2, which defines an explosion-proof enclosure as a metallic enclosure used as a winding compartment, conduit box, or a combination of both that complies with the applicable requirements of § 7.304 and that is constructed to withstand the explosion tests of § 7.306. This definition is modified to be specific to electric motor assemblies, as their subpart applies only to motor assemblies.

Fastening. This definition includes a bolt, screw or stud used to secure adjoining parts to prevent the escape of flame from an explosion-proof enclosure. Although the definition is new, it reflects the items included as fastenings in existing § 18.32.

Flame-arresting path. This definition identifies two or more adjoining or adjacent surfaces between which the escape of flame is prevented as a flame-arresting path. It is the same as that contained in § 18.2.

Internal free volume (of an empty enclosure). The rule identifies the internal free volume of an empty enclosure as that volume remaining after deducting the volume of any part that is essential to maintaining the explosion-proof integrity of the enclosure or necessary for operation of the motor. Essential parts would include the parts that constitute the flame-arresting path as well as those necessary to secure the parts that constitute a flame-arresting path. This definition is important because the volume of the enclosure defines the minimum design requirements of the explosion-proof enclosure. While the definition is new, it retains the interpretation of "volume of empty enclosure" currently used for the classification of construction requirements contained in existing § 18.31.

Motor assembly. This new definition defines a motor assembly as the winding compartment including a conduit box when specified. It also clarifies that the motor assembly would be comprised of one or more explosion-proof enclosures. This definition describes the typical arrangement currently used for motor assemblies in underground mines.

Plane joint. This definition identifies a plane joint to be a joint comprised of two adjoining surfaces in parallel planes. It is the same as that contained in § 18.2.

Step (rabbet) joint. This definition is derived from § 18.2. It retains its existing meaning and specifies a step or rabbet joint to be a joint comprised of two adjoining surfaces with one or more changes in direction between the inner and outer edges. Examples of a step joint would be one composed of a cylindrical portion and a plane portion or one composed of two or more plane portions.

Stuffing box. This new definition identifies and entrance that has a recess filled with packing material for cables extending through a wall of an explosion-proof enclosure.

Threaded joint. This definition maintains the definition in existing § 18.2 that a threaded joint is a joint consisting of a male- and a female-threaded member, both of which are the same type and gauge.

General definitions such as "applicant," "approval," and "post-approval product audit" are not included in this subpart. They are defined in the general provisions of subpart A of part 7.

Section 7.303 Application Requirements

Under the final rule, derived from existing § 18.6(a), an application for approval of a subpart J motor assembly is required to contain sufficient information to document compliance with the technical requirements of subpart J. The application must be accompanied by a composite drawing or drawings showing the design specifications for the motor assembly. For clear identification, each drawing is required to be titled, dated, and

numbered and include the latest revision number. A sample of a composite drawing is available upon request from the Approval and Certification Center, RR #1, Box 251, Industrial Park Road, Triadelphia, West Virginia 26059.

A commenter suggested that § 7.303 should include a statement that these application requirements are in addition to the procedures and requirements of existing § 7.3. This commenter was concerned that new applicants would be unfamiliar with the general requirements of part 7 subpart A. This final rule promulgates subpart J within part 7 and as such, all the general provisions of part 7 in subpart A are applicable. Consequently, it is necessary that applicants be familiar with all these general provisions.

Section 7.304 Technical Requirements

This section revises and updates the existing technical requirements for the approval of motor assemblies. The technical requirements for the approval of motor assemblies are derived from the existing requirements of part 18.

Paragraph (a) is derived from existing § 18.47 and specifies the maximum voltage rating as 4160 volts, which is the voltage limitation for machines approved under part 18. Paragraph (b) is derived from existing § 18.23 and limits the maximum temperature of the external sufaces of the motor assembly to 150°C (302°F) when operated at the manufacturer's specified ratings, which would be considered the normal operating conditions referred to in § 18.23. This is to prevent the thermal ignition of coal dust. A commenter suggested that the external motor surface temperature limitation of § 7.304(b) be applied when the motor is blanketed with dust. It was also suggested that because motors can be overloaded or have other abnormal operating conditions, additional tests should be conducted to verify that surface temperatures do not exceed 200°C under these conditions.

The motors approved under this subpart are intended for incorporation into permissible equipment approved under part 18 and used in gassy mines. Existing part 18 requirements limit the external surface temperature of motors to 150°C under normal operating conditions. Other requirements in part 18 address protection against motors running in overload or faulted conditions for prolonged periods. Part 75 prohibits excessive accumlations of coal dust and other combustibles on equipment. Therefore, the Agency believes that the limitation of 150°C, as specified in part 18 and incorporated in this subpart, provides adequate protection.

Paragraph (c) is derived from existing § 18.24 which requires the clearance between live parts and casings to be sufficient to minimize the possibility of arcs striking the casings. The rule establishes specific minimum clearance distances based upon the circuit voltage of the live parts. These minimum clearances are listed in table J–1. The minimums are applicable to the distance between uninsulated electrical conductor surfaces or between uninsulated electrical conductor surfaces and grounded metal surfaces within the enclosure. These minimum clearances are the result of an engineering study performed in conjunction with high voltage studies at MSHA's Approval and Certification Center.

One commenter suggested that reduced clearances for voltage ratings of 0–250 volts and 251–600 volts would be appropriate. The proposed rule addressed a voltage classification of 0–999 volts. Evaluation by the Agency of a further breakdown of voltage classifications as suggested has resulted in lesser clearances, consistent with the comment, for these voltage ranges. The final rule incorporates this modification. These clearances clarify existing requirements and will not result in additional costs to manufacturers nor impose new requirements.

Paragraph (d) of § 7.304, derived from existing § 18.34(a)(4), does not allow the use of parts such as bearings and seals for flame-arresting paths because they can become worn during the motor operation and therefore cause the explosion-proof integrity of the enclosure to be lost. Paragraph (e), derived from existing § 18.34(a)(6), adds o-ring grooves to the types of grooves to be deducted when determining the width of the flame-arresting paths. This change is consistent with existing MSHA policy that addresses the use of o-ring grooves.

Paragraph (f), derived from existing § 18.34(a)(8), allows an outer bearing cap to form part of a flame-arresting path only if it houses the bearing. A commenter suggested that this provision be modified to allow outer bearing caps that are not part of a bearing cartridge to form part of a flame-arresting path. A bearing cap that does not house the bearing is not essential for the motor operation and could inadvertently be removed from the motor assembly. If the bearing cap were part of the flame-arresting path, its removal would cause the motor assembly to lose its explosion-proof integrity. It is the Agency's experience that nonessential parts are sometimes inadvertently omitted; therefore, the final rule has not been modified.

The design requirements of paragraph (g) are derived from existing §§ 18.26, 18.29, 18.31 through 18.34, and current policy. Paragraph (g)(1), derived from existing § 18.31(a)(1), requires the motor assemblies to be constructed of metal, designed to withstand a minimum internal pressure of 150 pounds per square inch gauge (psig), to have castings free from blow holes and to be explosion-proof as determined by the tests of § 7.306. These requirements ensure that a motor assembly will withstand an internal methane explosion.

Paragraph (g)(2) of § 7.304, derived from existing § 18.31(a)(2), establishes the static pressure test requirements of § 7.307 as the minimum performance level for welded joints forming an enclosure. Submitting an enclosure to this performance test would be an alternative to welding in accordance with, or exceeding, American Welding Society (AWS) standard D14.4–77, which is incorporated by reference. This provides an objective requirement to replace the part 18 requirement that each application be evaluated individually as to the adequacy of the welding standards used. Existing § 18.31(a)(2) states that these welds are to be made in accordance with AWS standards, with no specific standard identified. MSHA policy has been to accept welds made in accordance with AWS D14–77. MSHA's experience with explosion-tested designs indicates that these minimum requirements provide a design adequate to maintain the explosion-proof integrity of the enclosure.

Paragraph (g)(3), derived from existing § 18.31(a)(3), limits the magnesium content of external rotating parts constructed of aluminum alloys to 0.6 percent. Existing § 18.31(a)(3) specifies this magnesium limit to be 0.5 percent. The Agency developed a policy approximately 20 years ago allowing a 0.6 percent magnesium content based upon experimental data demonstrating this value to be within the range of permissible safety limits. Paragraph (g)(3) is also derived from existing § 18.26 and requires that all nonmetallic rotating parts be provided with a means to prevent an accumulation of static electricity. This is to prevent a buildup of a static charge that could produce an incendive spark or arc. A commenter suggested that the requirements of this paragraph be applied to nonmetallic fan guards to evaluate their ability to dissipate static electricity. This comment was not adopted because

MSHA has not evaluated and certified any motors with nonmetallic fan guards. Future applications specifying these fan guards could be addressed as new technology under part 18.

Section 7.304(g)(4), derived from existing § 18.31(a)(5), requires threaded covers and mating parts to be designed with Class 1A and 1B coarse, loose-fitting threads. These are thread classifications from the American National Standard, ANSI B1.1–1982, "Unified Inch Screw Threads (UN and UNR Thread Form)". This provision retains the requirement contained in existing § 18.31(a)(5); however, the classification terms (Class 1A and 1B) are updated to reflect current terminology. The rule is still designed to minimize binding of threads. In addition, as in § 18.31(a)(5), the cover is required to be secured against loosening.

Paragraph (g)(5), derived from existing § 18.33, specifies requirements for the planarity, surface finish, and preparation of all flame-arresting path surfaces. These requirements are important because they relate to maintaining the maximum clearance between flame-arresting path surfaces to prevent the escape of flames and/or hot gases resulting from an internal explosion. One commenter suggested that the test method specified in a consensus standard be required for use to measure the surface finish. The maximum finish of the surface is critical, not the method of measurement. The final rule allows the applicant to determine the specific method, as long as the technical requirements are satisfied.

A second commenter recommended the following wording regarding rust inhibitors: "* * * so long as the final surface may be readily wiped free of any foreign materials." Because this was the intent of the requirement, the final rule includes this wording.

Paragraph (g)(6), derived from existing § 18.34(c), specifies clearance requirements between laminations and end rings for laminated stator frames. This also addresses hazards associated with the escape of flames and/or hot gases resulting from an internal explosion.

Paragraph (g)(7) of § 7.304 is derived from existing § 18.32(b) and requires locking devices to be provided for all fastenings securing parts which form flame-arresting path fits. The rule allows alternatives to lockwashers that meet the lockwasher equivalency test in § 7.308. The lockwasher equivalency test of § 7.308 provides an objective means of evaluating devices as currently permitted under existing § 18.32(b). One commenter suggested that lockwashers should not be required. As previously stated, the intent of part 7 subpart J is to objectively state the technical criteria presently required under part 18, not to introduce new or modified requirements. Therefore, the suggested modification is not included in this final rule.

Paragraph (g)(8), which is derived from existing § 18.32(c), requires all fastenings that hold a flame-arresting path part to be of uniform size, if practicable. This is intended to preclude improper assembly that may result in insufficient thread engagement or bottoming of the fastening. One commenter suggested that proposed § 7.304(g)(8) would change the requirement for uniformity of fasteners and would permit the use of nonuniform sized fasteners. However, the wording of this provision is identical to existing § 18.32(c), and it has been applied successfully. Therefore, this comment was not incorporated into the final rule.

Paragraph (g)(9), derived from § 18.32(d), requires that holes be threaded deeply enough so the fastenings would not bottom if the locking device is omitted. Paragraph (g)(10), which is also derived from existing § 18.32(d) and § 18.34(a)(9), requires that holes for fastenings not penetrate to the interior of the enclosure except as specified. This will prevent the existence of a through hole from the interior of the enclosure to the exterior through which flames and/or hot gases could escape in the event that a fastening were inadvertently omitted. Holes made through motor casings for bolts, studs or screws to hold parts that are essential for the motor operation are allowed.

Paragraph (g)(11) of § 7.304, derived from existing § 18.34(b), specifies requirements for the assembly of pole pieces to the frame of direct current motor assemblies, including the use of shims during assembly of the pole pieces. The pole bolts are necessary to maintain the pole pieces in the frame. The rule requires the total thickness of the shims to be specified, if used. This specification is required to determine the adequacy of the bolt engagement in the pole pieces. The rule also requires the shim assembly to meet the same requirements as the pole piece when mounted to the frame.

Paragraph (g)(12) allows for the use of coil-threaded inserts in holes for fastenings, provided they have conventional screw threads, the holes for the inserts are drilled and tapped consistent with the insert manufacturer's specifications, and the insert is long enough to ensure the required minimum thread engagement of the fastening in the insert. Although not addressed in existing part 18 requirements, current policy, based upon field experience, evaluation and testing by MSHA, permits their use. This provision allows correction of damaged threads for fastenings securing flame-arresting path parts that could lead to the expulsion of flames and/or hot gases due to an internal explosion. One commenter recommended that paragraph (g)(12)(ii) include the provision that the inserts be installed according to the manufacturer's specifications. This was specified in paragraph (g)(12)(iii) of the proposal and is addressed in the final rule.

Paragraph (g)(13) of § 7.304, derived from existing § 18.32 (e), clarifies the requirement for a minimum of ⅛ inch of stock at the bottom of each blind hole by identifying the subject holes as those that could penetrate into the interior of the explosion-proof enclosure. This requirement provides protection against failure of the enclosure surface beneath the blind hole in case fastenings are not present in the holes. One commenter suggested that under certain conditions a minimum of 1/16 inch be allowed in the bottom of blind holes. As previously stated, the intent of part 7 subpart J is to objectively state the established technical criteria presently required and successfully applied by MSHA under part 18, not to introduce new or modified requirements. Therefore, the suggested modification is not included in this final rule.

Paragraph (g)(14), derived from existing § 18.32(f), clarifies the requirement that fastenings hold only parts that are essential for maintaining the explosion-proof integrity of the motor or necessary for the operation of the motor. This ensures the proper thread engagement necessary to maintain the explosion-proof integrity of the enclosure. The rule also retains the requirement that the same fastenings not be used for making electrical connections. This addresses the concern that electrical energy could cause the connection to loosen or the hardware to deteriorate.

Paragraph (g)(15), derived from existing § 18.29(c), clarifies the requirements for through holes in explosion-proof enclosures. Although all through holes are required to be plugged, the plug for holes where future access is necessary only have to be spot welded or brazed, allowing for removal. However, plugs in through holes not requiring future access have to be continuously welded all around for permanent assembly. The rule also

requires removable plugs to meet the flame-arresting path requirements of § 7.304(g)(19). Figure J–1 in the appendix illustrates the alternate methods of securing the plug.

One commenter, concerned that spot welding or brazing can result in unnecessary damage, recommended that other means of securing plugs be allowed. Another commenter suggested alternate methods of securing plugs for holes where future access is not required. These methods that are accepted in some consensus standards include tack welding as a secondary securing measure. The methods specified in this paragraph provide the protection necessary to ensure the explosion-proof integrity of enclosures. Alternate methods would require an evaluation of the type of protection provided and therefore would be required to be evaluated under part 18.

Paragraph (g)(16) is new and specifies the acceptable location of o-rings in a flame-arresting path. Although not addressed in existing part 18, current policy specifies these locations when o-rings are installed to permit checking of flame-arresting path fits without interference from o-rings. This requirement is based upon the Agency's field experience and reflects proven methods needed for field inspection. Figures J–2, J–3, J–4 and J–5 in the appendix are included to clarify the required locations for o-rings.

One commenter expressed concern that the placement of o-rings specified in the proposed rule would result in trapped moisture, causing problems with rust, and suggested that alternate locations be allowed. The introduction of an o-ring does not increase the likelihood of rusting occurring on flame-arresting paths. Rust inhibitors may be used to protect against rust in these areas.

The commenter further suggested that the intent of the requirement of ½ inch in paragraph (g)(16)(ii) was for the o-ring to be located "at least one-half of the acceptable flame-arresting path in by the outer edge of the plane portion * * *". The intent of this requirement is, as stated in the final rule, for the o-ring to be located ½ inch within the outer edge of the plane portion.

Paragraph (g)(17) is new and sets requirements for the mating parts of a pressed fit. Although not addressed in existing part 18, these requirements are current policy developed to define pressed fits. A pressed fit must meet minimum interference and length requirements. These requirements are intended to ensure that the fit is sufficient to maintain the explosion-proof integrity of the motor assembly.

Paragraph (g)(18) of § 7.304, derived from existing § 18.31(a)(5), requires threaded joints to meet the applicable flame-arresting path requirements of § 7.304(g)(19). This addresses the hazards associated with the expulsion of flames and/or hot gases along these surfaces. One commenter suggested that threaded joints as specified under this paragraph must comply with the "minimum thread engagement of fastening" specified in Table J–2 of § 7.304(g)(19) and that an alternative construction based on the number of threads per inch be offered. The referenced minimum thread engagement requirement does not apply to the threaded joints addressed in this paragraph, but rather to hardware used to ensure the integrity of explosion-proof enclosures.

Paragraph (g)(19) references Table J–2 and footnotes that specify the design requirements for flame-arresting paths based on the volume of the empty enclosure. These provisions repeat requirements derived from existing § 18.31(a)(6), with a few clarifications and alternatives explained below.

One commenter requested clarification of the minimum requirements listed in the table concerning the tolerances in standard steel plate thicknesses. The minimum thicknesses included in the table apply to walls, covers, and flanges. While these dimensions are minimum values for flanges and covers, except where noted, they are intended to be the minimum nominal thickness of standard plate used for walls. The final rule includes a new Footnote 1 to clarify this requirement. The proposed footnotes have been renumbered accordingly in the final rule.

Under the maximum fastening spacing for joints, portions of which are in different planes, the specification of 8 inches with a minimum of 4 fastenings is added. This provides an objective requirement to replace the part 18 requirement that each application be evaluated individually. MSHA's experience with explosion-tested designs indicates that these minimum requirements provide a design adequate to maintain the explosion-proof integrity of the enclosure. The corresponding existing part 18 requirement has been retained to allow the continued individual evaluation of designs.

Footnote 5 of table J–2, derived from existing § 18.34(d), specifies alternate flame-arresting path dimension requirements for rabbet (step) joints on small motor assemblies having internal free volume not exceeding 350 cubic inches and joints not exceeding 32 inches in outer circumference. The requirements allow minimum total widths of rabbet (step) joints to be shorter than those specified in table J–2, provided the corresponding tighter clearances are maintained. Figure J–6 in the appendix is included to provide an illustration of a rabbet (step) joint.

Footnote 6 to the table in part 7, which is the same wording as Footnote 4 to the table specified in existing § 18.31, specifies the clearance requirements based on the length of flame-arresting path fits. One commenter questioned the need for this footnote. However, it provides additional clarification of the design requirements pertaining to these specific flame-arresting path fits and has been retained in the final rule.

Footnote 7 clarifies requirements pertaining to the use of studs as fasteners. One commenter requested clarification of the intent of this footnote. In response to this commenter, studs are included in the definition of fastening, and it is MSHA's intent that this footnote provide the basis for which studs are acceptable in lieu of mounting bolts.

Footnote 8 specifies clearance and location requirements for steel dowel pins. These pins are generally used in cover flanges to aid in aligning the covers. Although not addressed in existing part 18, these requirements are consistent with current policy. One commenter requested information on the need to reduce the spacing requirement from 6 inches to 5 inches for steel dowel pins. Where a steel dowel pin is located, an extra hole is created. Since a pin does not secure the cover, a reduction of bolt spacing is necessary to decrease the possibility of flame being admitted. This spacing requirement is based on MSHA's explosion-testing experience and has proven to be a safe design.

Footnotes 9 and 10 contain new performance-oriented criteria to evaluate fastenings not meeting the minimum diameter and thread engagement dimensions specified. Again, these footnotes provide an objective requirement to replace the part 18 requirements that each application be evaluated individually. MSHA's experience with explosion-tested designs indicates that these minimum requirements provide a design adequate to maintain the explosion-proof integrity of the enclosure. The corresponding existing part 18 requirement has been retained to allow the continued individual evaluation of designs. Footnote 9 allows the use of fastenings with diameters smaller than those specified in the table, provided

that the enclosure is first tested to meet the requirements of § 7.307 (static pressure test) and then § 7.306 (explosion-test). This new provision provides performance criteria upon which fastenings with smaller diameters will be evaluated. Footnote 10 allows minimum thread engagement less than the diameter of the fastening specified provided the enclosure meets these same test requirements. The criteria ensure adequate strength of the fastenings and threads for the motor design.

Footnote 11 of table J–2, which is new, specifies that the maximum clearance applies only when the fastening is located within the flame-arresting path. It clarifies when the requirement in the table is applicable. One commenter questioned whether the maximum diametrical clearance between fastening body and unthreaded holes through which it passes applied only when the fastening is located in the flame-arresting path. Footnote 11 specifically clarifies this concern.

Footnote 12, which addresses the deburring of holes, was inadvertently excluded from the proposal to this part 7 section. However, it is a footnote in existing § 18.31 and was proposed as a footnote to the revision of this section. For purposes of consistency, it is included in the final rule.

Footnote 13 states that the edge of the fastening hole must include the edge of any machining done to the fastening hole, such as chamfering. This is consistent with existing policy and is added for clarification.

Footnote 15 provides that shafts or operating rods not be less than ¼ inch in diameter. This provision has been changed in the final rule to be consistent with the comparable footnote published in proposed § 18.31(a)(6). This provision is also contained in existing part 18. The Agency's experience is that the ¼-inch minimum diameter provision for shafts and operating rods provides adequate strength for proper performance.

Commenters suggested that explosion-proof joint constructions specified in consensus standards be accepted as alternatives to the requirements of paragraph (g)(19). As previously stated, the intent of part 7 subpart J is to objectively state the established technical criteria presently required and successfully applied by MSHA under part 18, not to introduce new or modified requirements. Therefore, the suggested modification is not included in this final rule.

Paragraph (h) of § 7.304, derived from existing § 18.37, specifies the requirements for lead entrances. Except as explained below, the requirements are the same as those contained in existing § 18.37. Paragraph (h)(1) requires each cable extending through an outside wall of the motor assembly to pass through a stuffing-box lead entrance. This new provision reflects the Agency's belief that this is the only type of lead entrance for which objective criteria can be developed at this time.

Paragraph (h)(2) addresses the requirements for the proper packing of gland assemblies. Paragraph (h)(2)(i) specifies the minimum clearance distance for gland nuts. One commenter suggested that this provision clarify that there is no limitation on the maximum clearance distance as long as three effective engagement threads are maintained. It was MSHA's intent that the rule be applied in this way. Therefore, this clarification has been included in the final rule.

Paragraph (h)(2)(ii) provides for a minimum of three effective engagement threads for the packing gland nut. Although not contained in existing part 18, this minimum engagement is addressed by current policy. It was developed to define the minimum thread engagement for adequate mechanical strength.

Paragraph (h)(4) specifies a minimum of ½-inch contact distance for compressed packing material. One commenter requested that o-rings be allowed to be used to form a gas tight seal and further stated that if an appropriate o-ring were used it would not be necessary to maintain a minimum contact length of ½ inch. Such use of o-rings would constitute new technology and would not be subject to approval under this subpart. This category of design can be evaluated under part 18.

Paragraph (h)(5) replaces the term "asbestos packing material" with "MSHA accepted rope packing material" in order to address acceptable asbestos substitute materials. For clarification, Figures J–7 through J–14 in the appendix are included for use with the lead entrance requirements of paragraph (h).

Paragraph (i) specifies requirements for insulating material, with respect to combustible gases. These requirements are derived from existing § 18.25. Paragraph (i)(1) includes the existing part 18 requirement prohibiting the use of insulating materials that give off volatile gases when subjected to destructive electrical action. Paragraph (i)(2) allows any method of treatment to remove combustible solvents, instead of only heat as provided under existing § 18.25(b). As the desired result is removal of any combustible solvents, the method of removal is not critical.

Section 7.305 Critical Characteristics

This section is new and lists the critical characteristics that are required to be inspected on each motor assembly that has an approval marking. As defined in subpart A of part 7, a critical characteristic is a feature of a product that, if not manufactured as approved, could have an adverse effect on safety. This rule will assure the explosion-proof integrity of the motor assembly prior to use by requiring inspection of the critical characteristics of an approved motor assembly. This list of critical characteristics was developed using the applicable technical requirements in § 7.304 of this final rule. The same commenter who suggested that § 7.304(g)(7) omit the requirement for lockwashers also recommended that the critical characteristic pertaining to lockwashers be omitted. This suggestion was not incorporated into this provision for the reasons stated in the preamble discussion accompanying § 7.304 of this final rule.

Section 7.306 Explosion Tests

Section 7.306, derived from existing § 18.62, sets forth the equipment, test procedures, and acceptable performance criteria for the testing of a motor assembly to withstand an internal explosion of a combustible gas mixture. The provisions of this section provide objective criteria to evaluate the explosion-proof performance of a motor assembly.

Paragraph (a) requires the use of an explosion test chamber, methane gas supply, electric ignition source and a pressure recording system when conducting explosion tests. Factors that would affect the accuracy, reliability and repeatability of the testing procedures are specified.

The explosion test chamber is defined in paragraph (a)(1) as being designed and constructed to contain an explosive gas mixture. The gas mixture, as described in the testing procedures, would surround and fill the motor assembly being tested. The explosive gas contained within the chamber must envelop the motor assembly during testing. The amount of leakage from the chamber must be controlled so that the gas mixture is maintained within the specified tolerances for the duration of the testing. Therefore, a gas-tight chamber is not required. The chamber would be darkened and have flame-arresting path viewing capabilities enabling the testing personnel to discern the discharge of flame along flame-

arresting paths as well as the ignition of the explosive mixture surrounding the motor assembly being tested.

As specified in paragraph (a)(2) the methane gas supply must be composed of at least 98 percent of combustible hydrocarbons with inert products comprising the remainder. A minimum of 80 percent of the gas, by volume, is required to be methane. This composition of gas, which is specified to provide reliable and repeatable test results, is typical for commercial natural gas (methane) supplies.

Paragraph (a)(3) defines the coal dust to be used in the explosion tests. The existing identification of "Pittsburgh bed coal dust" in § 18.62(a) is replaced by a minimum volatile matter and BTU content. This change allows equivalent coal from other coal seams to be used in the tests. The requirement that the coal be ground to a fineness of minus 200 mesh is retained.

Paragraph (a)(4) establishes the minimum energy level for the electric spark ignition source as 100 millijoules. This minimum energy level ensures that there is sufficient energy available to ignite the explosive gas mixture within the motor assembly during each test. This provision retains the requirement in existing § 18.62(a) that an electric spark ignition source be used for the testing.

Paragraph (a)(5) is derived from § 18.62(a) and retains the existing requirement that the explosion pressure developed during testing be recorded. The rule clarifies this requirement by specifying that the pressure recording system must indicate the pressure peaks within the tested motor assembly as described in the test procedures.

Paragraph (b) of § 7.306 describes the general test procedures for conducting the explosion tests. The preparation of the motor for testing is described in paragraph (b)(1). this paragraph requires motor assemblies being tested to be equipped with unshielded bearings and have all parts not contributing to the operation or assuring the explosion-proof integrity of the enclosure removed. Examples of those parts to be removed include oil seals, grease fittings, hose conduit, cable clamps and outer bearing caps that do not house the bearings. Preparation of the motor assembly in this manner is consistent with existing MSHA policy.

The types of parts identified in paragraph (b)(1) could obstruct the observation of flame-arresting paths during testing and possibly inhibit the expulsion of flames and hot gases. Additionally, since these parts do not contribute to the operation or explosion-proof integrity of the motor, they can be omitted with no reduction in operational capabilities. Testing with these parts not present ensures that no reduction in safety results in such instances.

Paragraph (b)(2) addresses the general procedures of filling the chamber and motor assembly with explosive mixtures, the locations for pressure measurements, and the number of tests permitted before the chamber is purged and recharged. The motor assembly must be observed for discharge of flames during each test. In order to provide adequate observation of any discharge of flames, each externally visible flame-arresting path fit must be observed for discharge of flame for at least two tests, one with coal dust added.

The motor assembly must be filled with and surrounded by explosive methane mixtures for each test. Just before ignition, the gas concentration within the test chamber must be between 6.0 percent and the concentration within the motor assembly. This is specified in paragraph (c), which sets out test procedures. To ensure the accuracy of the test, the gas mixtures must be adequately mixed so that homogeneous gas concentrations within the explosive limits are present.

The rule also specifies that a single spark source is to be used for all testing, with test holes of sufficient quantity and location to permit ignition and pressure recording in each enclosure, as required in paragraph (c).

Finally, paragraph (b) also requires the motor assembly to be completely purged and recharged with a fresh explosive gas mixture from the chamber or by injection after each test. The chamber is required to be completely purged and recharged as necessary. The oxygen level will be maintained at no less than 18 percent. In the absence of oxygen monitoring equipment, the rule includes an alternative method for ensuring that this level is maintained. This method will limit the maximum number of tests between purgings to no more than the number obtained by dividing the chamber volume by forty times the motor assembly volume. This requirement for purging and recharging of the chamber is the result of testing and analysis of data obtained by MSHA.

The purging and recharging sequences are required in order to provide appropriate concentration levels of the combustion gases and the combustion by-products within the motor assembly chamber. The concentration levels of these various gases must be maintained within proper limits to ensure reliable and repeatable ignition and combustion of the explosive gas.

Paragraph (c) provides the specific testing procedures to be followed for each series of tests conducted on a motor assembly. The number of tests, methane concentration levels, stationary or rotating rotor, location of ignition source, and use of coal dust are specified. Existing § 18.62(a) requires testing under these various conditions; however, specific values are not stated. The values that are required under this rule have been developed from the Agency's testing experience and existing policy. The rule provides an objective testing procedure to evaluate all designs foreseen to be explosion tested under this subpart.

The methane concentrations of 7.0±.3 and 9.4±.4 percent are specified to accomplish testing at easily ignitable and violently explosive values, respectively. Ignitions while the rotor is rotating at rated speed test the motor assembly at maximum internal turbulence. Ignitions with the rotor stationary test the motor assembly with no turbulence along the flame-arresting path. Turbulence along the flame-arresting path might prevent flames from existing. If the motor assembly incorporates a nonisolated conduit box, two additional tests must be conducted with ignitions within the conduit box. These tests are designed to detect pressure piling in the winding compartment resulting from ignitions in the conduit box. Pressure piling from precompression of the gases in the winding compartment due to ignition of the gases in the conduit box could result in higher pressures being attained.

Four tests are then to be conducted with the gas concentration at 9.4±.4 percent methane and 0.05 ounces per cubic foot of internal free volume of the motor assembly of finely ground coal dust. The requirement of introducing coal dust is derived from § 18.62(a). The existing standard does not specify the quantity of coal dust to be added. The value of 0.05 ounces per cubic foot volume was established through MSHA's testing experience and engineering analysis to provide sufficient coal dust to coat all internal surfaces of the motor assembly.

These four tests, two with the rotor stationary and two with it rotating at rated speed, require ignitions within the motor assembly at varying locations. These locations were chosen, based on MSHA's testing experience, to produce the greatest potential for development of the highest pressures within the motor assembly upon ignition of the explosive mixture. Paragraph (c)(4) outlines additional testing procedures to be followed for motor assemblies that incorporate a conduit box isolated from

the winding compartment. Examples of isolating barriers would be terminals or potting compound, such as chico. Paragraph (4)(i) describes the location of ignition and pressure recording positions for the conduit box. Two ignition points are to be used for a conduit box with internal free volume greater than 150 cubic inches, one ignition point as near to the geometric center as practical and the other as far as possible from the isolating barrier between the conduit box and winding compartment. Pressure recording points are to be on the same and opposite sides of the conduit box as the latter ignition point. One ignition point as near to the geometric center as practical and one pressure recording point on a side of the conduit box are to be used for a conduit box with internal free volume equal to or less than 150 cubic inches.

Paragraph (4)(ii) requires the conduit box to be tested separately by performing the tests with the isolating barrier in place. A total of ten explosion tests must be performed on the conduit box, six tests with 9.4±.4 percent methane by volume followed by two tests with 7.0±.3 percent methane by volume. The remaining two tests must be conducted at 9.4±.4 percent methane with coal dust added. The quantity (per cubic foot) and specifications of the coal dust are the same as that provided for in paragraph (c)(3). If the internal free volume of the conduit box exceeds 150 cubic inches, the tests are to be equally divided between the two ignition points.

Paragraph (4)(iii) describes the testing sequence to be followed in removal of the isolating barrier. If the isolating barrier is comprised of multiple assemblies, such as terminals, one assembly is to be removed for the initial series of six explosion tests. Following this initial series of tests, one test will be conducted following the removal of each additional assembly. This procedure will continue until the motor assembly has been tested with all isolated barrier assemblies removed.

Each test conducted under this paragraph must be performed using an explosive gas mixture containing 9.4±.4 percent methane by volume within the conduit box and winding compartment. For the initial six tests, the rotor will be stationary for one test and rotating for another for each of three ignition points. The three ignition points must be opposite ends of the winding compartment and the conduit box ignition point which provided the highest pressures during the tests conducted in paragraph (c)(4)(ii). Of these three ignition points, the one that produces the highest recorded pressures will be used for testing following removal of each additional isolating assembly (sectionalizing terminal).

Paragraph (d) provides additional testing procedures or inclusion of a warning statement for any motor assemblies where recorded pressures exceeding 110 psig result following removal of any or all isolating barriers. The additional testing requires the motor assembly to withstand a static pressure test at a pressure of twice the maximum recorded explosion test pressure. As an alternative to conducting the static pressure testing, a warning statement is required. The warning statement, incorporated on the approval plate, states that the isolating barrier must be maintained to ensure the explosion-proof integrity of the motor assembly.

During maintenance and repair of electric motor assemblies, isolating barriers might not be included in the assembly procedure. Normally there is no evidence to indicate the prior existence of an isolating barrier. Deletion of this barrier could result in development of a hazardous situation with no prior warning. Paragraphs (c)(4)(iii) and (d) address this situation.

Some winding compartment-conduit box combination designs can result in increased explosion pressures due to pressure piling. The provisions of paragraphs (c)(4)(iii) and (d) allow the use of such designs while providing what MSHA believes to be adequate safeguards. A warning statement on the approval plate notifies the user that the integrity of the isolating barrier must be maintained to ensure the explosion-proof integrity of the motor assembly.

Paragraph (e) describes the acceptable performance criteria for explosion tests. These criteria are derived from existing § 18.62 (b) and (c). This rule requires that there be no flame discharge from the motor assembly or ignition of the explosive mixture surrounding the motor assembly. These conditions would indicate that the flame-arresting paths are inadequate to prevent the escape of flame and the enclosure is not constructed to withstand and contain internal explosions of methane-air mixtures. Rupture of any part of or any panel or divider within the motor assembly, clearances along accessible flame-arresting paths in excess of those specified in subpart J, and permanent deformation greater than 0.040 inches per linear foot are all indications of structural deficiencies of the motor assembly.

The criterion which considers development of afterburning as an unacceptable result of explosion tests is derived from § 18.62(b)(3). The term "afterburning" is applied to combustion, immediately after an internal explosion, of a gaseous mixture that was not in the enclosure at the time of that explosion. Sometimes the external gases are drawn into a motor interior immediately after an explosion as a result of the cooling of the product of the original explosion or otherwise and continue to burn. If prolonged, afterburning may damage the insulation. What is more serious is that the heating may allow flames to pass to the outside of the apparatus along flame-arresting paths that would otherwise be effective in cooling them. This condition reflects deficiencies in the motor assembly and would represent an increased hazard in an explosive atmosphere.

The occurrence of subsequent pressure peaks within an electric motor assembly in conjunction with an internal explosion is not an unusual event. This phenomenon occurs in multiple compartmented enclosures when the explosion is initiated in one compartment and propagates to the others. This occurrence differs from afterburning in that the secondary pressure peaks result from the combustion of the gases already present in the enclosure at the time of ignition. The pressure developed from the initial explosion is not completely dissipated at the time the secondary peaks develop.

Development of pressures exceeding 110 psig during explosion tests is not acceptable, unless the enclosure has met the acceptable performance criteria of the static pressure tests conducted at twice the maximum recorded explosion test pressure or a warning statement in accordance with § 7.306(d) is included on the approval plate. This provision modifies the existing requirements contained in § 18.62(c).

The ignition and pressure recording locations specified in the explosion test procedures are designed to provide the maximum pressure development and sensing for the enclosures. However, variations in enclosure designs may cause the specified locations to differ slightly from the "optimum" locations. To provide for this potential variation, the rule requires additional testing at a pressure indication of 110 psig rather than the 125 psig required in existing § 18.62(d). The rule also requires this testing to be done statically rather than dynamically, as specified in the existing regulations. The Agency believes that static pressure testing at two times the highest recorded explosion test pressure will provide an adequate safety margin to ensure a safe design. The static pressure test at these higher pressures also provides greater safety to the testing personnel since the development and

release of the testing pressure can be controlled.

The Agency received comments recommending alternate test methods, including the use of different gases and different test parameters. The test procedures contained in the final rule and discussed above are based on the current test procedures and part 18 requirements. Subjective areas were clarified and restated in an objective manner in order to formulate tests that can be repeatedly used by third parties. The use of other test procedures and test requirements was not an objective of this rulemaking. Therefore, test methods alternate to MSHA's established procedures were not included in the proposal and are not in the final rule.

Section 7.307 Static Pressure Test

Section 7.307 describes the test procedures and the acceptable performance criteria for conducting static pressure tests. The static pressure test is new and provides an alternative means of satisfying the technical requirements of § 7.304(g)(2) for welded joints, § 7.304(g)(19) (footnote 8) for diameters of fasteners, and § 7.304(g)(19) (footnote 9) for engagement of fasteners. The test will also be used, as specified in § 7.306(d) and (e)(6), for motor assemblies where explosion test pressures exceed 110 psig. The test procedures are based on the static test procedures developed as part of the approval criteria for high-voltage machines containing on-board switching of high-voltage circuits. These criteria resulted from engineering investigation and testing experience. The acceptable performance criteria are the same performance requirements of § 18.62 with regard to physical failure conditions.

The static pressure test provides an alternative means of satisfying the requirements of the above sections because the concern addressed by those sections was that of failure due to physical stress and deformities.

One commenter recommended the use of air as the pressurizing agent for the static pressure test with the inclusion of additional low-pressure tests. MSHA believes that while the suggested test procedures would meet the requirements and would provide acceptable testing, this is not the only means available to satisfy the test requirement. Therefore, the final rule does not require a specific pressurizing agent or test procedure. Additional tests can be conducted if desired by the applicant.

Another commenter suggested alternate test requirements for the static pressure test. As previously stated, the intent of part 7 subpart J is to objectively state the established technical criteria presently required and successfully applied by MSHA under part 18, not to introduce new or modified requirements. Therefore, the suggested modification is not included in this final rule.

Section 7.308 Lockwasher Equivalency Test

Section 7.308 specifies new test procedures and acceptable performance criteria when conducting tests on locking devices other than lockwashers. The lockwasher equivalency test provides an alternative means of satisfying the technical requirement of § 7.304(g)(7) if a locking device other than a lockwasher is used. The test has been developed based upon testing procedures specified in Society of Automotive Engineers (SAE) recommended practice, Torque-Tension Test Procedure for Steel Threaded Fasteners (SAE J174, 1971) and Military Specification, Inserts, Screw-Thread, Helical Coil (MIL–I–8846B, 1973). The same commenter who suggested that §§ 7.304(g)(7) and 7.305 omit the requirement for lockwashers recommended omitting the lockwasher equivalency test of this section. This suggestion was not incorporated into this provision for the reasons stated in the preamble discussion accompanying § 7.304 of this final rule.

Section 7.309 Approval Marking

Section 7.309, derived from § 18.13, requires a legible and permanent approval plate with the assigned MSHA approval number inscribed. The plate is required to be securely attached to the motor assembly in a manner that does not adversely affect the explosion-proof integrity of the motor assembly. The rule allows identification of approved subpart J motor assemblies in a manner that facilitates field identification of the motor assembly as approved by MSHA.

Section 7.310 Post-Approval Product Audit

Section 7.310 is new and requires an approval holder, upon request, to make available to MSHA at no cost an approved subpart J motor assembly for audit. This request will be made no more than once a year by MSHA, except for cause. The audit will be conducted at a mutually agreeable site and time. This will be in addition to MSHA's ongoing quality assurance program for which the agency can obtain products for audit at any time at MSHA's expense.

Section 7.311 Approval Checklist

Section 7.311 is new and requires the manufacturer to include with each motor assembly bearing an MSHA approval marking a list of items that should be checked by the user to ensure the motor assembly is maintained in approved condition. This is consistent with existing checklist requirements contained in §§ 7.51 and 7.71 of part 7.

B. Section-by-Section Discussion of Part 18

Part 18 includes various provisions by which MSHA can allow variations in design in the evaluation and testing of explosion-proof enclosures. Under these provisions MSHA can evaluate certain variations in designs based upon its experience, engineering judgment and testing results. This flexibility exists in part 18 but is not appropriate in a part 7 subpart. As a result, some specific modifications to part 18 requirements have been incorporated into part 7 requirements, but not part 18. Additionally, modifications judged appropriate for inclusion as part 18 requirements and necessary to make part 18 consistent with subpart J of part 7 are discussed below.

Section 18.4 Equipment for Which Approval Will Be Used

This section is revised to specify that components approved under part 7 will also be acceptable for incorporation in the assembly of a complete machine or accessory.

Section 18.24 Electrical Clearances

This section is revised to establish specific minimum clearance distances based upon the voltage of the energized parts. It specifies these minimum distances to define the adequacy of spacing required under the existing section. The minimums are applicable to the distance between uninsulated electrical conductor surfaces or between uninsulated electrical conductor surfaces and grounded metal surfaces within the enclosure. These minimum clearances are the result of an engineering study performed in conjunction with high voltage studies at MSHA's Approval and Certification Center. The clearances specified in the final rule are consistent with those specified in subpart J, which were modified as discussed earlier in response to a comment.

Section 18.31 Enclosures—Joints and Fastenings

Paragraph (a)(3) is revised to change the maximum allowable magnesium content of external rotating parts constructed of aluminum alloys to 0.6

percent from 0.5 percent. As stated in the preceding preamble discussion for § 7.304(g)(3), this is consistent with MSHA policy.

Paragraph (a)(5) is revised to change the Class 1 thread terminology of the existing requirement to the present Class 1A and 1B terminology, consistent with that of § 7.304(g)(4).

Paragraph (a)(6) is revised for consistency with subpart J of part 7. The introductory paragraph is changed to include an explanation of "internal volume of an empty enclosure." This explanation is expanded to include the parts necessary for use (operation), making it consistent with MSHA's existing policy.

The rule identifies the internal free volume of an empty enclosure as that remaining after the volume of any part that is essential to maintaining the explosion-proof integrity of the enclosure or necessary for operation. Essential parts include the parts that constitute the flame-arresting path, as well as those necessary to secure the parts that constitute the flame-arresting path. This explanation is important because the volume of the enclosure defines the minimum design requirements of the explosion-proof enclosure. The interpretation of "volume of empty enclosure" currently used is retained for the construction requirements in § 18.31.

The tabulated construction requirements are modified in several areas. The requirements for minimum thickness of material for flanges and covers are combined into one category. This change represents a format change only, since the technical requirements are unchanged. The maximum bolt spacing requirements for joints all in one plane are modified to include the requirement for "a minimum of 4 bolts" to be used in the category of "more than 124 cu. ins." of volume. This modification clarifies the Agency's belief and experience that a minimum of 4 bolts is necessary, regardless of the enclosure's volume or the configuration of the parts forming the joints.

The cylindrical joint portion of the table also includes several modifications. The maximum clearance along shafts centered by ball or roller bearings is expressed in terms of diametrical rather than radial dimensions for clarity. The parts that constitute these fits are generally expressed in terms of diametrical rather than radial dimensions.

The categories of "shafts through journal bearings" and "other than shafts" are combined into a single classification of "other cylindrical joints." The clearances specified are the diametrical equivalent for the radial clearances listed in § 18.31(a)(6) for shafts through journal bearings. Except as discussed below, the contents of the footnotes of § 18.31(a)(6) are retained.

Footnote 4 is derived from § 18.34(a)(6) and includes the requirement to deduct the width of oil grooves and grooves for oil seals in measuring the widths of flame-arresting paths. This provision is expanded to include any groove, because the minimum flame-arresting path length is still required to be met.

Footnote 8 is added to specify clearance and location requirements for steel dowel pins. These pins are generally used in cover flanges to aid in aligning the covers. These requirements are consistent with current policy.

Footnote 12, which is new, specifies that the maximum clearance applies only when the fastening is located within the flame-arresting path. It clarifies when the specification in the table is applicable.

Footnote 13 is added to state that the edge of the fastening hole must include the edge of any machining done to the fastening hole, such as chamfering. This is consistent with existing policy and is added for clarification.

Paragraph (a)(7) of § 18.31 is new and specifies the acceptable location of o-rings in a flame-arresting path. When o-rings are installed, current policy requires these locations to permit checking of flame-arresting path fits without interference from o-rings. This requirement is based upon the Agency's field experience. Figures J–2, J–3, J–4 and J–5 in the appendix to subpart J of part 7 are referenced to clarify the required locations for o-rings.

Section 18.32 Fastenings—Additional Requirements

Paragraph (i) is added to allow for the use of coil-threaded inserts in holes for fastenings, provided they have conventional screw threads, the holes for the inserts are drilled, tapped, and installed consistent with the insert manufacturer's specifications and the insert is long enough to ensure the required minimum thread engagement of the fastening in the insert. Although not addressed in existing part 18, as a result of evaluation and testing by MSHA, current policy permits their use. This provision allows correction of damaged threads for fastenings securing flame-arresting path parts that could lead to the expulsion of flames or hot gases due to an internal explosion.

Section 18.33 Finish of Surface Joints

This section is revised to read that a rust inhibitor is acceptable provided the final surface may be readily wiped free of any foreign materials. This change is consistent with the one previously discussed under § 7.304(g)(5) and was the intent of the requirement. This clarifies the type of preparation that might be used to inhibit rusting. The addition of foreign particles to a flame-arresting path is not desirable because it could interfere with maintaining the proper clearance to prevent the escape of flame and/or hot gases.

Section 18.34 Motors

This section is revised by adding an introductory paragraph to specify that explosion-proof electric motor assemblies intended for use in approved equipment in underground mines that are addressed by part 7 are to be approved under part 7. Explosion-proof motor assemblies incorporating designs not specifically addressed under part 7 will continue to be submitted for acceptance or certification under part 18. Those motor assembly designs that, for example, contain devices for ventilation, pressure relief and drainage will continue to be evaluated under part 18. In addition, designs incorporating parts common to explosion-proof enclosures other than conduit boxes and those incorporating new technology will also be addressed under part 18. These designs are not being covered under subpart J of part 7 because their acceptance by MSHA requires an individual evaluation of design and performance tests. Designs incorporating parts common to explosion-proof enclosures other than conduit boxes and those incorporating new technology will also require evaluation on an individual basis. Paragraph (a)(6) is revised by deleting the present wording "The widths of oil grooves and grooves for holding oil seals will be deducted in measuring the widths of flame-arresting paths," as this requirement is incorporated into footnote 3 of § 18.31(a)(6). The wording of the present "note" is retained, as removing the oil seals is standard practice on motors submitted for testing.

Section 18.37 Lead Entrances

Paragraph (b) is revised to provide for a minimum of three effective engagement threads for the packing gland nut. This minimum engagement is addressed by current policy. It was developed to define what the minimum thread engagement is for adequate mechanical strength.

Section 18.62 Tests To Determine Explosion-Proof Characteristics

Paragraph (a) of § 18.62 is revised with respect to the definition of coal

dust used in the explosion tests. The identification of "Pittsburgh bed coal dust" in § 18.62(a) is replaced by a minimum volatile matter and BTU content. This change allows equivalent coal from other coal seams to be used in the tests. The requirement that the coal be ground to a fineness of minus 200 mesh is retained.

Derivation Table

The following derivation tables list: (1) Each section number of the final rule (New Section); and (2) The section number of the standard from which the section is derived (Old Section).

DERIVATION TABLE.—PART 7

New section	Old section
7.301	18.1
7.302	18.2
7.303	18.6(a)
7.304(a)	18.47
7.304(b)	18.23
7.304(c)	18.24
7.304(d)	18.34(a)(4)
7.304(e)	18.34(a)(6)
7.304(f)	18.34(a)(8)
7.304(g)(1)	18.31(a)(1)
7.304(g)(2)	18.31(a)(2)
7.304(g)(3)	18.31(a)(3) and 18.26
7.304(g)(4)	18.31(a)(5)
7.304(g)(5)	18.33
7.304(g)(6)	18.34(c)
7.304(g)(7)	18.32(b)
7.304(g)(8)	18.32(c)
7.304(g)(9)	18.32(d) and 18.34(a)(9)
7.304(g)(10)	18.32(d)
7.304(g)(11)	18.34(b)
7.304(g)(12)	New
7.304(g)(13)	18.32(e)
7.304(g)(14)	18.32(f)
7.304(g)(15)	18.29(c)
7.304(g) (16) and (17)	New
7.304(g)(18)	18.31(a)(5)
7.304(g)(19)	18.31(a)(6) and 18.34(d)
7.304(h)	18.37
7.304(i)	18.25
7.305	New
7.306	18.62
7.307	New
7.308	New
7.309	18.13
7.310	New
7.311	New
18.4	18.4
18.24	18.24
18.31(a)(3)	18.31(a)(3)
18.31(a)(5)	18.31(a)(5)
18.31(a)(6)	18.31(a)(6) and 18.34(a)(6)
18.31(a)(7) and 18.32(l)	New
18.33	18.33
18.34	18.34
18.37(b)	18.37(b)
18.62(a)	18.62(a)

Distribution Table

The following distribution tables list: (1) Each section number of the part 18 standard (Old Section); and (2) Each section number of the final rule (New Section). Unless indicated in the part 18 Distribution Table, the existing sections of part 18 are retained.

DISTRIBUTION TABLE.—PART 7

Old section	New section
18.1	7.301
18.2	7.302
18.6	7.303
18.13	7.309
18.23	7.304(b)
18.24	7.304(c)
18.25	7.304(l)
18.26	7.304(g)(3)
18.29(c)	7.304(g)(15)
18.31(a)(1)	7.304(g)(1)
18.31(a)(2)	7.304(g)(2)
18.31(a)(3)	7.304(g)(3)
18.31(a)(5)	7.304(g) (4) and (18)
18.31(a)(6)	7.304(g)(19)
18.32(b)	7.304(g)(7)
18.32(c)	7.304(g)(8)
18.32(d)	7.304(g) (9) and (10)
18.32(e)	7.304(g)(13)
18.32(f)	7.304(g)(14)
18.33	7.304(g)(5)
18.34(a)(4)	7.304(d)
18.34(a)(6)	7.304(e)
18.34(a)(8)	7.304(f) and 7.304(g)(10)
18.34(b)	7.304(g)(11)
18.34(c)	7.304(g)(6)
18.34(d)	7.304(g)(19)
18.37	7.304(h)
18.47	7.304(a)
18.62	7.306

DISTRIBUTION TABLE.—PART 18

Old section	New section
18.4	18.4
18.24	18.24
18.31(a)(3)	18.31(a)(3)
18.31(a)(5)	18.31(a)(5)
18.33	18.33
18.34	18.31(a)(6) and 18.34
18.37(b)	18.37(b)
18.62(a)	18.62(a)

III. Executive Order 12291 and Regulatory Flexibility Act

In accordance with Executive Order 12291, MSHA prepared a Regulatory Impact Analysis (RIA). MSHA determined that the final rule will not result in major cost increases nor have an incremental effect of $100 million or more on the economy. This RIA also formed the basis for the analysis required by the Regulatory Flexibility Act. The Regulatory Flexibility Act requires that, in developing regulatory proposals, agencies evaluate compliance alternatives that minimize any adverse impact on small businesses. Subpart J clarifies the standards that industry must meet for approval of certain explosion-proof electric motor assemblies intended for use in approved equipment in underground mines. MSHA designed its product testing requirements to be as performance oriented as possible to allow manufacturers to choose the most cost effective option. Performance-oriented standards benefit both large and small manufacturers.

The rule will increase private-sector involvement in the approval of mining products. For the first time, instead of testing only by MSHA, the applicant or a third party selected by the applicant will test explosion-proof electric motor assemblies. The Agency anticipates that this new procedure will in some cases reduce associated testing costs and potential delay in product approvals.

MSHA also will be able to shift resources from the more standard approvals covered under part 7 to those approvals covered under part 18 that involve new technology and substantial design changes. MSHA anticipates that the increase in resources devoted to part 18 approvals will reduce the time needed to approve new technology from the current 4 months to 6 months to an expected 2 months to 3 months.

MSHA estimates that the total annual compliance cost to electric motor assembly manufacturers under the existing standards is about $65,700. The total annual compliance cost under the new rule will be about $78,600 for the first few years after the effective date, gradually decreasing to $45,800 after manufacturers and MSHA become more familiar with applications under part 7. The cost increase is associated with the requirements for MSHA observation of testing, annual product audits, and quality assurance procedures. These costs, however, are offset by decreased costs for MSHA fees for processing applications and testing products. Even though there are many small firms, MSHA lacks data on them to identify the potential impact on small entities.

MSHA estimates that the incremental cost of the final rule is an increased annual cost of about $12,900 for the first few years, gradually decreasing to a net annual cost reduction of about $19,900. Incremental annual cost increases total about $18,100 and are offset by cost savings of about $5,200 for the first few years after the effective date of this Subpart J and a savings of about $38,000 annually thereafter.

This final rule will not significantly alter the existing technical requirement for electric motor assemblies. Any necessary testing of products required by MSHA either is not substantially different from the currently undertaken or does not impose significant costs compared to the sales value of the product. The annual incremental compliance cost, for the 40 firms which may be affected by the final rule, averages about $322 per firm for the first few years, gradually decreasing to a cost reduction of about $498 per firm in subsequent years.

IV. Paperwork Reduction Act

This final rule contains information collection requirements subject to the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 et seq. The burden hour estimate includes the time for reviewing instructions, gathering and maintaining the data needed, and completing and reviewing the collected information. the information collection requirements contained in the rule are discussed below.

Section 7.303 requires applicants seeking approval of an electric motor assembly to submit an application for approval. MSHA estimates that there will be 42 applications submitted per year, each requiring 1.5 hours to prepare for a total of 63 burden hours.

Existing § 7.4(a) requires records of test results and procedures to be retained for at least 3 years. Standard testing protocols used by the manufacturing community include the keeping of records of product testing; therefore, no additional burden hours are assigned to this requirement.

Existing § 7.7(d) requires applicants to report to MSHA any knowledge of a product distributed with critical characteristics not in accordance with the approval specifications. MSHA estimates that under subpart J manufacturers will submit 40 reports per year requiring 15 minutes per report for a total of 10 burden hours. The rule requires applicants to maintain records on the distribution of each product bearing an approval marking as set forth in § 7.7(c). This provision does not specify the type of record, and MSHA believes applicants will use existing sales record systems to comply.

In accordance with Section 3504(h) of the Paperwork Reduction Act of 1980, the collection of information requirements contained in § 7.303 of the final rule have been approved by OMB under control No. 1219015.

V. Metric Measurements

In accordance with section 5164 of the Omnibus Trade and Competitiveness Act of 1988, MSHA requested comments on the availability of metric equipment and supplies and metric nominal safety equivalences of the English inch-pound measurements. One commenter recommended issuance of separate metric approval rules, believing that more than a simple conversion of the present dimensions into metric values is required. MSHA agrees that more than a simple direct conversion of dimensions into metric values is appropriate. However, to effectively accomplish this conversion, metric values that establish equivalent safety would have to be developed for all the technical requirements specified in parts 7 and 18. Such an approach would require a broader rulemaking effort than intended under the establishment of part 7, subject J. Therefore, technical requirements specified in metric units are not included in this final rule. However, current applications under part 7 and part 18 can be and are submitted with metric measurements. The Agency will continue efforts to work towards metric equivalents to ensure the approval of safe products.

List of Subjects in 30 CFR Parts 7 and 18

Approval of equipment, Incorporation by reference, Mine safety and health, Underground mining.

Dated: December 14, 1992.

William J. Tattersall,

Assistant Secretary for Mine Safety and Health.

Accordingly subchapter B, chapter I, title 30 of the Code of Federal Regulations is amended as follows:

PART 7—TESTING BY APPLICANT OR THIRD PARTY [AMENDED]

1. The authority citation for part 7 continues to read as follows:

Authority: 30 U.S.C. 957.

2. A new subpart J is added to part 7 to read as follows:

Subpart J—Electric Motor Assemblies

Sec.

Appendix I to Subpart J of Part 7

Subpart J—Electric Motor Assemblies

§ 7.301 Purpose and effective date.

This subpart establishes the specific requirements for MSHA approval of certain explosion-proof electric motor assemblies intended for use in approved equipment in underground mines. Applications for approval or extensions of approval submitted after (insert date three years after effective date of this subpart) shall meet the requirements of this part. Those motors that incorporate features not specifically addressed in this subpart will continue to be evaluated under part 18 of this chapter.

§ 7.302 Definitions.

The following definitions apply in this subpart:

Afterburning. The combustion of any flammable mixture that is drawn into an enclosure after an internal explosion in the enclosure. This condition is determined through detection of secondary pressure peaks occurring subsequent to the initial explosion.

Cylindrical joint. A joint comprised of two contiguous, concentric, cylindrical surfaces.

Explosion-proof enclosure. A metallic enclosure used as a winding compartment, conduit box, or a combination of both that complies with the applicable requirements of § 7.304 of this part and is constructed so that it will withstand the explosion tests of § 7.306 of this part.

Fastening. A bolt, screw, or stud used to secure adjoining parts to prevent the escape of flame from an explosion-proof enclosure.

Flame-arresting path. Two or more adjoining or adjacent surfaces between which the escape of flame is prevented.

Internal free volume (of an empty enclosure). The volume remaining after deducting the volume of any part that is essential in maintaining the explosion-proof integrity of the enclosure or necessary for operation of the motor. Essential parts include the parts that constitute the flame-arresting path and those necessary to secure parts that constitute a flame-arresting path.

Motor assembly. The winding compartment including a conduit box when specified. A motor assembly is comprised of one or more explosion-proof enclosures.

Plane joint. A joint comprised of two adjoining surfaces in parallel planes.

Step (rabbet) joint. A joint comprised of two adjoining surfaces with a change or changes in direction between its inner and outer edges. A step joint may be composed of a cylindrical portion and a plane portion or of two or more plane portions.

Stuffing box. An entrance with a recess filled with packing material for cables extending through a wall of an explosion-proof enclosure.

Threaded joint. A joint consisting of a male- and a female-threaded member, both of which are the same type and gauge.

§ 7.303 Application requirements.

(a) An application for approval of a motor assembly shall include a composite drawing or drawings with the following information:

(1) Model (type), frame size, and rating of the motor assembly.

(2) Overall dimensions of the motor assembly, including conduit box if applicable, and internal free volume.

(3) Material and quantity for each of the component parts that form the explosion-proof enclosure or enclosures.

(4) All dimensions (including tolerances) and specifications required to ascertain compliance with the requirements of § 7.304 of this part.

(b) All drawings shall be titled, dated, numbered, and include the latest revision.

§ 7.304 Technical requirements.

(a) Voltage rating of the motor shall not exceed 4160 volts.

(b) The temperature of the external surfaces of the motor assembly shall not exceed 150 °C (302 °F) when operated at the manufacturers' specified ratings.

(c) Minimum clearances between uninsulated electrical conductor surfaces, or between uninsulated conductor surfaces and grounded metal surfaces, within the enclosure shall meet the requirements of table J–1 of this section.

TABLE J–1.—MINIMUM CLEARANCES BETWEEN UNINSULATED SURFACES

Phase-to-phase voltage (rms)	Clearances (inches)	
	Phase-to-phase	Phase-to-ground or control circuit
0 to 250	0.25	0.25
251 to 600	0.28	0.25
601 to 1000	0.61	0.25
1001 to 2400	1.4	0.6
2401 to 4160	3.0	1.4

(d) Parts whose dimensions can change with the motor operation, such as ball and roller bearings and oil seals, shall not be used as flame-arresting paths.

(e) The widths of any grooves, such as grooves for holding oil seals or o-rings, shall be deducted in measuring the widths of flame-arresting paths.

(f) An outer bearing cap shall not be considered as forming any part of a flame-arresting path unless the cap is used as a bearing cartridge.

(g) Requirements for explosion-proof enclosures of motor assemblies.

(1) Enclosures shall be—

(i) Constructed of metal;

(ii) Designed to withstand a minimum internal pressure of 150 pounds per square inch (gauge);

(iii) Free from blowholes when cast; and

(iv) Explosion proof as determined by the tests set out in § 7.306 of this part.

(2) Welded joints forming an enclosure shall be—

(i) Continuous and gas-tight; and

(ii) Made in accordance with or exceed the American Welding Society Standard AWS D14.4–77, "Classification and Application of Welded Joints for Machinery and Equipment," or meet the test requirements set out in § 7.307 of this part. AWS D14.4–77 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American Welding Society, Inc., 2501 NW 7th Street, Miami, FL 33125. Copies may be inspected at the Mine Safety and Health Administration, Department of Labor, Approval and Certification Center, RR 1, Industrial Park Road, Triadelphia, WV 26059, or at the Office of the Federal Register, 800 N. Capitol Street, NW., 7th Floor, Suite 700, Washington, DC 20408.

(3) External rotating parts shall not be constructed of aluminum alloys containing more than 0.6 percent magnesium. Non-metallic rotating parts shall be provided with a means to prevent an accumulation of static electricity.

(4) Threaded covers and mating parts shall be designed with Class 1A and 1B (coarse, loose fitting) threads. The covers shall be secured against loosening.

(5) Flat surfaces between fastening holes that form any part of a flame-arresting path shall be plane to within a maximum deviation of one-half the maximum clearance specified in paragraph (g)(19) of this section. All surfaces forming a flame-arresting path shall be finished during the manufacturing process to not more than 250 microinches. A thin film of nonhardening preparation to inhibit rusting may be applied to these finished metal surfaces as long as the final surface can be readily wiped free of any foreign materials.

(6) For a laminated stator frame, it shall be impossible to insert a 0.0015 inch thickness gauge to a depth exceeding ⅛ inch between adjacent laminations or between end rings and laminations.

(7) Lockwashers, or equivalent, shall be provided for all fastenings. Devices other than lockwashers shall meet the requirements of § 7.308 of this part. Equivalent devices shall only be used in the configuration in which they were tested.

(8) Fastenings shall be as uniform in size as practicable to preclude improper installation.

(9) Holes for fastenings in an explosion-proof enclosure shall be threaded to ensure that all specified bolts or screws will not bottom even if the washers are omitted.

(10) Holes for fastenings shall not penetrate to the interior of an explosion-proof enclosure, except holes made through motor casings for bolts, studs, or screws to hold essential parts, such as pole pieces, brush rigging, and bearing cartridges. The attachments of such parts shall be secured against loosening. The threaded holes in these parts shall be blind unless the fastenings are inserted from the inside, in which case the fastenings shall not be accessible with the rotor in place.

(11) For direct current motor assemblies with narrow interpoles, the distance from the edge of the pole piece to any bolt hole in the frame shall be at least ⅛ inch. If the distance is ⅛ to ¼ inch, the diametrical clearance for the pole bolt shall not exceed 1/64 inch for not less than ½ inch through the frame. Furthermore, the pole piece shall have the same radius as the inner surface of the frame. Pole pieces may be shimmed as necessary. If used, the total resulting thickness of the shims shall be specified. The shim assembly shall meet the same requirements as the pole piece.

(12) Coil-thread inserts, if used in holes for fastenings, shall meet the following:

(i) The inserts shall have internal screw threads.

(ii) The holes for the inserts shall be drilled and tapped consistent with the insert manufacturer's specifications.

(iii) The inserts shall be installed consistent with the insert manufacturer's specifications.

(iv) The insert shall be of sufficient length to ensure the minimum thread engagement of fastening specified in paragraph (g)(19) of this section.

(13) A minimum of ⅛ inch of stock shall be left at the center of the bottom of each blind hole that could penetrate into the interior of an explosion-proof enclosure.

(14) Fastenings shall be used only for attaching parts that are essential in maintaining the explosion-proof integrity of the enclosure, or necessary for the operation of the motor. They shall not be used for making electrical connections.

(15) Through holes not in use shall be closed with a metal plug. Plugs, including eyebolts, in through holes where future access is desired shall meet the flame-arresting paths, lengths, and clearances of paragraph (g)(19) of this section and be secured by spot welding or brazing. The spot weld or braze may be on a plug, clamp, or fastening (for example see figure J–1). Plugs for holes where future access is

not desired shall be secured all around by a continuous gas-tight weld.

(16) O-rings, if used in a flame-arresting path, shall meet the following:

(i) When the flame-arresting path is in one plane, the o-ring shall be located at least one-half the acceptable flame-arresting path length specified in paragraph (g)(19) of this section from within the outside edge of the path (see figure J–2).

(ii) When the flame-arresting path is one of the plane-cylindrical type (step joint), the o-ring shall be located at least ½ inch from within the outer edge of the plane portion (see figure J–3), or at the junction of the plane and cylindrical portion of the joint (see figure J–4), or in the cylindrical portion (see figure J–5).

(17) Mating parts comprising a pressed fit shall result in a minimum interference of 0.001 inch between the parts. The minimum length of the pressed fit shall be equal to the minimum thickness requirement of paragraph (g)(19) of this section for the material in which the fit is made.

(18) The flame-arresting path of threaded joints shall conform to the requirements of paragraph (g)(19) of this section.

(19) Explosion-proof enclosures shall meet the requirements set out in table J–2 of this section, based on the internal free volume of the empty enclosure.

TABLE J–2.—EXPLOSION-PROOF REQUIREMENTS BASED ON VOLUME

	Volume of empty enclosure		
	Less than 45 cu. ins.	45 to 124 cu. ins. inclusive	More than 124 cu. ins.
Minimum thickness of material for walls [1]	1/8"	3/16"	1/4"
Minimum thickness of material for flanges and covers	[2] 1/4"	[3] 3/8"	[3] 1/2"
Minimum width of joint; all in one plane	1/2"	3/4"	1"
Maximum clearance; joint all in one plane	0.002"	0.003"	0.004"
Minimum width of joint, portions of which are in different planes; cylinders or equivalent	[4] 3/8"	[4] 5/8"	[4] 3/4"
Maximum clearances; joint in two or more planes, cylinders or equivalent: [5]			
(a) Portion perpendicular to plane [6]	0.008"	0.008"	0.008"
(b) Plane portion	0.006"	0.006"	0.006"
Maximum fastening [7,8] spacing; joints all in one plane	([16])	([16])	([16])
Maximum fastening spacing; joints, portions of which are in different planes	([17])	([17])	([17])
Minimum diameter of fastening [9] (without regard to type of joint)	1/4"	1/4"	3/8"
Minimum thread engagement of fastening [10]	1/4"	1/4"	3/8"
Maximum diametrical clearance between fastening body and unthreaded holes through which it passes [8,11,12]	1/64"	1/32"	1/16"
Minimum distance from interior of enclosure to the edge of a fastening hole: [8,13]			
Joint—minimum width 1"			[14] 7/16"
Joint—less than 1" wide	1/8"	3/16"	
Cylindrical Joints			
Shaft centered by ball or roller bearings:			
Minimum length of flame-arresting path	1/2"	3/4"	1"
Maximum diametrical clearance	0.020"	0.025"	0.030"
Other cylindrical joints: [15]			
Minimum length of flame-arresting path	1/2"	3/4"	1"
Maximum diametrical clearance	0.006"	0.008"	0.010"

[1] This is the minimal nominal dimension when applied to standard steel plate.
[2] 1/32 inch less is allowable for machining rolled plate.
[3] 1/16 inch less is allowable for machining rolled plate.
[4] If only two planes are involved, neither portion of a joint shall be less than 1/8 inch wide, unless the wider portion conforms to the same requirements as those for a joint that is all in one plane. If more than two planes are involved (as in labyrinths or tongue-and-groove joints) the combined lengths of those portions having prescribed clearances are considered.
[5] For winding compartments having internal free volume not exceeding 350 cubic inches and joints not exceeding 32 inches in outer circumference and provided with step joints between the stator frame and the end bracket the following dimensions shall apply:

DIMENSIONS OF RABBET (STEP) JOINTS-INCHES

[See figure J–6 in appendix]

Minimum total width	Minimum width of clamped radial portion	Maximum clearance of radial portion	Maximum diametrical clearance at axial portion
3/8	3/64	0.0015	0.003
1/2	3/64	0.002	0.003
1/2	3/32	0.002	0.004

[6] The allowable diametrical clearance is 0.008 inch when the portion perpendicular to the plane portion is 1/4 inch or greater in length. If the perpendicular portion is more than 1/8 inch but less than 1/4 inch wide, the diametrical clearance shall not exceed 0.006 inch.
[7] Studs, when provided, shall bottom in blind holes, be completely welded in place, or have the bottom of the hole closed with a plug secured by weld or braze. Fastenings shall be provided at all corners.
[8] The requirements as to diametrical clearance around the fastening and minimum distance from the fastening hole to the inside of the explosion-proof enclosure apply to steel dowel pins. In addition, when such pins are used, the spacing between centers of the fastenings on either side of the pin shall not exceed 5 inches.
[9] Fastening diameters smaller than specified may be used if the enclosure meets the test requirements of 30 CFR 7.307 and then 7.308 in that order.
[10] Minimum thread engagement shall be equal to or greater than the diameter of the fastening specified, or the enclosure must meet the test requirements of 30 CFR 7.307 and then 7.308 in that order.
[11] This maximum clearance applies only when the fastening is located within the flame-arresting path.
[12] Threaded holes for fastening bolts shall be machined to remove burrs or projections that affect planarity of a surface forming a flame-arresting path.
[13] Edge of the fastening hole shall include the edge of any machining done to the fastening hole, such as chamfering.
[14] If the diametrical clearance for fastenings does not exceed 1/32 inch, then the minimum distance shall be 1/4 inch.
[15] Shafts or operating rods through journal bearings shall be at least 1/4" in diameter. The length of the flame-arresting path shall not be reduced when a pushbutton is depressed. Operating rods shall have a shoulder or head on the portion inside the enclosure. Essential parts riveted or bolted to the inside portion are acceptable in lieu of a head or shoulder, but cotter pins and similar devices shall not be used.
[16] 6" with a minimum of 4 fastenings.
[17] 8" with a minimum of 4 fastenings.

(h) *Lead entrances.* (1) Each cable, which extends through an outside wall of the motor assembly, shall pass through a stuffing-box lead entrance (see figure J–7). All sharp edges shall be removed from stuffing boxes, packing nuts, and other lead entrance (gland) parts, so that the cable jacket is not damaged.

(2) When the packing is properly compressed, the gland nut shall have—

(i) A clearance distance of ⅛ inch or more, with no maximum, to travel without interference by parts other than packing; and

(ii) A minimum of three effective threads engaged (see figures J–8, J–9, and J–10).

(3) Packing nuts (see figure J–7) and stuffing boxes shall be secured against loosening (see figure J–11).

(4) Compressed packing material shall be in contact with the cable jacket for a length of not less than ½ inch.

(5) Requirements for lead entrances in which MSHA accepted rope packing material is specified, are:

(i) Rope packing material shall be acceptable under § 18.37(e) of this chapter.

(ii) The width of the space for packing material shall not exceed by more than 50 percent the diameter or width of the uncompressed packing material (see figure J–12).

(iii) The maximum diametrical clearance, using the specified tolerances, between the cable and the through holes in the gland parts adjacent to the packing (stuffing box, packing nut, hose tube, or bushings) shall not exceed 75 percent of the nominal diameter or width of the packing material (see figure J–13).

(6) Requirements for lead entrances in which grommet packing made of compressible material is specified, are:

(i) The grommet packing material shall be accepted by MSHA as flame-resistant material under § 18.37(f)(1) of this chapter.

(ii) The diametrical clearance between the cable jacket and the nominal inside diameter of the grommet shall not exceed 1/16 inch, based on the nominal specified diameter of the cable (see figure J–14).

(iii) The diametrical clearance between the nominal outside diameter of the grommet and the inside wall of the stuffing box shall not exceed 1/16 inch (see figure J–14).

(i) Combustible gases from insulating material.

(1) Insulating materials that give off flammable or explosive gases when decomposed electrically shall not be used within explosion-proof enclosures where the materials are subjected to destructive electrical action.

(2) Parts coated or impregnated with insulating materials shall be treated to remove any combustible solvent before assembly in an explosion-proof enclosure.

§ 7.305 Critical characteristics.

The following critical characteristics shall be inspected on each motor assembly to which an approval marking is affixed:

(a) Finish, width, and planarity of surfaces that form any part of a flame-arresting path.

(b) Clearances between mating parts that form flame-arresting paths.

(c) Thickness of walls, flanges, and covers that are essential in maintaining the explosion-proof integrity of the enclosure.

(d) Spacing of fastenings.

(e) Length of thread engagement on fastenings and threaded parts that assure the explosion-proof integrity of the enclosure.

(f) Use of lockwasher or equivalent with all fastenings.

(g) Dimensions which affect compliance with the requirements for packing gland parts in § 7.304 of this part.

§ 7.306 Explosion tests.

(a) The following shall be used for conducting an explosion test:

(1) An explosion test chamber designed and constructed to contain an explosive gas mixture to surround and fill the motor assembly being tested. The chamber must be sufficiently darkened and provide viewing capabilities of the flame-arresting paths to allow observation during testing of any discharge of flame or ignition of the explosive mixture surrounding the motor assembly.

(2) A methane gas supply with at least 98 by volume per centum of combustible hydrocarbons, with the remainder being inert. At least 80 percent by volume of the gas shall be methane.

(3) Coal dust having a minimum of 22 percent dry volatile matter and a minimum heat constant of 11,000 moist BTU (coal containing natural bed moisture but not visible surface water) ground to a fineness of minus 200 mesh U.S. Standard sieve series.

(4) An electric spark ignition source with a minimum of 100 millijoules of energy.

(5) A pressure recording system that will indicate the pressure peaks resulting from the ignition and combustion of explosive gas mixtures within the enclosure being tested.

(b) *General test procedures.* (1) Motor assemblies being tested shall—

(i) Be equipped with unshielded bearings regardless of the type of bearings specified; and

(ii) Have all parts that do not contribute to the operation or assure the explosion-proof integrity of the enclosure, such as oil seals, grease fittings, hose conduit, cable clamps, and outer bearing caps (which do not house the bearings) removed from the motor assembly.

(2) Each motor assembly shall be placed in the explosion test chamber and tested as follows:

(i) The motor assembly shall be filled with and surrounded by an explosive mixture of the natural gas supply and air. The chamber gas concentrations shall be between 6.0 by volume per centum and the motor assembly natural gas concentration just before ignition of each test. Each externally visible flame-arresting path fit shall be observed for discharge of flames for at least two of the tests, including one with coal dust added.

(ii) A single spark source is used for all testing. Pressure shall be measured at each end of the winding compartment simultaneously during all tests. Quantity and location of test holes shall permit ignition on each end of the winding compartment and recording of pressure on the same and opposite ends as the ignition.

(iii) Motor assemblies incorporating a conduit box shall have the pressure in the conduit box recorded simultaneously with the other measured pressures during all tests. Quantity and location of test holes in the conduit box shall permit ignition and recording of pressure as required in paragraphs (c)(1) and (c)(4)(i) of this section.

(iv) The motor assembly shall be completely purged and recharged with a fresh explosive gas mixture from the chamber or by injection after each test. The chamber shall be completely purged and recharged with a fresh explosive gas mixture as necessary. The oxygen level of the chamber gas mixture shall be no less than 18 percent by volume for testing. In the absence of oxygen monitoring equipment, the maximum number of tests conducted before purging shall be less than or equal to the chamber volume divided by forty times the volume occupied by the motor assembly.

(c) *Test procedures.* (1) Eight tests at 9.4±0.4 percent methane by volume within the winding compartment shall be conducted, with the rotor stationary during four tests and rotating at rated speed (rpm) during four tests. The ignition shall be at one end of the winding compartment for two stationary and two rotating tests, and then switched to the opposite end for the remaining four tests. If a nonisolated conduit box is used, then two additional tests, one stationary and one rotating, shall be conducted with ignition in the conduit box at a point furthest away from the opening between the conduit box and the winding compartment.

(2) Four tests at 7.0±0.3 percent methane by volume within the winding compartment shall be conducted with

the rotor stationary, 2 ignitions at each end.

(3) Four tests at 9.4±0.4 percent methane by volume plus coal dust shall be conducted. A quantity of coal dust equal to 0.05 ounces per cubic foot of internal free volume of the winding compartment plus the nonisolated conduit box shall be introduced into each end of the winding compartment and nonisolated conduit box to coat the interior surface before conducting the first of the four tests. The coal dust introduced into the conduit box shall be proportional to its volume. The remaining coal dust shall be equally divided between the winding compartment ends. For two tests, one stationary and one rotating, the ignition shall be either in the conduit box or one end of the connected winding compartment, whichever produced the highest pressure in the previous tests. The two remaining tests, one stationary and one rotating, shall be conducted with the ignition in the winding compartment end furthest away from the conduit box.

(4) For motor assemblies incorporating a conduit box which is isolated from the winding compartment by an isolating barrier the following additional tests shall be conducted—

(i) For conduit boxes with an internal free volume greater than 150 cubic inches, two ignition points shall be used, one as close to the geometric center of the conduit box as practical and the other at the furthest point away from the isolating barrier between the conduit box and the winding compartment. Recording of pressure shall be on the same and opposite sides as the ignition point furthest from the isolating barrier between the conduit box and the winding compartment. Conduit boxes with an internal free volume of 150 cubic inches or less shall have one test hole for ignition located as close to the geometric center of the conduit box as practical and one for recording of pressure located on a side of the conduit box.

(ii) The conduit box shall be tested separately. Six tests at 9.4±0.4 percent methane by volume within the conduit box shall be conducted followed by two tests at 7.0±0.3 percent methane by volume. Then two tests at 9.4±0.4 percent methane by volume with a quantity of coal dust equal to 0.05 ounces per cubic foot of internal free volume of the conduit box and meeting the specifications in paragraph (c)(3) of this section shall be conducted. For conduit boxes with an internal free volume of more than 150 cubic inches, the number of tests shall be evenly divided between each ignition point.

(iii) The motor assembly shall be tested following removal of the isolating barrier or one sectionalizing terminal (as applicable). Six tests at 9.4±0.4 percent methane by volume in the winding compartment and conduit box shall be conducted using three ignition locations. The ignition shall be at one end of the winding compartment for one stationary and one rotating test; the opposite end for one stationary and one rotating test; and at the ignition point that produced the highest pressure on the previous test in paragraph (c)(4)(ii) of this section in the conduit box for one stationary and one rotating test. Motor assemblies that use multiple sectionalizing terminals shall have one test conducted as each additional terminal is removed. Each of these tests shall use the rotor state and ignition location that produced the highest pressure in the previous tests.

(d) A motor assembly incorporating a conduit box that is isolated from the winding compartment that exhibits pressures exceeding 110 psig, while testing during removal of any or all isolating barriers as specified in paragraph (c)(4) of this section, shall have a warning statement on the approval plate. This statement shall warn that the isolating barrier must be maintained to ensure the explosion-proof integrity of the motor assembly. A statement is not required when the motor assembly has withstood a static pressure of twice the maximum pressure recorded in the explosion tests of paragraph (c)(4) of this section. The static pressure test shall be conducted on the motor assembly with all isolating barriers removed, and in accordance with § 7.307 of this part.

(e) *Acceptable performance.* Explosion tests of a motor assembly shall not result in—

(1) Discharge of flames.

(2) Ignition of the explosive mixture surrounding the motor assembly in the chamber.

(3) Development of afterburning.

(4) Rupture of any part of the motor assembly or any panel or divider within the motor assembly.

(5) Clearances, in excess of those specified in this subpart, along accessible flame-arresting paths, following any necessary retightening of fastenings.

(6) Pressure exceeding 110 psig, except as provided in paragraph (d) of this section unless the motor assembly has withstood a static pressure of twice the maximum pressure recorded in the explosion tests of this section following the static pressure test procedures of § 7.307 of this part.

(7) Permanent deformation greater than 0.040 inches per linear foot.

§ 7.307 Static pressure test.

(a) *Test procedure.* (1) The enclosure shall be internally pressurized to a minimum of 150 psig and the pressure maintained for a minimum of 10 seconds.

(2) Following the pressure hold, the pressure shall be removed and the pressurizing agent removed from the enclosure.

(b) *Acceptable performance.* (1) The enclosure during pressurization shall not exhibit—

(i) Leakage through welds or casting; or

(ii) Rupture of any part that affects the explosion-proof integrity of the enclosure.

(2) The enclosure following removal of the pressurizing agent shall not exhibit—

(i) Visible cracks in welds;

(ii) Permanent deformation exceeding 0.040 inches per linear foot; or

(iii) Clearances, in excess of those specified in this subpart, along accessible flame-arresting paths, following any necessary retightening of fastenings.

§ 7.308 Lockwasher equivalency test.

(a) *Test procedure.* (1) Each test sample shall be an assembly consisting of a fastening with a locking device. Each standard sample shall be an assembly consisting of a fastening with a lockwasher.

(2) Five standard samples and five test samples shall be tested.

(3) Each standard and test sample shall use a new fastening of the same specifications as being used on the motor assembly.

(4) A new tapped hole shall be used for each standard and test sample. The hole shall be of the same specifications as used on the motor assembly.

(5) Each standard and test sample shall be inserted in the tapped hole and continuously and uniformly tightened at a speed not to exceed 30 rpm until the fastening's proof load is achieved. The torquing device shall not contact the locking device or the threaded portion of the fastening.

(6) Each standard and test sample shall be engaged and disengaged for 15 full cycles.

(b) *Acceptable performance.* The minimum torque value required to start removal of the fastening from the installed position (minimum breakway torque) for any cycle of any test sample shall be greater than or equal to the average breakway torque of each removal cycle of every standard sample.

§ 7.309 Approval marking.

Each approved motor assembly shall be identified by a legible and permanent approval plate inscribed with the assigned MSHA approval number and a warning statement as specified in § 7.306(d) of this part. The plate shall be securely attached to the motor assembly in a manner that does not impair any explosion-proof characteristics.

§ 7.310 Post-approval product audit.

Upon request by MSHA but not more than once a year, except for cause, the approval holder shall make a motor assembly available for audit at no cost.

Appendix I to Subpart J of Part 7

§ 7.311 Approval checklist.

Each motor assembly bearing an MSHA approval marking shall be accompanied by a list of items necessary for maintenance of the motor assembly as approved.

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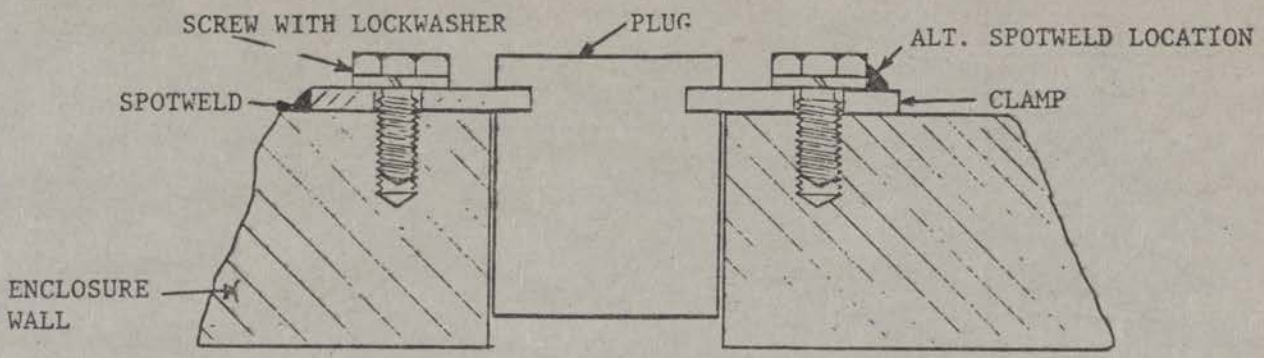
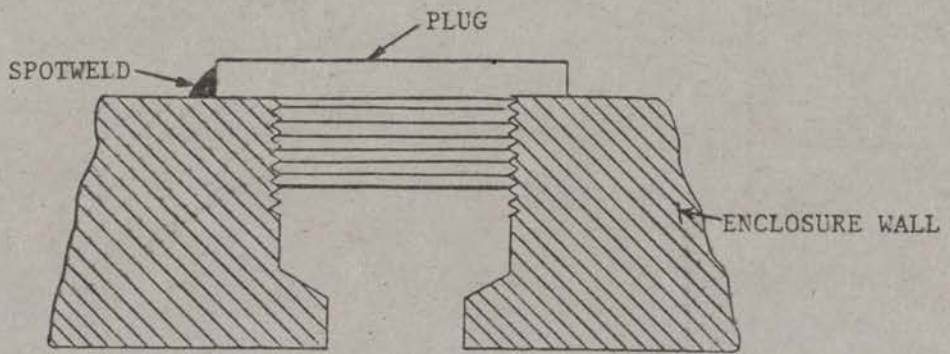
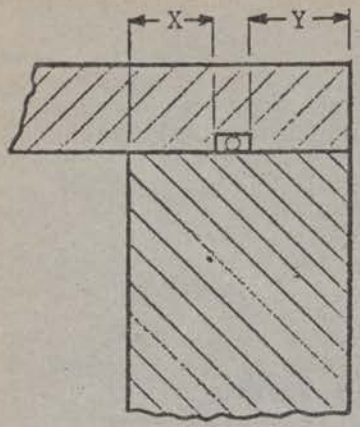
Appendix I to Subpart J—Figures J–1 through J–14





WELD (OR BRAZE) MAY BE ON PLUG, CLAMP, OR FASTENING

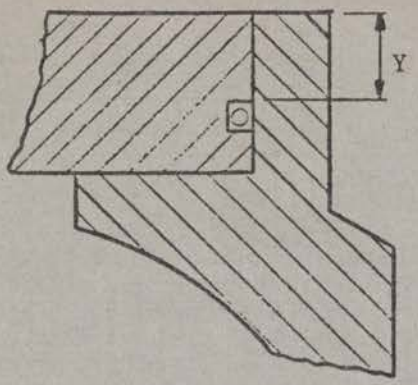
FIGURE J-1



X + Y = MIN. ACCEPTABLE FLAME-ARRESTING PATH LENGTH

$$Y = \frac{X + Y}{2}$$

FIGURE J-2



Y = 1/2" MIN.

FIGURE J-3

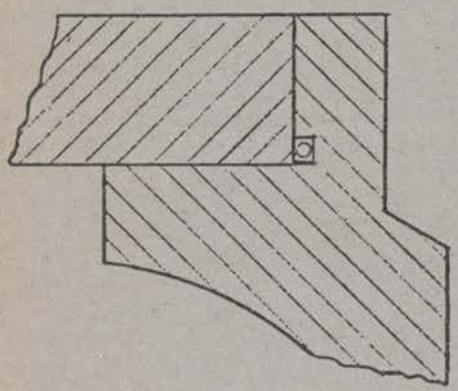
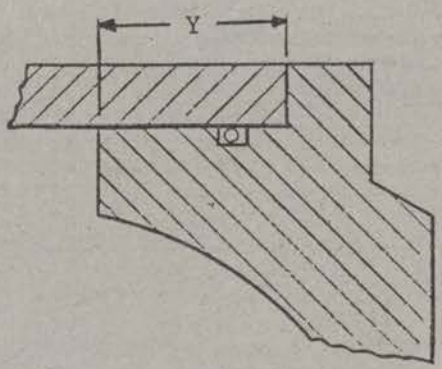
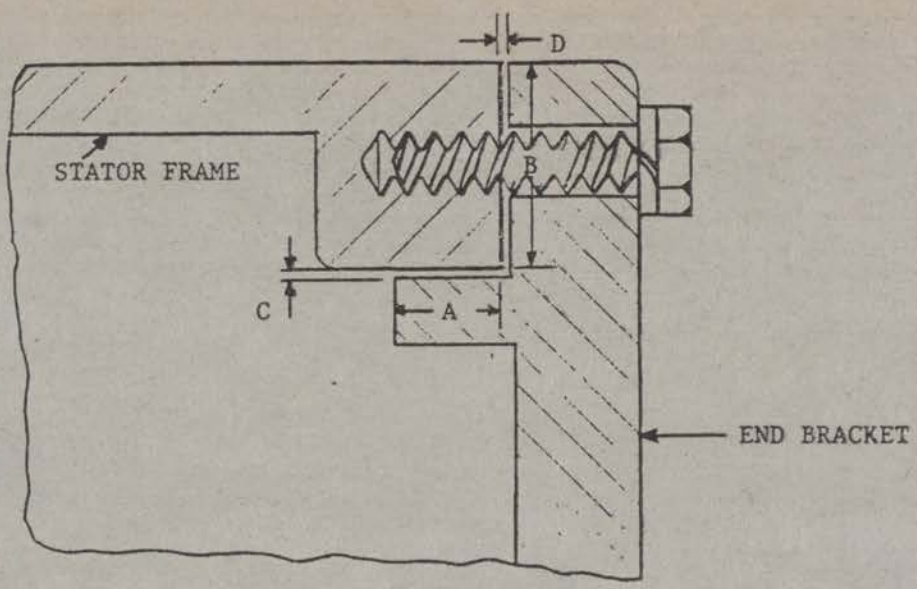


FIGURE J-4



O-RING CAN BE LOCATED ANYWHERE ALONG LENGTH OF (Y).

FIGURE J-5



A = Width of Axial Portion

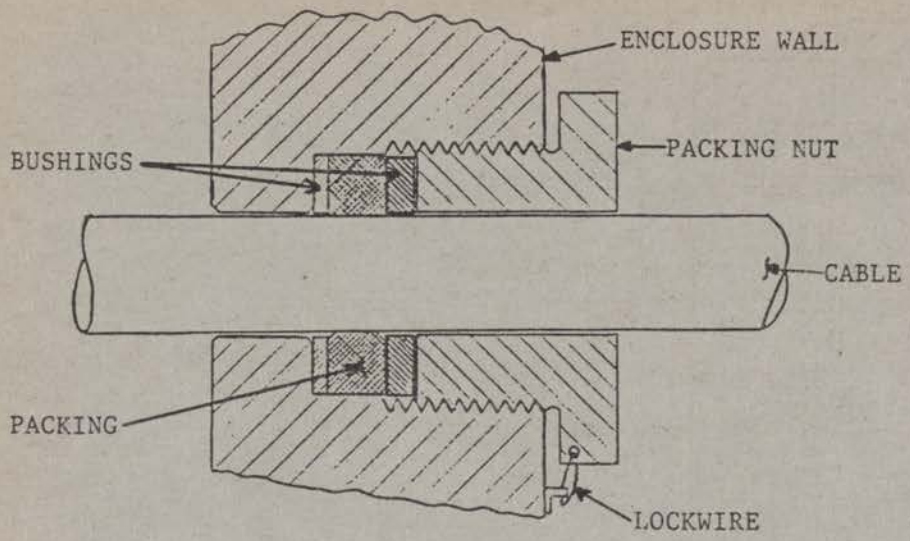
B = Width of Clamped Radial Portion

C = Clearance of Axial Portion

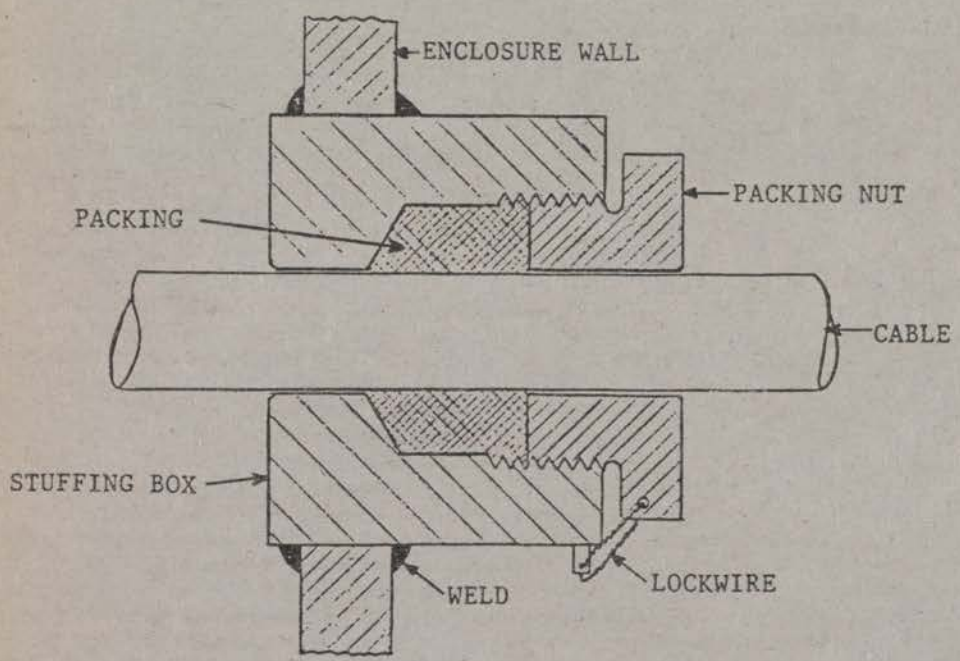
D = Clearance of Radial Portion

Total Width of Flamepath = A + B

FIGURE J-6

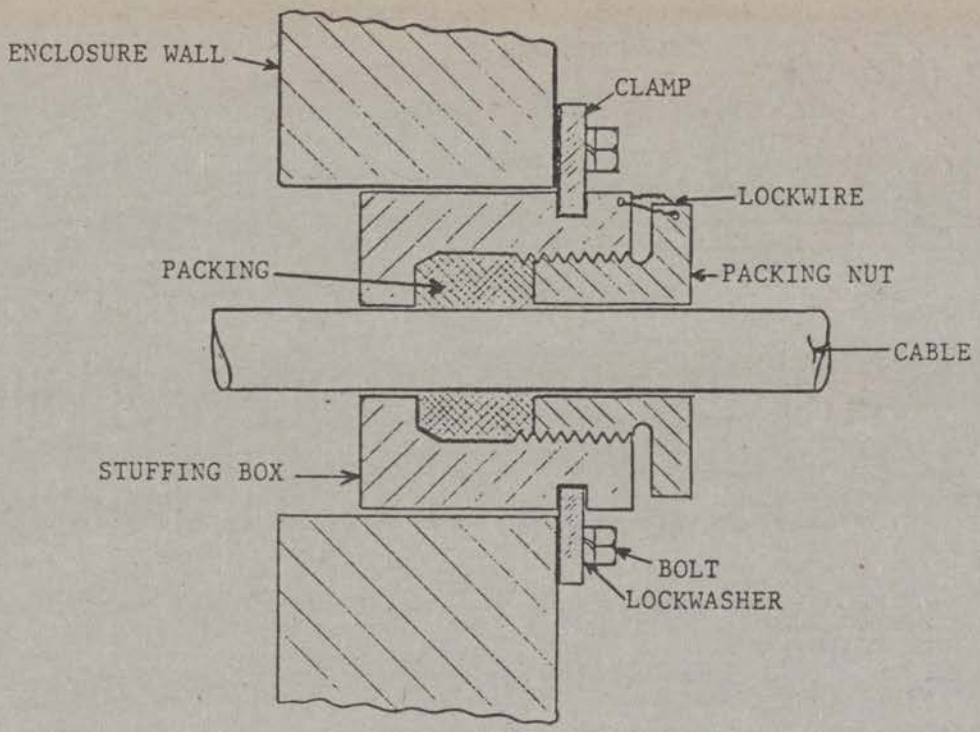


MACHINED-IN STUFFING BOX



WELD-IN STUFFING BOX

FIGURE J-7



SLIP-FIT STUFFING BOX

FIGURE J-7

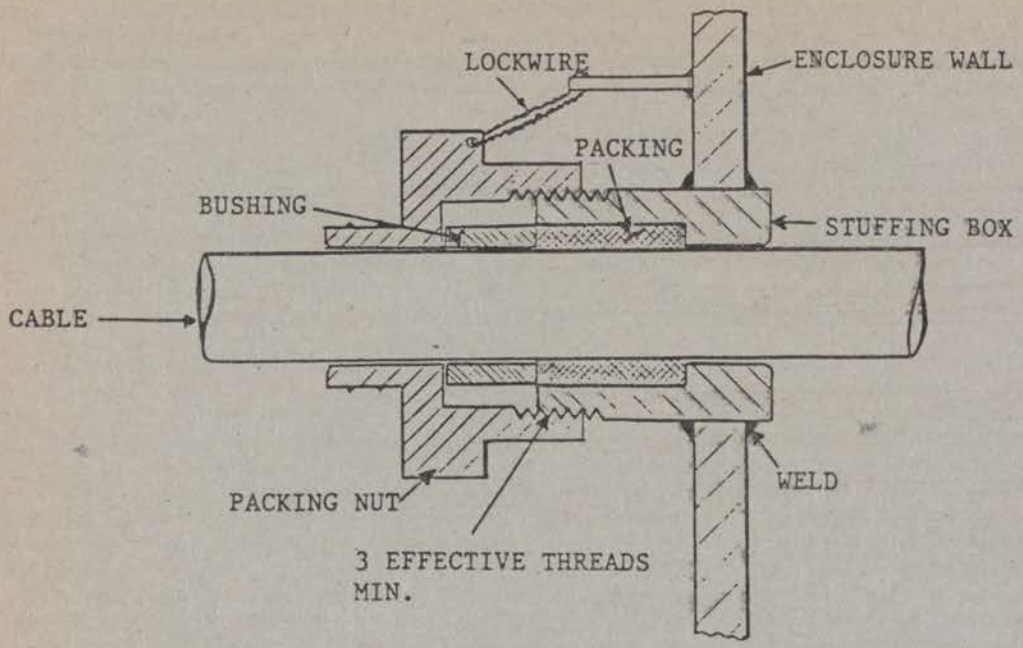


FIGURE J-8

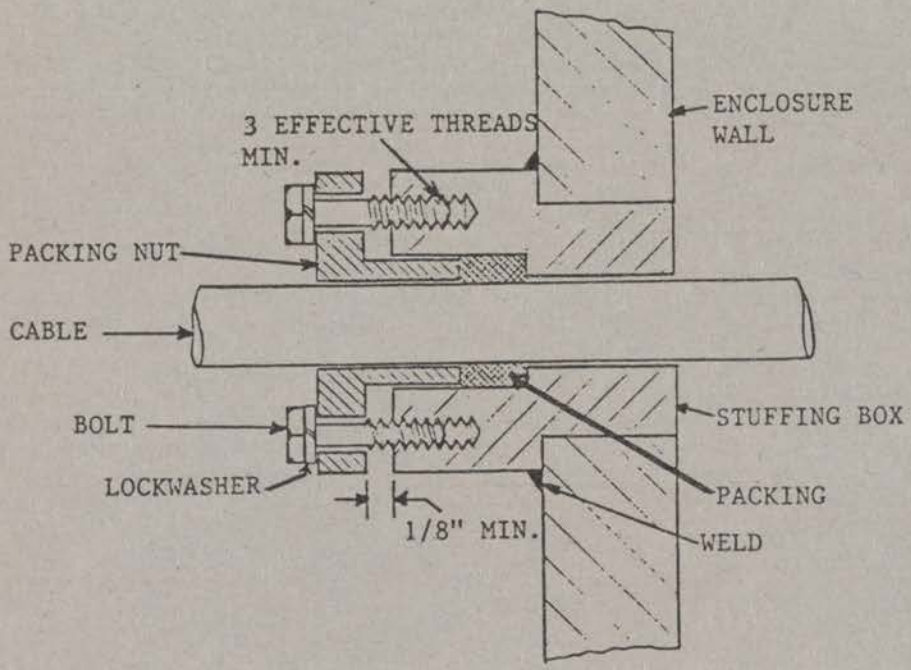


FIGURE J-9

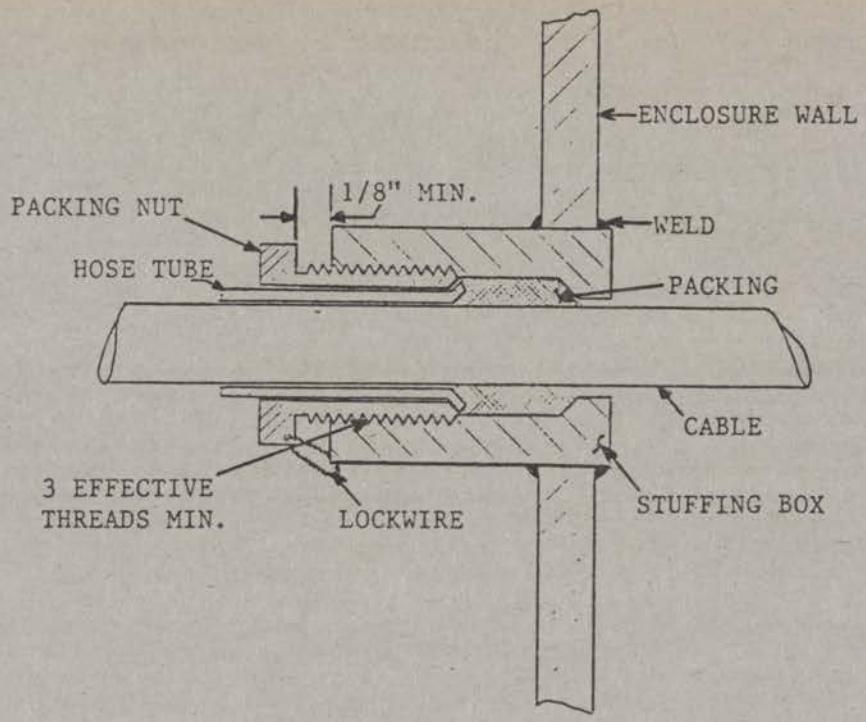

ENCLOSURE WALL
1/8" MIN.
PACKING NUT
WELD
HOSE TUBE
PACKING
CABLE
3 EFFECTIVE
THREADS MIN.
LOCKWIRE
STUFFING BOX

FIGURE J-10

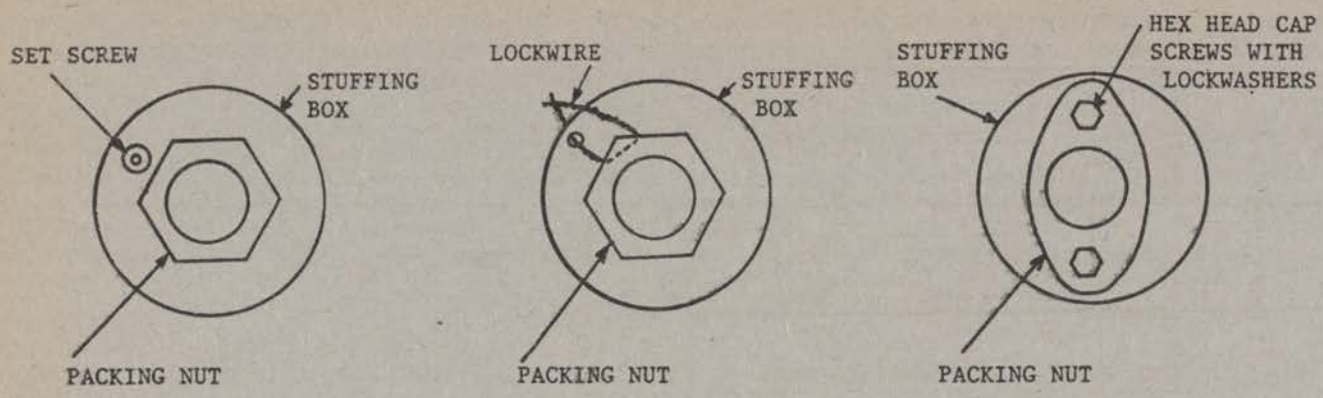
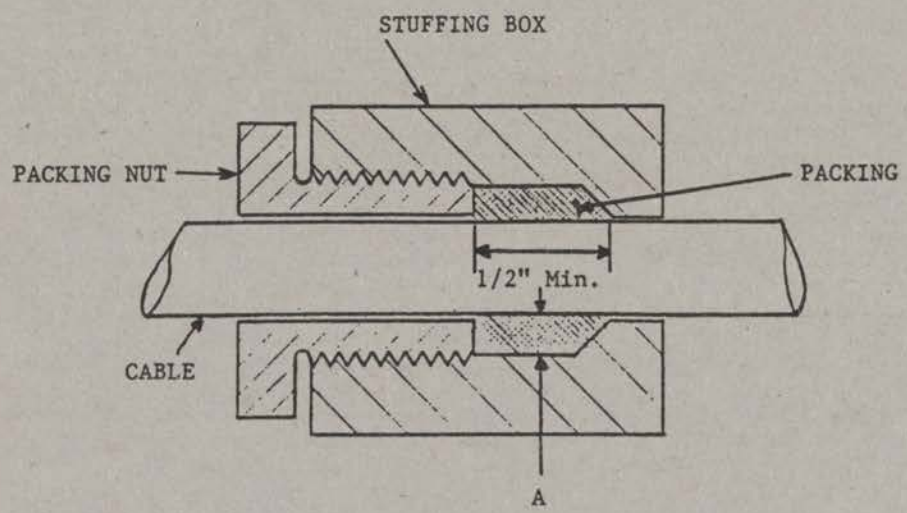
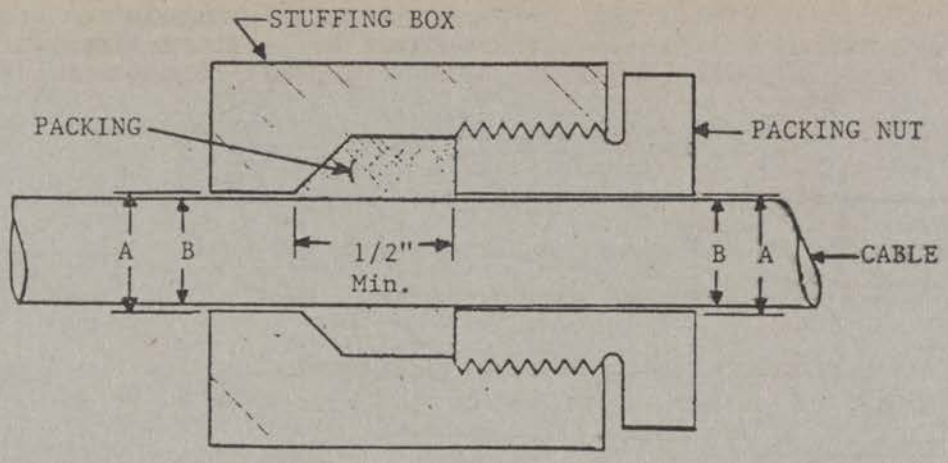


FIGURE J-11



A ≤ 150% of Packing Material Diameter or Width

FIGURE J-12



A - B ≤ 75% of Packing Material Diameter or Width

FIGURE J-13

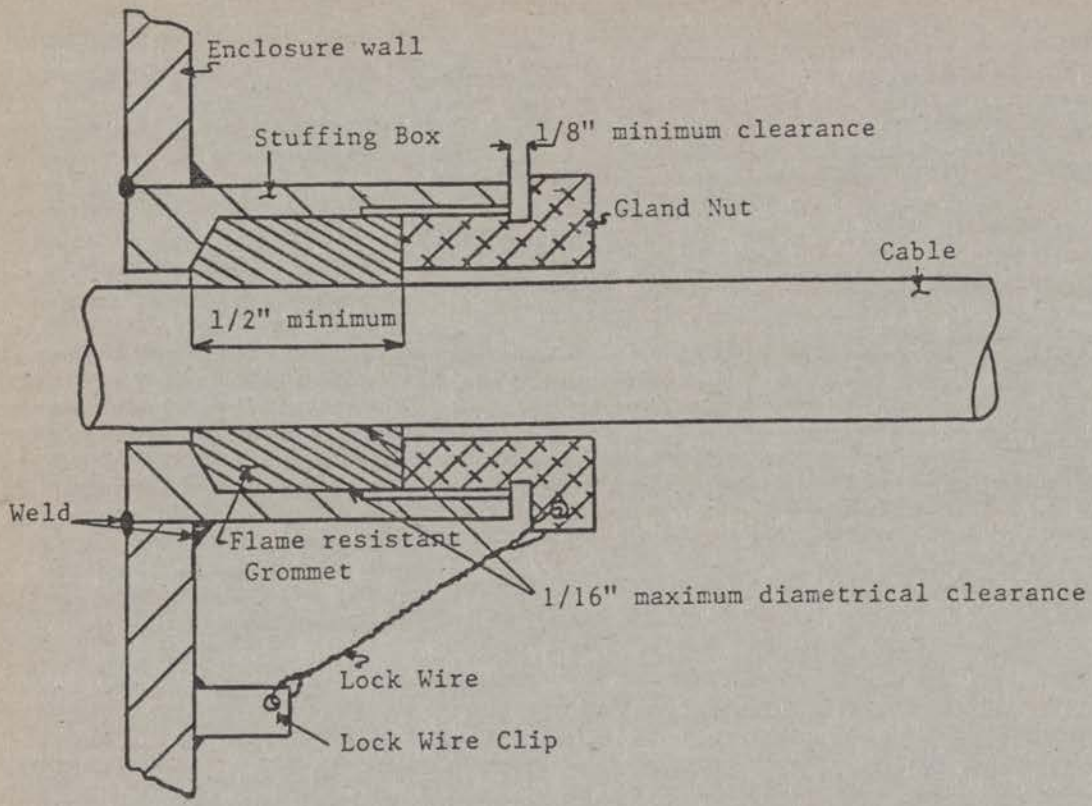


FIGURE J-14

BILLING CODE 4510-43-C

PART 18—ELECTRIC MOTOR-DRIVEN MINE EQUIPMENT AND ACCESSORIES [AMENDED]

1. The authority citation for part 18 continues to read as follows:

Authority: 30 U.S.C. 957 and 961.

2. Section 18.4 is revised to read as follows:

§ 18.4 Electrical equipment for which approval is issued.

An approval will be issued only for a complete electrical machine or accessory. Only components meeting the requirements of subpart B of this part or those approved under part 7 of this chapter, unless they contain intrinsically safe circuits, shall be included in the assemblies.

3. Section 18.24 is revised to read as follows:

§ 18.24 Electrical clearances.

Minimum clearances between uninsulated electrical conductor surfaces, or between uninsulated conductor surfaces and grounded metal surfaces, within the enclosure shall be as follows:

MINIMUM CLEARANCES BETWEEN UNINSULATED SURFACES

Phase-to-Phase Voltage (rms)	Clearances (inches)	
	Phase-to-Phase	Phase-to-Ground or Control Circuit
0 to 250	0.25	0.25
251 to 600	0.28	0.25
601 to 1000	0.61	0.25
1001 to 2400	1.4	0.6
2401 to 4160	3.0	1.4

4. Section 18.31 is amended by revising paragraphs (a)(3), (a)(5), and (a)(6) and by adding paragraphs (a) (7) and (8) to read as follows:

§ 18.31 Enclosures—joints and fastenings.

(a) * * *

(3) External rotating parts shall not be constructed of aluminum alloys containing more than 0.6 percent magnesium.

* * * * *

(5) Threaded covers and mating parts shall be designed with Class 1A and 1B (coarse, loose-fitting) threads. The flame-arresting path of threaded joints shall conform to the requirements of paragraph (a)(6) of this section.

(6) Enclosure requirements shall be based on the internal volumes of the empty enclosure. The internal volume is the volume remaining after deducting the volume of any part that is essential in maintaining the explosion-proof integrity of the enclosure or necessary for the operation. Essential parts include the parts that constitute the flame-arresting path and those necessary to secure parts that constitute a flame-arresting path. Enclosures shall meet the following requirements:

EXPLOSION-PROOF REQUIREMENTS BASED ON VOLUME

	Volume of empty enclosure		
	Less than 45 cu. in.	45 to 124 cu. in. inclusive	More than 124 cu. in.
Minimum thickness of material for walls [1]	1/8"	3/16"	1/4"
Minimum thickness of material for flanges and covers	[2] 1/4"	[3] 3/8"	[3] 1/2"
Minimum width of joint; all in one plane [4]	1/2"	3/4"	1"
Maximum clearance; joint all in one plane	0.002"	0.003"	0.004"
Minimum width of joint, portions of which are in different planes; cylinders or equivalent [4,5]	3/8"	5/8"	3/4"
Maximum clearances; joint in two or more planes, cylinders or equivalent:			
(a) Portion perpendicular to plane [6]	0.008"	0.008"	0.008"
(b) Plane portion	0.006"	0.006"	0.006"
Maximum bolt [7,8] spacing; joints all in one plane	([16])	([16])	([16])
Maximum bolt spacing; joints, portions of which are in different planes	([9])	([9])	([9])
Minimum diameter of bolt (without regard to type of joint)	1/4"	1/4"	3/8"
Minimum thread engagement [10]	1/4"	1/4"	3/8"
Maximum diametrical clearance between bolt body and unthreaded holes through which it passes [8,11,12]	1/64"	1/32"	1/16"
Minimum distance from interior of enclosure to the edge of a bolt hole: [8,13]			
Joint—minimum width 1"	.....	.....	[14] 7/16"
Joint—less than 1" wide	1/8"	3/16"	.....
Cylindrical joints			
Shaft centered by ball or roller bearings:			
Minimum length of flame-arresting path	1/2"	3/4"	1"
Maximum diametrical clearance	0.020"	0.025"	0.030"
Other cylindrical joints: [15]			
Minimum length of flame-arresting path	1/2"	3/4"	1"
Maximum diametrical clearance	0.006"	0.008"	0.010"

[1] This is the minimal nominal dimension when applied to standard steel plate.
[2] 1/32 inch less is allowable for machining rolled plate.
[3] 1/16 inch less is allowable for machining rolled plate.
[4] The widths of any grooves, such as grooves for holding oil seals or O-rings, shall be deducted in measuring the widths of flame-arresting paths.
[5] If only two planes are involved, neither portion of a joint shall be less than 1/8 inch wide, unless the wider portion conforms to the same requirements as those for a joint that is all in one plane. If more than two planes are involved (as in labyrinths or tongue-and-groove joints) the combined lengths of those portions having prescribed clearances are considered.
[6] The allowable diametrical clearance is 0.006 inch when the portion perpendicular to the plane portion is 1/4 inch or greater in length. If the perpendicular portion is more than 1/8 inch but less than 1/4 inch wide, the diametrical clearance shall not exceed 0.006 inch.
[7] Where the term "bolt" is used, it refers to a machine bolt or a cap screw, and for either of these studs may be substituted provided the studs, bottom in blind holes, are completely welded in place, or the bottom of the hole is closed with a plug secured by weld or braze. Bolts shall be provided at all corners.
[8] The requirements as to diametrical clearance around the bolt and minimum distance from the bolt hole to the inside of the explosion-proof enclosure apply to steel dowel pins. In addition, when such pins are used, the spacing between centers of the bolts on either side of the pin shall not exceed 6 inches.
[9] Adequacy of bolt spacing will be judged on the basis of size and configuration of the enclosure, strength of materials, and explosion test results.
[10] In general, minimum thread engagement shall be equal to or greater than the diameter of the bolt specified.
[11] Threaded holes for fastening bolts shall be machined to remove burrs or projections that affect planarity of a surface forming a flame-arresting path.
[12] This maximum clearance applies only when the bolt is located within the flamepath.
[13] The edge of the bolt hole shall include the edge of any machining done to the bolt hole, such as chamfering.
[14] Less than 7/16" (1/4" minimum) will be acceptable provided the diametrical clearance for fastening bolts does not exceed 1/32".
[15] Shafts or operating rods through journal bearings shall be at least 1/4" in diameter. The length of fit shall not be reduced when a push button is depressed. Operating rods shall have a shoulder or head on the portion inside the enclosure. Essential parts riveted or bolted to the inside portion are acceptable in lieu of a head or shoulder, but cotter pins and similar devices shall not be used.
[16] 6" with a minimum of 4 bolts.

(7) O-rings, if used in a flame-arresting path, shall meet the following:

(i) When the flame-arresting path is in one plane, the o-ring shall be located at least one-half the acceptable flame-arresting path length specified in paragraph (a)(6) of this section within the outside edge of the path (see figure J–2 in the appendix to subpart J of part 7 of this chapter).

(ii) When the flame-arresting path is one of the plane-cylindrical type (step joint), the o-ring shall be located at least ½ inch within the outer edge of the plane portion (see figure J–3 in the appendix to subpart J of part 7 of this chapter), or at the junction of the plane and cylindrical portion of the joint (see figure J–4 in the appendix to subpart J of part 7 of this chapter); or in the cylindrical portion (see figure J–5 in the appendix to subpart J of part 7 of this chapter).

(8) Mating parts comprising a pressed fit shall result in a minimum interference of 0.001 inch between the parts. The minimum length of the pressed fit shall be equal to the minimum thickness requirement of paragraph (a)(6) of this section for the material in which the fit is made.

* * * * *

5. Section 18.32 is amended by adding paragraph (i) to read as follows:

§ 18.32 Fastenings—additional requirements.

* * * * *

(i) Coil-thread inserts, if used in holes for fastenings, shall meet the following:

(1) The inserts shall have internal screw threads.

(2) The holes for the inserts shall be drilled and tapped consistent with the insert manufacturer's specifications.

(3) The inserts shall be installed consistent with the insert manufacturer's specifications.

(4) The insert shall be of sufficient length to ensure the minimum thread engagement of fastening specified in § 18.31(a)(6) of this part.

6. Section 18.33 is revised to read as follows:

§ 18.33 Finish of surface joints.

Flat surfaces between bolt holes that form any part of a flame-arresting path shall be plane to within a maximum deviation of one-half the maximum clearance specified in § 18.31(a)(6). All metal surfaces forming a flame-arresting path shall be finished during the manufacturing process to not more than 250 microinches. A thin film of nonhardening preparation to inhibit rusting may be applied to these finished metal surfaces as long as the final surface can be readily wiped free of any foreign materials.

7. Section 18.34 is amended by adding an introductory paragraph and revising paragraph (a)(6) to read as follows:

§ 18.34 Motors.

Explosion-proof electric motor assemblies intended for use in approved equipment in underground mines that are specifically addressed in part 7 of this chapter shall be approved under part 7 of this chapter after February 22, 1996. Those motor assemblies not specifically addressed under part 7 of this chapter shall be accepted or certified under this part.

(a) * * *

(6) Oil seals shall be removed from motors prior to submission for explosion tests.

* * * * *

8. Section 18.37 is amended by revising paragraph (b) to read as follows:

§ 18.37 Lead entrances.

* * * * *

(b) Stuffing boxes shall be so designed, and the amount of packing used shall be such, that with the packing properly compressed, the gland nut still has a clearance distance of ⅛ inch or more to travel without meeting interference by parts other than packing. In addition, the gland nut shall have a minimum of three effective threads engaged. (See Figures 8, 9 and 10 in Appendix II.)

* * * * *

9. Section 18.62 is amended by revising the fifth sentence of paragraph (a) to read as follows:

§ 18.62 Tests to determine explosion-proof characteristics.

(a) * * * Coal dust having a minimum of 22 percent dry volatile matter and a minimum heat constant of 11,000 moist BTU (coal containing natural bed moisture but not visible surface water) ground to a fineness of minus 200 mesh U.S. Standard sieve series. * * *

* * * * *

[FR Doc. 92–30837 Filed 12–22–92; 8:45 am]

BILLING CODE 4510–43–M

DEPARTMENT OF LABOR

Mine Safety and Health Administration

30 CFR Parts 7, 18, 57 and 75

RIN 1219–AA57

Electric Cables, Signaling Cables and Cable Splice Kits

AGENCY: Mine Safety and Health Administration (MSHA), Labor.

ACTION: Final rule.

SUMMARY: This final rule implements new procedures for testing and approval of electric cables, signaling cables and cable splice kit designs. The final rule revises the existing requirements for acceptance of cables in 30 CFR part 18, establishes the flame-resistant requirements for approval of cable splice kit designs, and contains the approval requirements for signaling cables, all of which are currently being granted acceptance by MSHA. The final rule also makes conforming changes to 30 CFR parts 57 and 75 to require certain cables and splices to be accepted or approved by MSHA as flame resistant.

EFFECTIVE DATE: Subpart K of part 7 and §§ 7.44(k), 18.35(a)(3), 18.94(a)(2), and conforming amendments to parts 18, 57, and 75 will be effective on February 22, 1993. Sections 18.1, 18.2, 18.6(a), 18.6(b), 18.6(i), 18.9, and 18.64 will be effective on December 23, 1993.

FOR FURTHER INFORMATION CONTACT: Patricia W. Silvey, Director, Office of Standards, Regulations and Variances, MSHA.

SUPPLEMENTARY INFORMATION:

I. Background

This final rule will replace, in one year, the current regulations and acceptance programs covering the testing and approval for flame resistance of electric cables, signaling cables, and cable splice kits found in 30 CFR part 18. These revisions are issued pursuant to section 508 of the Federal Mine Safety and Health Act of 1977 (Mine Act) (30 U.S.C. 957). In addition, pursuant to section 101 of the Mine Act (30 U.S.C. 811), the final rule makes conforming changes to 30 CFR parts 57 and 75 to require certain cables and splices to be accepted or approved by MSHA as flame resistant.

MSHA published a proposed rule in the **Federal Register** on October 1, 1990 (55 FR 40124). The proposal did not retain the existing regulations and acceptance programs covering the testing and approval for flame resistance of electric cables, signaling cables, and

cable splice kits found in part 18. Instead, it proposed that electric cables, signaling cables, and splice kits be evaluated for approval by the applicant or a third party selected by the applicant under the provisions of 30 CFR part 7, Underground Mining Equipment; Product Testing by Applicant or Third Party. These products meet the criteria for applicant or third party testing because they possess characteristics that can be objectively tested in a routine and readily reproducible manner with no elements of subjective analysis.

Part 7 initiated a revised role for MSHA in the evaluation and testing of selected products used in underground mines. Products approved under part 7 are required to be tested by the applicant or by a third party selected by the applicant to conduct the testing. All testing is to be conducted using MSHA-specified test procedures with certification of test results by the applicant. In addition, the Agency has the right to observe all product testing. When requesting approval, the applicant is required to submit certain product information. This includes, for example, drawings and specifications to document compliance with the technical requirements. Based upon an evaluation of the technical documentation, MSHA observations of product testing, and a review of the certification statements, MSHA will issue an approval or notice denying approval of the product.

Once a product is approved under part 7, an approval holder is required to inspect or test critical characteristics of the product as part of its quality assurance program. Under the provisions of subpart A, the approval holder will report to MSHA any knowledge that a product has been distributed with critical characteristics not meeting required specifications. Upon receiving such a report, MSHA will work with the approval holder to implement appropriate corrective action. Since critical characteristics are features of a product which, if not built to specification, can create a hazard, immediate notification should be by expeditious means, such as by telephone. MSHA will perform periodic audits of products approved under part 7 to ensure that they are being manufactured as approved. If a product fails to meet the technical requirements of part 7 or creates a hazard related to its use, MSHA will take immediate action to address the problem, including revocation of the approval, if necessary.

MSHA reviewed all written statements submitted in response to the proposed rule. No public hearing was requested or held on subpart K. Comments were received from all segments of the mining community, including equipment manufacturers, testing laboratories, trade associations, mine operators, and representatives of miners. This final rule was developed after a full evaluation of the entire public record.

II. Discussion and Summary of the Final Rule

MSHA's regulations found in 30 CFR part 18 governing the approval of electric cables were last reviewed in 1968. Since that time, technological advances in insulation and jacket material, as well as manufacturing techniques, have led to the development of improved electric cables suitable for use in underground mines having potentially explosive atmospheres.

As subpart K to part 7, this rule specifies the technical requirements and test procedures for the approval of electric cables, signaling cables, and cable splice kits. The rule is derived from existing part 18 and current MSHA policies interpreting parts 18 and 75. It provides objective criteria for applicant or third party testing, replacing subjective technical requirements with performance-oriented tests. These tests are based on MSHA's engineering experience with the subjective criteria in the existing approval requirements. Except where indicated, they are not intended to introduce more stringent testing methods but rather to explicitly state the tests used in MSHA's current testing program which have proven to be effective. By using these test procedures, manufacturers can measure, evaluate, and certify compliance of their product with the requirements of this subpart in order to receive an MSHA approval.

The Agency's final rule addresses the comments received and is consistent with Executive Order 12291, the Regulatory Flexibility Act, and the Paperwork Reduction Act.

III. Section-by-Section Discussion

The following section-by-section analysis discusses each provision of subpart K and addresses the comments received on the proposed rule.

Section 7.401 Purpose and Effective Date

This section is derived from § 18.1 and defines the purpose and scope of electric cable, splice kit, and signaling cable approvals issued under this subpart.

Electric cables are used for the transmission and distribution of electric energy for powering equipment in both gassy metal/nonmetal mines and coal mines. Splice kits are used in the repair of damaged electric cables. Signaling cables are used in the transmission of optical signals or electric signals in current-limited applications which include low-energy communication circuits and intrinsically safe remote control circuits. Because of the hazard presented by fire in underground coal mines and gassy underground metal/nonmetal mines, MSHA safety standards such as 30 CFR 57.4057, 57.22310, 57.22311 and 75.600 require the use of flame-resistant cables. In addition, MSHA safety standards in 30 CFR 75.604 address flame-resistant splices in electric cables; however, the flame-resistant performance requirements for splices are not specified.

This final rule modifies the existing requirements for acceptance of cables contained in §§ 18.6(b), 18.6(i), and 18.64 of this chapter and establishes the flame-resistant requirements for approval of electric cable splice kit designs. Additionally, it contains approval requirements for signaling cables which are currently being granted acceptance by MSHA. Conforming amendments to 30 CFR parts 7, 18, 57, and 75 resulting from the approval requirements in this subpart K final rule are included as part of this rulemaking. The conforming amendments revising parts 57 and 75 require the use of cables and splices that have been accepted or approved by the Agency as flame resistant. Although amendatory language was not in the actual proposed rule, in the preamble to the proposal the Agency published its intent to modify these safety standards with this final rule and set forth the actual language the Agency intended to use in requiring that such cables and splices be accepted or approved as flame resistant.

Section 7.401 provides that the requirements of subpart K take effect 60 days after publication of the final rule. It further provides that manufacturers may continue to submit requests for acceptance or extension of acceptance for electric cables, signaling cables, and splice kits under existing procedures until one year from the effective date of this subpart K. After this one-year phase-in period, the applicable portions of part 18 referring to cables will be modified and the signaling cable and splice kit acceptance programs will be discontinued. All new cable and splice kit designs submitted for approval or extension of approval after one year will be required to meet the requirements of this subpart.

This subpart K has been developed to include a product-specific phase-in period, consistent with the preamble

discussion to the final rule on part 7, subpart A (53 FR 23488, June 22, 1988). This phase-in period is based on an assessment of the amount of time needed to prepare for testing and reflects commenters' concerns addressed to subpart A that a phase-in period of sufficient duration be provided to ensure that competent third-party testing facilities be available for prompt testing of products at a reasonable cost. This one-year phase-in period will provide sufficient time for cable and splice kit manufacturers and independent testing laboratories to establish testing capabilities for part 7 testing. The phase-in period is not intended to limit the use or manufacture of preivously approved electric cables, signaling cables, and splice kits.

Several commenters expressed concern that a sufficient amount of phase-in time be allocated in order for existing inventories of electric cables, signaling cables, and splice kits to be exhausted. They also requested that electric cables, signaling cables, and splices installed prior to the effective date of the final rule continue to be usable without immediately having to replace them with products approved under this subpart K. Another commenter questioned the need for a one-year phase-in period. This commenter believed that upon implementation of the final rule, existing approvals should be valid for a transition period of only one year and all applications for approval should be made under this subpart. According to this commenter, all existing approvals that had not been issued under the provisions of this subpart should no longer be valid after this one-year period.

In revising the technical requirements for the approval of electric cables, signaling cables, and splice kits under the procedures of part 7, the final rule does not significantly alter the approval criteria for these products. Furthermore, as discussed under § 7.407(b) in the proposal (55 FR 40128, October 1, 1990), the test results of cable and splice acceptance applications for the past several years indicate the products currently being manufactured and marketed meet the final rule's acceptable performance criteria. MSHA does not intend to revoke, except for cause, any cable or splice approvals previously granted. Cable and splice products accepted under prior regulations and in compliance with those regulations may continue to be manufactured and offered for sale in the mining community as long as no changes are made which would deviate from conformance with the approval documentation. Furthermore, MSHA will consider any cable or splice kit, evaluated and issued an acceptance under the provisions of part 18 or approved under this subpart, to meet the requirements for flame resistance stated in MSHA's safety standards as set forth in 30 CFR parts 57 and 75. Therefore, MSHA will not require mine operators to replace existing inventories or to install only those products approved under this subpart.

Part 7 revises MSHA's role in the evaluation and testing of certain products used in underground mines. Where the Agency's role had been one which emphasized testing by MSHA, part 7 requires testing by the applicant or a third party selected by the applicant to make the approval process more efficient for those products capable of being tested outside the Agency using Agency-developed, standardized and repeatable tests and procedures. As such, the various product subparts have been developed to include product-specific phase-in periods appropriate to provide manufacturers and independent testing laboratories sufficient time to prepare for part 7 testing responsibility. The topic of phase-in periods was discussed in the preamble discussion to the final rule on part 7, subpart A. During this one-year phase-in period, both part 18 and subpart K will be in effect. Applicants can, therefore, choose to submit applications for acceptance under part 18 and have cable and splice products tested by MSHA or submit them under subpart K where the obligation to test will be with the applicant. Furthermore, applicants will be required to submit extensions of approval in accordance with the approval regulations under which the original approval was granted. At the expiration of one year, all applications for extension of approval will be treated as new applications and applicants will be required to apply for an original approval under subpart K. MSHA believes that this procedure will minimize confusion and allow for the continued introduction of cable and splice products to the mining industry without unnecessary delay.

Section 7.402 Definitions

The following definitions applying to the approval of electric cables, cable splice kits, and signaling cables are new. They are designed to clarify the requirements of subpart K.

Component. This definition includes any material in a splice kit which becomes part of the splice. Materials such as conductor insulation, outer jacket, and shielding are included in this definition. Assembly instructions, cleaning solvents, abrasive strips and other materials included in the splice kit, necessary for preparing the splice but not part of the final assembly, have been excluded from this definition.

Conductor. This definition specifies a conductor to be a bare or insulated wire or combination of wires not insulated from one another, suitable for carrying an electric current.

Electric Cable. This definition identifies an electric cable as the assembly of one or more insulated conductors of electric current under a common or integral jacket. Additionally, an electric cable may also contain one or more uninsulated conductors. Under the definition, single conductor cables as well as multiple conductor cables are covered. While the minimum materials comprising an electric cable are specified, materials such as filler and metallic shielding are also included. The cable construction and type determine those additional materials which are included as part of the assembly.

Jacket. This definition specifies a jacket to be a nonmetallic abrasion-resistant outer covering of a cable or splice. The jacket is intended to provide protection against physical damage. Commonly used jacket materials include neoprene and polyvinyl chloride.

Power Conductor. This definition identifies a power conductor to be an insulated conductor of a cable assembly through which the primary electric current or power is transmitted.

Signaling Cable. This definition identifies a signaling cable to be either a fiber optic cable or a cable containing electric conductors, of cross-sectional area less than #14 AWG, used where the circuit cannot deliver electric currents which could increase conductor temperatures beyond the normal operating temperature as established for the current-carrying capacity of the conductors. These cables are normally used to transmit signals for audio or visual annunciation. Equipment using these cables is typically powered by regulated power supplies or batteries. This equipment generally includes, but is not limited to, intrinsically safe systems.

Splice. This definition specifies a splice to be the mechanical joining of one or more severed conductors in a single length of a cable and includes the replacement of insulation and jacket. A splice is intended as a repair to a damaged electric cable.

Splice Kit. This definition identifies a cable splice kit as a group of materials and related instructions for making a flame-resistant splice in an electric

cable. The materials typically contained in a splice kit include replacement jacket, insulation, shielding (if for shielded cable), cable cleaner, abrasive strips, and assembly instructions.

A commenter noted that the proposed language for this definition did not include signaling cable splice kits, while there is a need to repair some types of signaling cables. The commenter believed that subpart K should be modified with language to accommodate splice kits for the repair of those types of signaling cables. The commenter further stated that some signaling cable may also meet the definition of an electric cable and it would be unnecessarily restrictive to preclude an applicant from developing a splice kit for signaling cable that does not qualify as an electric cable.

Present federal regulations require flame-resistant properties only for trailing cables and for the cables installed on equipment that must be maintained in permissible condition. Flame-resistant splices are required on trailing cables and, except for shearer and motor cables on longwall mining systems, cables on permissible equipment are not permitted to be spliced. Furthermore, present MSHA policy does not allow splicing of any cables used in intrinsically safe systems, and splice kits used to repair cables in areas where permissibility is not required to be maintained are not required to be approved for flame resistancy.

As stated previously, signaling cables are normally used to transmit signals for audio or visual annunciation. Equipment using these cables is typically powered by regulated power supplies or batteries. This equipment generally includes, but is not limited to, intrinsically safe systems. Therefore, in most applications where flame-resistant signaling cables are required, a splice kit would not be permitted to be used to repair a damaged cable.

To date, MSHA has not tested or otherwise evaluated splice kits designed solely for the repair of signaling cables. For this reason, MSHA has not included approval requirements for these products in this final rule. The final rule includes provisions under § 7.411 to accommodate the approval of splice kits for which the requirements of this subpart are not applicable. If an applicant submits an application for approval of a splice kit designed to repair a signaling cable that does not qualify as an electric cable as defined in this subpart, MSHA will evaluate the product as new technology under the provisions of § 7.411.

The proposed rule included a definition for filler to identify the materials used to fill the interstices of a cable to provide for a substantially uniform cross section of the completed assembly. This definition has not been included in the final rule since this term is not used.

Section 7.403 Application Requirements

Section 7.403(a) contains the application requirements for approval of electric cables and signaling cables. The requirements stated in this section are derived from existing requirements of 30 CFR 18.6 and the standard application procedures presently in use.

Under this final rule, an application for approval is required to provide product identification information to include cable type, construction, number and size of conductors, and voltage rating for all cables containing electric conductors. This final rule allows for a single application to address two or more sizes, types, and constructions if the products do not differ in composition of materials or basic design. The final rule also requires applications to include technical specifications related to the flame resistance of the product, including the type of material and identifying number for each material comprising the finished assembly, as well as current-carrying capacity (rated ampacity) with the corresponding ambient temperature upon which the current rating is based. Since current-carrying capacity is not a factor in determining the flame resistance of signaling cables, the final rule does not require this information to be provided for these products. Technical information related to jacket, conductor insulation, and filler materials is required for all electric cables and signaling cables approved under this subpart K. Because applicable design factors such as material thickness, conductor configuration, kind and position of shield or braid coverings, and type of construction may affect the flame-resistant performance of electric cables or signaling cables, the final rule requires that complete design specifications or a reference to an existing consensus design standard specification such as the Insulated Cable Engineer's Association (ICEA) Publication No. S–19–81, Fourth Edition, be included with the application. If a product submitted for approval is not based on an existing consensus design standard specification, the application must be accompanied by complete specifications related to the design of the product or include information which details differences in design between the product and an existing consensus design standard specification.

Section 7.403(b) contains the application requirements for approval of electric cable splice kit designs which are similarly based on existing procedures. Under the final rule, applications for approval are required to include product identification information including trade names, style, code numbers, and voltage rating. Applications are also required to include complete splice assembly instructions and technical specifications related to the flame resistance of the splice, including the type of material and identifying number for each component used in the finished product. Design factors such as material thickness, conductor configuration, kind and position of shield or braid coverings, and type of construction could affect the flame-resistant performance of a splice. Therefore, the final rule requires that the complete design specifications or a reference to a published design standard be provided with the application. This information includes identification of the type of splice (shielded, nonshielded) and final assembly dimensions for all components required for splices in each cable that the splice kit is designed to repair.

MSHA will use the application information to evaluate electric cables, signaling cables, and splice kit designs submitted for approval or extension of approval, as well as to identify those bearing an MSHA approval marking as those approved by the Agency.

One commenter believed that a single application is not sufficient to determine the flame resistance of more than one size, type or construction of electric cable or signaling cable because various design factors may affect the flame-resistant performance of the cables. Further, this commenter stated that it would not be a substantial burden for manufacturers to submit a separate application for each product for which they are seeking approval. At the present time, MSHA permits a single application to include two or more sizes, types, and constructions of cables as long as the products do not differ in composition of materials or basic design. Furthermore, MSHA does not currently test each cable product submitted for approval since it has determined that it is unnecessary to test each size, type, and construction to assess the flammability characteristics inherent in the basic design of any particular cable. Instead, only selected sizes, types, and constructions are flame

tested and, based on the results of this testing, similarly designed cable products are granted acceptance without additional tests begin performed. These policies and procedures reflect the experience of over 40 years in testing and evaluating the flame-resistant properties of cable products.

As stated in subpart A of part 7, manufacturers will be required to submit applications detailing the information necessary to evaluate all facets of the design and construction of the product relative to the approval requirements. The application procedures require submission of all the technical specifications that the Agency has determined affect the flame resistance of the cable product designs. Applicants requesting approval or extension of approval must indicate whether, in their opinion, changes in a previously approved product require testing. If tests are not planned, the applicant will be required to explain the technical reasons for not conducting testing. Under this final rule, manufacturers will be required to provide detailed information relative to the design and testing for each size, type, and construction for each product addressed in the application. MSHA will evaluate the need for testing in each case, taking into account the applicant's explanation for not planning to test. MSHA's decision will be based on its evaluation of the effect of any proposed changes on the safe performance of the product. In those cases where the Agency decides that testing is necessary, the applicant will be notified so that testing can be scheduled.

MSHA has granted acceptances for cable products using these procedures over a period of several years and the Agency is not aware of any administrative or technical problems related to permitting more than one size, type, and construction to be evaluated in a single application. The Agency believes that a change in testing policies or this provision, which is based on current application procedures and practice, will result in unnecessary paperwork without improving the integrity of the approval program. Therefore, based on this information, MSHA has not modified this provision in the final rule and will continue to permit a single application for approval to cover two or more sizes, types, and constructions if the products do not differ in composition of material or basic design. It will be the Agency, however, who will be the arbiter of whether any such differences exist.

Fees

In accordance with 30 CFR part 5, fees for MSHA processing of an application under part 7 are subject to an hourly charge. Fee schedules are updated at least once every 3 years and published in the Federal Register.

An application fee of $100 must be submitted with each request for approval or extension of approval for electric cables, signaling cables and splice kits under subpart K of part 7. Under the 1992 rate schedule, the Agency will charge $39 per hour for processing new approvals and $38 per hour for processing extensions of approval.

Section 7.404 Technical Requirements

Section 7.404 is derived from and retains the existing technical requirement of § 18.35(a)(3) for flame resistance of electric cables and applies the same criteria to splices in electric cables. The test presently used for signaling cables is also incorporated into the final rule. Flame resistance will be demonstrated by successful completion of the applicable flame test, as specified in this final rule. A complete description of the flame test is contained in the discussion of §§ 7.407 and 7.408.

Section 7.405 Critical Characteristics

This section is new and lists the critical characteristics that are required to be inspected or tested from each production run, batch, or lot of cables or splice kits manufactured having an approval marking. As defined in subpart A of this part, a "critical characteristic" is a feature of a product that, if not manufactured as approved, could have a direct adverse effect on safety. The critical characteristic identified for inspection or testing of cable and splice kits is flame resistance.

One commenter recommended that manufacturers be required to perform flame tests as well as other physical and chemical tests in order to assure compliance. Other commenters were concerned that an unrealistic number of tests would be required to be performed on a sample of each production run, lot, or batch, since some manufacturers can produce different constructions in a 24-hour period, resulting in up to 100 flame tests being run per week. While MSHA agrees that flame testing samples is the most reliable method to make a determination as to whether an electric cable, signaling cable, or splice made from a splice kit meets the technical requirements of this subpart, inspections and tests other than flame testing can be used to determine compliance with this final rule.

Section 7.405(a) provides for the flame testing of a sample of each production run, batch, or lot as one method to ensure continued compliance with the flame-resistant requirements. As an alternate to flame testing, § 7.405(b) provides that materials that contribute to the flame-resistant characteristic, along with a sample of the cable or splice kit assembly for each production run, batch, or lot, be inspected or tested. Such inspections or tests will be conducted to verify material composition, thickness, and, for cables, position within the finished product in relationship to the approved design. Appropriate inspection or test procedures, other than flame testing, that satisfy the requirements of § 7.405(b) are dependent upon the materials used that contribute to the flame-resistant characteristic of the product as well as the manufacturing process used. MSHA, therefore, has not identified these inspection and test procedures specifically. Inspections could include observation of the color or consistency of the materials or sample of the assembly. Tests could include chemical or physical analysis of the materials that comprise the product.

Although current regulations do not specifically require flame testing of samples or inspection or testing of the physical properties of the finished product, they do require manufacturers to maintain the quality of approved products. Further, use of the MSHA marking obligates the manufacturer to produce cable and slice products as accepted to meet flame resistance. Based on product audits, MSHA has no evidence to show that cable and splice products being supplied to the mining community do not meet the technical requirement for flame resistance. Thus, the Agency has concluded that existing manufacturing techniques and quality assurance methods have been effective in assessing the critical flame-resistant characteristic of cable and splice products. Furthermore, MSHA believes that there will be minimal impact upon manufacturers in determining compliance of their final products, as existing methods and procedures have proven to be adequate and are likely to continue to be used for cable and splice products approved under this subpart K to part 7. Finally, MSHA disagrees with the comment proposing that additional physical tests be required to be performed on every product approved under this subpart in order to determine compliance with this section. MSHA maintains that a manufacturer is obligated to perform only tests and inspections necessary to assure that the

technical requirement is met. The manufacturer should not be required to perform superfluous testing.

Section 7.406 Flame Test Apparatus

The flame test apparatus described in § 7.406 is the same as that presently used by MSHA for conducting tests under § 18.64(a) and (b). Because variations in design may change the conditions of the test or disturb the burning process, the design factors essential to obtaining uniform and consistent test results are stated for each principal part of the flame test apparatus. They are based on equipment presently used by MSHA. However, where variations do not affect the reliability of the test results, MSHA has not specified design characteristics and will allow design flexibility. Apart from a comment directed to § 7.406(c), which is discussed below, commenters had no objections to the provisions on the flame test apparatus.

Section 7.406(a) addresses requirements concerning the size of the test chamber and is derived from § 18.64. It requires that the chamber be completely open at the top and front as well as have provisions (supports) for mounting the test specimen and energizing electric cable or splice specimens with electric current. It also requires that the floor of the chamber be fabricated or lined with a noncombustible material, such as metal, that will not readily extinguish burning matter which may fall from the specimen during testing. This reduces the possibility that burning matter will either ignite the floor of the chamber or be extinguished due to the composition of the floor material. Disturbance of the burning process by such events will affect the reliability of the test results.

Section 7.406(b) is derived from § 18.64(b) and requires that the specimen holder (support) be constructed of three metal rods and be designed to support and maintain the specimen at a specific level within the test chamber. The existing requirement stated in § 18.64(b)(4) that the metal rods be wrapped with asbestos tape to reduce the cooling effect has been replaced in the final rule with a new requirement that the rods have a nominal diameter of approximately 3/16 inch. Further, the length of the horizontal portion of the rod which contacts the test specimen is specified to be approximately 12 inches in length. Existing regulations do not specify rod size, and MSHA believes that this new specification will provide uniform control of the cooling effects of the rods upon the test specimen, thereby improving the repeatability of the test.

Section 7.406(c) is derived from existing requirements stated in § 18.64 concerning the type of fuel and gas burner used to ignite the test specimen. It continues to specify a natural gas type Tirrill burner as the gas ignition source and requires the natural gas fuel for the burner to be composed of at least 96 percent combustible hydrocarbons, with a methane content of at least 80 percent. These fuel specifications, derived from the fuel used by MSHA in flame testing, are considered necessary in order to ensure proper operation of the gas burner.

One commenter suggested that MSHA consider methods other than gas composition, since variations in gas composition affect BTU output as well as the flame temperature during the igniting process. These could include measuring flame temperature or specifying a range of heating values as an alternative to that which was proposed. The commenter offered these recommendations to assist the Agency in developing a natural gas specification which would minimize local variances and thus preclude the possibility of affecting the reliability of test results.

Based on these suggestions, MSHA reevaluated the appropriateness of the natural gas specification requirements stated in proposed § 7.406(c). MSHA has had extensive experience in conducting flame tests of cable and splice products and has performed these tests using natural gas with the full range of gas constituents specified in the proposed rule. The description of the allowable gas concentration in the proposed rule has been slightly modified to accurately reflect the variations that have been present during the testing performed by MSHA. The Agency has not observed any significant variations in test results using these natural gas supplies and has concluded that the effects of any variations in heat content or flame temperature, due to varying gas compositions, were inconsequential with respect to the outcome of the flame test. Thus, there is no data to support a change in the natural gas requirements and no experience to show how much variation may be tolerated by specifying the natural gas requirements in another manner. For these reasons, the method used in the final rule to identify the quality of the natural gas supply remains unchanged from the proposal. The specified gas compositions stated in final § 7.406(c) will allow the use of most natural gas supplies while still ensuring the consistency and reliability of the test results.

Section 7.406(d) is derived from § 18.64(b)(1) and requires a source of either alternating current or direct current to energize and regulate electric current flow through the electric cable or spliced test specimen. It also specifies the type of conductors which are subject to heating current. A new requirement concerning the output voltage of the current source has been added because use of an incompatible voltage to energize test specimens during the flame test may provide unpredictable results.

Section 7.406(e) is derived from § 18.64(b)(2) and requires that an instrument be provided to measure current flow through the power conductors of the test specimens within an accuracy of ±1 percent. This monitoring accuracy is necessary to attain a consistent heating rate of the cable.

Section 7.406(f) is derived from § 18.64(b)(3) and requires a device to measure the conductor temperature of the electric cable and spliced test specimen. It allows for design flexibility in the type of device provided and does not require the use of a thermocouple-type instrument as specified in existing regulations. However, MSHA requires that the device measure conductor temperature within an accuracy of ±2 percent. In addition, the device used must be capable of measuring the temperature without removing any cable material from the test specimen in order to make the temperature measurements. Any material disturbed in inserting the device, such as a thermocouple, is required to be returned as closely as possible to its original location and be maintained there for the duration of the testing. If such material were removed or unduly displaced, unpredictable cooling effects could occur which would affect the repeatability of the test. Paragraphs (d) through (f) do not apply to signaling cables because signaling cables are not tested with any preheating requirements.

Section 7.407 Test for Flame Resistance of Electric Cables and Cable Splices

The flame test described in § 7.407(a) is derived from § 18.64 (a), (c), and (d). It is the same as that presently used, with some minor changes detailed below. MSHA's experience with this procedure is that it produces repeatable, objective test results which assess the flame-resistant properties of electric cables and is considered equally effective for testing splices.

Existing requirements concerning the size and preparation of test specimens are maintained in § 7.407(a)(1). Section 7.407(a)(2) adds a new requirement for conditioning all specimens before testing and for maintaining the same

environmental conditions during testing. Temperature and moisture content of the specimen at the start of and during the flame resistance test may affect the repeatability of test results and for this reason have been addressed in this final rule.

Section 7.407(a)(3) is derived from existing requirements concerning the location for measuring conductor temperature of electric cables and spliced cables. It provides flexibility in the method of securing the sensing element of the temperature measuring instrument. The existing requirement for tying the flap of jacket and insulation material with wire has been replaced by the more performance-oriented requirement that any disturbed jacket or insulation material be restored as closely as possible to its original location and be maintained there for the duration of the test. Unpredictable cooling effects could occur if such material were displaced.

Section 7.407(a)(4) retains existing requirements concerning the mounting of the applicable test specimen on the rods positioned within the chamber. It provides flexibility in the placement of the test chamber by deleting the existing requirement for using a ventilated hood or canopy, although the use of a hood or canopy is still acceptable. The existing requirement for the test specimen to be free from external air currents during testing has been retained and, as stated previously, the test chamber must be placed in an area having controlled temperature and humidity, because uncontrolled environmental conditions could affect the burning process.

Section 7.407(a)(5) specifies the adjustment of the flame from the gas ignition source and retains present specifications concerning flame height and size. Also, a new requirement has been added that requires the flame to be blue in color without a persistence of yellow coloration. The persistence of yellow coloration indicates maladjustment or impurities in the fuel. This will provide for a controlled and consistent flame during the igniting process and will provide for more consistent repeatable test results.

Section 7.407(a)(6) retains the existing requirement for connecting electric cable and spliced test specimens to the current source. It requires that connections be secure and compatible with the size of the specimen's power conductors, as improper connections may produce undesirable heating effects affecting temperature measurement and yielding unreliable results.

Section 7.407(a)(7) is derived from existing test procedure requirements for electric cable and spliced test specimens and specifies that all power conductors be energized with electric current. It retains the intent of existing regulations that the value of the effective heating current be five times the rated power conductor ampacity, but specifically states that the rating be based on using an ambient temperature of 104 °F (40 °C), for consistency. One commenter noted that ampacity tables are not included in this subpart K but do appear in existing regulations in part 18. The commenter indicated that it is not clear whether existing conductor ampacity tables, per ICEA standards, will be applied to the test method. To properly conduct the test, the final rule requires that each power conductor be energized with a current that is five times the power conductor rating at 104 °F (40 °C). MSHA has noted differences in power cable ampacity ratings, for identical sizes and cable types, due to the design standard used in their manufacture. For this reason, MSHA has chosen to require that flame tests be performed using current values determined from the ampacity rating stated by the manufacturer of the product in its application for approval. To permit advances in technology and to accommodate the testing of a wide variety of cable constructions, including standard and nonstandard designs, that result in various current ratings, MSHA has not published ampacity tables in this final rule.

Section 7.407(a)(8) is derived from the existing requirement for monitoring the current flow through the power conductors. It requires that the effective heating current be adjusted to within #5 percent, as required, to maintain the proper value. This provides for a controlled and consistent heating process, thus improving the repeatability of the test results.

Section 7.407(a)(9) is derived from the existing procedure for the location and application of the flame. For electric cables, the tip of the inner cone from the flame of a gas burner is to be applied directly beneath the test specimen for 60 seconds at a location 14 inches from one end of the cable and between the supports separated by a 16-inch distance. For spliced cable specimens, the tip of the inner cone from the flame of a gas burner is to be applied for 60 seconds beneath the midpoint of the splice jacket.

Paragraphs 7.407(a) (10) and (11) retain the existing requirements concerning the duration of exposure to external flame and the measurement and recording of burn time of the specimen, respectively. Section 7.407(a)(10) requires the flame from the gas burner and the electric current to be removed simultaneously from the test specimen after the specified time period. It further requires that the flame from the gas burner be removed from beneath the test specimen in a manner which does not disturb air currents created during the burning process within the test chamber. If special care is not taken, unnatural turbulence could be produced which may affect the burning process and the results of the tests. MSHA has not specified a method for removing the flame or electric current in order to provide more performance-related requirements and to allow design flexibility. Section 7.407(a)(11) requires that the duration of burning be recorded and that the measurement of the time the specimen continues to burn after the flame from the gas burner has been removed begin concurrently with flame removal. The duration of burning includes the burn time of material that falls from the test specimen after the flame from the gas burner has been removed. This requirement is based on an interpretation of the existing requirement for measuring burn time and is currently considered as a factor for evaluating the flame-resistant properties of electric cables and splices under existing procedures.

Sections 7.407(a) (12) and (13) retain the existing requirements for measuring the length of burned area of the test specimen for testing three cable specimens, respectively. It requires that the measurement be made longitudinally along the cable axis to provide for a consistent measurement parameter and that the burned length include any charred length.

Section 7.407(b) is derived from § 18.64(e). It modifies and expands the requirements to include splices. This section sets forth the criteria for acceptable performance for this test. It requires that each of the three specimens tested exhibit burn times not exceeding 240 seconds and the length of burned area in each specimen be less than 6 inches. This change from the present requirement that two of three specimens meet the acceptable performance criteria addresses advances in technology. The existing criteria for acceptable performance for testing were developed approximately 40 years ago based upon the use of natural rubber-jacketed cables. Two out of three specimens represented optimal performance and was acceptable for these cables. Jacket materials presently used have better flame-resistant properties, and three out of three represents the optimal performance for these synthetic compounds and

produces reliable test results. The technology currently used in the manufacturing process has advanced to provide more consistent flame-resistant properties for the manufactured product. The test results of cable and splice acceptance applications for the past several years indicate the products currently being manufactured and marketed will meet this final rule without requiring modification to the manufacturing process.

Section 7.408 Test for Flame Resistance of Signaling Cables

The flame test described in § 7.408 is derived from § 18.64 (a), (c), and (d). It is the same as that presently performed under the signaling cable acceptance program. The test apparatus for signaling cables is the same as that for electric cables except that there is no preheating requirement. Preheating is not required to be performed for these cables due to their intended use. Fiber optic cables do not carry electric current and therefore are not subject to electric current heating. Cables having electric conductors of cross-sectional area less than #14 AWG for use as signaling cables are used in low-current applications, as stated earlier. Equipment using these signaling cables is typically powered by batteries or by regulated power supplies which are not capable of delivering currents which exceed the current-carrying capacities of the conductors. As a result, the signaling cables are not subject to excessive currents that could cause the conductors to become overheated. Electrically preheating the cable during testing would simulate a condition to which these cables would not be subjected.

The requirements concerning the size and preparation of test specimens are specified in § 7.408(a)(1). It requires three samples of signaling cable to be prepared, each three feet long.

Section 7.408(a)(2) adds a new requirement for conditioning all specimens before testing and maintaining the same environmental conditions while conducting the testing. Temperature and moisture content of the specimen at the start of and during the flame-resistance test may affect the repeatability of test results.

Section 7.408(a)(3) retains existing testing procedures concerning the mounting of the applicable test specimen on the rods positioned within the chamber. It provides flexibility in the placement of the test chamber by removing the existing requirement for using a ventilated hood or canopy, although use of a hood or canopy is still acceptable. The existing requirement for the test specimen to be free from external air currents during testing has been retained, and the test chamber must be placed in an area having controlled temperature and humidity because uncontrolled environmental conditions could affect the burning process.

Section 7.408(a)(4) specifies the adjustment of the flame from the gas ignition source and retains present specifications concerning flame height and size. Also, a new requirement has been added to require that the flame be blue in color without a persistence of yellow coloration. The persistence of yellow coloration indicates maladjustment or impurities in the fuel. This adjustment will provide for a controlled and consistent flame during the igniting process and will provide for more consistent repeatable test results. Section 7.408(a)(5) retains the existing procedure for locating and applying the flame. The flame is applied for 30 seconds directly beneath the sample centered between either end support and the center support.

The existing requirements concerning the duration of exposure to external flame and the measurement and recording of burn time of the specimen, respectively, are retained in § 7.408(a) (6) and (7). Section 7.408(a)(6) requires the flame from the gas burner to be removed from the test specimen after the specified time period. It further requires that the flame from the gas burner be removed from beneath the test specimen in a manner which does not disturb air currents created during the burning process within the test chamber. If special care is not taken, unnatural turbulence could be produced which may affect the burning process and the results of the tests. MSHA has not specified a method for removing the flame in order to provide a more performance-oriented requirement and to allow design flexibility. Section 7.408(a)(7) requires that the duration of burning be recorded and that the measurement of the time the specimen continues to burn after the flame from the gas burner has been removed begin concurrently with flame removal. The duration of burning includes the burn time of material that falls from the test specimen after the flame from the gas burner has been removed. This requirement is based on an interpretation of the existing requirement for measuring burn time and is currently considered as a factor for evaluating the flame-resistant properties of signaling cables under existing procedures.

The existing requirements for measuring the length of burned area of the test specimen and for testing three cable specimens, respectively, are retained in § 7.408(a) (8) and (9). These provisions require that the measurement be made longitudinally along the cable axis to provide for a consistent measurement parameter and that the burned length include any charred length.

Section 7.408(b) is derived from § 18.64(e) and the existing signaling cable acceptance program. It specifies the criteria for acceptable performance for this test. It requires that each of the three specimens tested exhibit burn times not exceeding 60 seconds, which is the same as is presently required under the signaling cable flame test program. This time is shorter than for electric cables and splices because the signaling cables are not preheated. The allowable length of burned (charred) area specified; i.e., not exceeding 6 inches, remains the same as the present criteria for this product. The requirement that each of the three specimens meet the acceptable performance criteria of this section is consistent with the existing signaling cable acceptance program.

Section 7.409 Approval Markings

Section 7.409 implements the general provisions of subpart A of this part, which requires each product issued approval under part 7 to have an approval marking. This section of the final rule is derived from existing § 18.64(f) which requires approval markings on electric cables so that mine operators know which cables meet the flame-resistance specifications of the Secretary. It expands the marking requirements to include signaling cables and splices and adds additional marking requirements for electric cables and signaling cables.

One commenter disagreed with the marking of signaling cables and stated that these marking requirements would result in added cost to the industry, while not enhancing safety in any manner. At the present time, MSHA has issued signaling cable acceptances to a number of manufacturers according to guidelines established in the Signaling Cable Acceptance Program developed by the Agency to evaluate these products. Under this program, signaling cable manufacturers are required to mark products that have been granted acceptance by MSHA with permanent and legible approval markings at intervals not exceeding three feet. MSHA believes that products are being marked in this manner without placing a significant financial burden upon the industry and that the presence of an approval marking enhances safety by

providing, for mine operators, identification of those products which have met the flame-resistant criteria of the Agency.

Under part 18, MSHA requires trailing cables to be marked at intervals not exceeding 12 feet, with the marking impressed in the jacket or as raised letters and figures on an impressed background. Other types of cable may be marked in the same manner or have a durable marking printed on the surface of the cable at intervals not exceeding 3 feet. As proposed, the 12-foot marking interval currently specified under part 18 would have been deleted in order to facilitate the identification of shorter sections of cable.

One commenter recommended that the current 12-foot marking interval for trailing cables and mine power feeder cables be retained because these cables are used in lengths long enough to insure proper identification with a 12-foot marking interval. The commenter further noted a lack of personal experience with any problems indicating a need to mark these types of cables in 3-foot intervals. Under the proposal, all approved cables would have to be legibly and permanently marked on the jacket at 3-foot intervals. Further, the marking would have to include additional information pertaining to the size and number of conductors, type of cable, and voltage rating for those cables containing electric conductors, as well as the MSHA-assigned approval number. Although the final rule imposes additional cable making requirements, it allows for flexibility by not specifying the marking method. An electric cable construction approved under this subpart may be used in a number of different applications. In one application it may be used between electric components of a machine; in another as a trailing cable or mine power feeder cable. The cable length in each of these applications can often be 12 feet or less and varies according to the function it serves.

The revised marking regulation will facilitate identification of appropriate cables and splices. Mine operators are obligated to maintain permissible equipment in approved condition. Equipment manufacturers are obligated to assemble permissible equipment according to the design approved by MSHA. Additionally, underground equipment is required to use electric cables and conductors of proper size for the loads involved. Improper cable selection when installing or replacing cables on permissible equipment could cause potential fire and explosion hazards. Cable marking information pertaining to the size (gauge) and number of conductors, as well as cable type and voltage rating for cables containing electric conductors, in addition to the MSHA approval number designation, is considered necessary for a proper and complete identification of an electric cable or signaling cable. Furthermore, a complete identification of a damaged electric cable is required in order to select a splice kit that is proper for the repair. Based upon experience, MSHA believes that there are a number of cable manufacturers who are producing "MSHA accepted" cables that comply with the marking requirements as stated in this subpart and that compliance with these provisions will not impose an undue burden on the industry.

The marking requirements for the jacket in a splice kit remain unchanged from existing policy. The approval marking is required to be legible and permanent and appear at least once on the outside of the assembled splice. One commenter recommended that a splice kit stipulate the size of electric cable that it is designed to repair as this information would help prevent using the wrong kit to repair an electric cable. This information is currently available for the proper selection of splice kits to repair electric cables. Further, the Agency is unaware of any problems resulting from unavailability of this information. It may be supplied on the splice kit package, on the splice outer jacket, on charts, or contained in the detailed assembly instructions which are required to be provided with all splice kit products approved under the existing procedures or under the provisions in § 7.402 and § 7.403 of this final rule. Therefore, the final rule has not been modified to specify the inclusion of this information.

Section 7.410 Post-Approval Product Audit

This section is new and implements the post-approval product audit requirements as set forth in the general provisions of subpart A to this part 7. Subpart A sets forth that a product will be audited no more than once a year unless MSHA has cause to audit more frequently. Paragraph (a) specifies that upon request by MSHA, 12 feet of an approved electric cable or approved signaling cable design be provided at no cost for auditing purposes. Paragraph (b) specifies that 3 approved splice kits of an approved splice kit design, as well as 12 feet of MSHA-approved cable which the splice is designed to repair, be provided at MSHA's request at no cost.

MSHA received a number of comments concerning the post-approval audit provisions of this final rule. Two commenters stated their concern with the "except for cause" provision. One indicated that the term "cause" needed to be explained more fully. The other commenter noted that the Agency could perform more audits if the "except for cause" language were deleted from the final rule. Based on MSHA's experience, the Agency anticipates few instances in which more than one approved cable or spliced product will be required "for cause" from any one manufacturer in any one year. There are circumstances, however, under which an additional audit is appropriate to ascertain compliance with the technical requirements upon which an approval was based. Examples of such circumstances include verified complaints about the safety of approved cables or splices, evidence of changes that have not been approved, audit test results that warrant further testing to determine compliance, and evaluation of corrective action taken by an approval holder. Under these circumstances, an approval holder must provide, at no cost to MSHA, additional approved cables or splices so the Agency can ensure that the approval holder is meeting the obligation to manufacture the product as approved. As an on-going program, MSHA obtains approved cable and splice products from other sources as well to perform product audits. These audit activities supplement existing quality assurance efforts to ensure conformity with the technical requirements upon which product approval was based. This work complements the quality assurance provisions of this subpart by providing a mechanism for independent evaluation by MSHA of approved products on a random basis.

Another commenter indicated that MSHA's intent to conduct all periodic audits of approved products itself is too restrictive. This commenter stated that independent third party agencies, which regularly conduct such product audits as part of their labeling, listing, and follow-up services, should be permitted to perform this function as an alternative to MSHA audits. In the part 7 process, MSHA remains as the approval-issuing authority and as such should maintain control of the post-approval auditing.

As noted in earlier rulemaking for subpart A of this part 7, approved products audited by MSHA will be selected by the Agency as representative of those distributed for use in mines. When an approved product is requested by MSHA for audit from the approval holder, the Agency will arrange to examine and evaluate it at a mutually-

agreed-upon time and location and permit the approval holder to observe audit-related tests. This examination can take place at an MSHA facility, at the manufacturer's plant or distribution center, or at any place agreed upon by MSHA and the approval holder. The information necessary to determine compliance, such as that related to product design, may not be readily available to independent third-party test laboratories. This information is considered, by manufacturers, as proprietary and is not available for disclosure by the Agency. Therefore, while MSHA has no objection to other organizations independently testing cable and splice products against the flame-resistant requirement and reporting this information to the Agency, it must conduct all product audits in order to maintain a viable audit program.

Section 7.411 New Technology

Section 7.411 allows for approval of cables and splice kit designs that incorporate technology for which the specific requirements of this subpart are not applicable, if MSHA determines that the product is as safe as those which meet the requirements of this subpart. One commenter expressed an opinion that this section is unnecessary because part 18 provides MSHA with the authority to approve cable and splice products that incorporate new technology. Although this section is derived from existing § 18.20(b), MSHA believes that it is necessary to retain this provision in the final rule because, after one year from the effective date of this subpart K, part 18 will be modified and those sections pertaining to issuing cable acceptances under part 18 will be deleted. All new cable and splice kit applications will be required to be evaluated under the provisions of this subpart. The Agency recognizes that technology not now envisioned may at some time be applied to cable and splice products. Therefore, MSHA has retained the new technology provisions in this final rule in order to maintain a mechanism for evaluating these products and not limit the introduction of technological improvements or hinder new applications of existing technology. To implement this provision, MSHA will prescribe appropriate test procedures and performance requirements when such an approval is sought.

Once MSHA approves an electric cable, signaling cable, or splice kit under this section, the Agency will make the modified tests and requirements used by MSHA to evaluate a particular technology available to manufacturers and other interested persons. If, over a period of time, MSHA receives a number of applications for the same type of technology or newly adapted technology, MSHA will revise the electric cable, signaling cable, or splice kit approval regulations through the rulemaking process to recognize such developments.

Conforming Amendments

The changes to MSHA's requirements for acceptance of cable and splice kits as flame resistant also necessitate certain conforming modifications to the Agency's safety standards in 30 CFR parts 57 and 75. Currently MSHA's standards require mine operators to use cable which is accepted as flame resistant pursuant to 30 CFR 18.64 in underground coal and metal and nonmetal mines. (See §§ 57.4057, 57.22310, 57.22311, and 75.600–1.) In addition, permanent splices in cable used in underground coal mines must also be flame resistant (see § 75.604(c)).

As discussed in the proposed rule (55 FR 40124), to avoid conflict with amendatory language which had been proposed for the parts 57 and 75 electrical standards, MSHA did not propose amendatory language of these parts in the regulatory text of the proposed rule. However, the preamble to the proposal did state that MSHA intended to amend its safety standard language to state that cables or splices "be accepted or approved by MSHA as flame resistant." Therefore, revisions are being made wherever part 57 or part 75 requires cables or splices to be flame resistant or references the flame-resistance test in § 18.64. The modified wording will allow mine operators to use any cable or splice determined by MSHA to be flame resistant without regard to the specific approval part under which the approval or acceptance was issued. This is possible because cables and splices already tested and accepted by the Agency as flame resistant will remain unaffected by this rule for approval of cables and splice kits under the procedures of part 7.

Derivation Table

The following derivation table lists: (1) Each section number of the final rule (New Section) and (2) the section number of the standard from which the section is derived (Old Section).

DERIVATION TABLE

New Section	Old Section
7.401	18.1.
7.402	New.
7.403	18.6.
7.404	18.35(a)(3).
7.405	New.
7.406	18.64(a) and (b).
7.407(a)	18.64(a), (c) and (d).
7.407(b)	18.64(e).
7.408(a)	18.64(a), (c) and (d).
7.408(b)	18.64(e).
7.409	18.64(f).
7.410	New.
7.411	18.20(b).

Distribution Table

The following distribution table lists: (1) Each section number of the part 18 standard (Old Section) and (2) each section number of final subpart K of part 7 (New Section). New section numbers marked with an asterisk (*) refer to subpart A—the general provisions of part 7 applicable to all technical product subparts.

DISTRIBUTION TABLE

Old Section	New Section
18.1	7.1*, 7.401, 18.1.
18.2	7.2*, 18.2.
18.6	7.3*, 7.403, 18.6.
18.9(a)	7.4(c)*, 18.9(a).
18.10	7.5*, 18.10(a).
18.15	7.3(a)*, 18.15.
18.16	7.9*, 18.16.
18.20(b)	7.411, 18.20(b).
18.35(a)(3)	7.404.
18.64(a)	7.406, 7.407(a), 7.408(a).
18.64(b)	7.406.
18.64(c)	7.407(a) and 7.408(a).
18.64(d)	7.407(a) and 7.408(a).
18.64(e)	7.407(b) and 7.408(b).
18.64(f)	7.409.

IV. Executive Order 12291 and Regulatory Flexibility Act

In accordance with Executive Order 12291, MSHA has prepared an analysis to identify the potential costs and benefits associated with subpart K. This analysis has formed the basis for the Initial Regulatory Flexibility Analysis required by the Regulatory Flexibility Act. In this analysis, MSHA has determined that this rule neither results in major cost increases nor has an incremental effect of $100 million or more on the economy. Therefore, the rule is not within the criteria for a major rule, and a Regulatory Impact Analysis is not necessary.

The Regulatory Flexibility Act requires that in developing regulatory proposals agencies evaluate compliance alternatives that minimize any adverse impact on small businesses. Subpart K would clarify the standards which industry must meet for approval of electric cables, signaling cables, and cable splice kits. MSHA designed its product testing requirements to be as performance oriented as possible to

allow manufacturers to choose the most cost-effective option. Performance-oriented standards should benefit both large and small manufacturers.

The rule upgrades existing requirements in 30 CFR § 18.64 that address the acceptance of electric cables as flame-resistant. It establishes flame-resistant requirements for the approval of signaling cables and cable splice kit designs. MSHA currently accepts these products under the requirements in § 18.64, which have been modified for signaling cables and cable splice kits. The rule also includes current terminology, not in part 18, in the definitions section of part 7; eliminates unnecessary provisions, such as certain cable marking requirements; and, where possible, provides alternative methods of compliance.

This final rule does not significantly alter the existing technical requirement for electric cables, signaling cables, and cable splice kits. MSHA requires certain electric cables used in underground coal and gassy metal/nonmetal mines to be approved (accepted). MSHA has interpreted this to include signaling cables and splice kits, although existing requirements do not include approval criteria for these materials. The final rule sets out, with little modification, the approval criteria presently used by MSHA to approve these products. MSHA expects all currently accepted electric cables, signaling cables and splice kit materials to be able to meet the technical requirements. There is no additional cost associated with this requirement, since existing regulations require approval. Any necessary testing of products required by MSHA either is not substantially different from that currently undertaken or does not impose significant costs compared to the sales value of the product. The application procedures, testing procedures, quality assurance program, and annual audit do not impose significant costs.

The rule will increase private-sector involvement in the approval of mining products. For the first time, in lieu of testing only by MSHA, the applicant or a third party selected by the applicant will test electric cables, signaling cables, and splices in electric cables. The Agency anticipates that this new procedure will reduce duplicate testing of products in some cases and eliminate associated costs and potential delays in product approvals. In addition, MSHA expects that this procedure will enhance the safety of miners through the more rapid introduction of technological advances in mining products.

During the phase-in period for subpart K, which will be 1 year from the effective date of this final rule, MSHA will grant extensions of approval pursuant only to the part under which the original approval was granted. After the phase-in period, MSHA will discontinue issuing acceptances under the existing acceptance programs, and all applications for an approval or an extension of approval for electric cables, signaling cables, and cable splice kits will be subject to the provisions of part 7. If a manufacturer does not change a product that has a current acceptance, then it can continue to be manufactured and used.

The proposal will affect 135 foreign and domestic firms that currently have MSHA acceptances for electric cables, signaling cables, or cable splice kits. Of these firms, 68 manufacture electric cables, 6 manufacture signaling cables, 7 manufacture both signaling and electric cables, and 54 manufacture splice kits. About 33 percent of these firms have not had any contact with MSHA in the past 10 years.

MSHA estimates that the annual compliance cost increase due to the provisions of subpart K will be about $17,000, but there will be an offsetting cost reduction of about $6,400 from MSHA testing fees and shipping costs. The total annual incremental cost increase, therefore, will be about $10,600. Product audits, the most costly provision, will cost about $9,800.

V. Paperwork Reduction Act

This final rule contains information collection requirements subject to the Paperwork Reduction Act of 1980.

Section 7.403 requires applicants seeking approval of electric cables, signaling cables, and cable splice kits to submit an application for approval. MSHA estimates that there will be an average of 38 applications submitted per year, each requiring 1 hour to prepare, and an average of 3 applications submitted per year, each requiring 4 hours to prepare for a total of 50 burden hours.

Section 7.4(a) requires records of test results and procedures to be retained for at least 3 years. Standard testing protocols used by the manufacturing community include the keeping of records of product testing; therefore, MSHA estimates there will be no additional cost for applicants to maintain these records.

Section 7.7(d) requires applicants to report to MSHA any knowledge of a product distributed with critical characteristics not in accordance with the approval specifications. MSHA estimates that manufacturers will submit 142 reports per year requiring 15 minutes per report for a total of 36 burden hours.

The rule requires applicants to maintain records on the distribution of each product bearing an approval marking as set forth in § 7.7(c). This provision does not specify the type of record, and MSHA believes applicants will use existing sales record systems to comply.

In accordance with § 3504(h) of the Paperwork Reduction Act of 1980, the collection of information requirements contained in § 7.403 of the final rule have been approved by OMB under control number 1219–0100.

List of Subjects in 30 CFR Parts 7, 18, 57, and 75

Mine safety and health, Underground mining.

Dated: December 14, 1992.

William J. Tattersall,

Assistant Secretary for Mine Safety and Health.

Chapter I of title 30 of the Code of Federal Regulations is amended as follows:

PART 7—TESTING BY APPLICANT OR THIRD PARTY

1. The authority citation for part 7 continues to read as follows:

Authority: 30 U.S.C. 957.

2. Section 7.44 is amended by revising the first sentence of paragraph (k) to read as follows:

§ 7.444 Technical requirements.

* * * * *

(k) Cables within a battery box shall be accepted by MSHA as flame resistant under part 18 of this chapter or approved under subpart K of this part.

* * *

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3. A new subpart K is added to part 7 to read as follows:

Subpart K—Electric Cables, Signaling Cables and Cable Splice Kits.

Sec.

§ 7.401 Purpose and effective date.

This subpart establishes the flame-resistant requirements for approval of

electric cables, signaling cables and cable splice kit designs. Applications for approval or extension of approval submitted after February 22, 1994 shall meet the requirements of this subpart.

§7.402 Definitions.

The following definitions apply in this subpart.

Component. Any material in a cable splice kit which becomes part of a splice.

Conductor. A bare or insulated wire or combination of wires not insulated from one another, suitable for carrying an electric current.

Electric Cable. An assembly of one or more insulated conductors of electric current under a common or integral jacket. A cable may also contain one or more uninsulated conductors.

Jacket. A nonmetallic abrasion-resistant outer covering of a cable or splice.

Power Conductor. An insulated conductor of a cable assembly through which the primary electric current or power is transmitted.

Signaling Cable. A fiber optic cable, or a cable containing electric conductors of a cross-sectional area less than #14 AWG used where the circuit cannot deliver currents which would increase conductor temperatures beyond that established for the current-carrying capacity of the conductors.

Splice. The mechanical joining of one or more severed conductors in a single length of a cable including the replacement of insulation and jacket.

Splice Kit. A group of materials and related instructions which clearly identify all components and detail procedures used in safely making a flame-resistant splice in an electric cable.

§7.403 Application requirements.

(a) *Electric cables and signaling cables.* A single application may address two or more sizes, types, and constructions if the products do not differ in composition of materials or basic design. Applications shall include the following information for each product:

(1) Product information:

(i) Cable type (for example, G or G–GC).

(ii) Construction (for example, round or flat).

(iii) Number and size (gauge) of each conductor.

(iv) Voltage rating for all cables containing electric conductors.

(v) For electric cables, current-carrying capacity of each conductor, with corresponding ambient temperature upon which the current rating (ampacity) is based, of each power conductor.

(2) Design standard. Specify any published consensus standard used and fully describe any deviations from it, or fully describe any nonstandard design used.

(3) Materials. Type and identifying numbers for each material comprising the finished assembly.

(b) *Splice kit.* A single application may address two or more sizes, types, and constructions if the products do not differ in composition of materials or basic design. Applications shall include the following information for each product:

(1) Product information:

(i) Trade name or designation (for example, style or code number).

(ii) Type or kit (for example, shielded or nonshielded).

(iii) Voltage rating.

(2) Design standard. Specify any published design standard used and fully describe any deviations from it, or provide complete final assembly dimensions for all components for each cable that the splice kit is designed to repair.

(3) Materials. Type of materials, supplier, supplier's stock number or designation for each component.

(4) Complete splice assembly instructions which clearly identify all components and detail procedures used in making the splice.

§7.404 Technical requirements.

(a) Electric cables and splices shall be flame resistant when tested in accordance with §7.407.

(b) Signaling cables shall be flame resistant when tested in accordance with §7.408.

§7.405 Critical characteristics.

(a) A sample from each production run, batch, or lot of manufactured electric cable, signaling cable, or splice made from a splice kit shall be flame tested, or

(b) A sample of the materials that contribute to the flame-resistant characteristic of the cable or splice and a sample of the cable or splice kit assembly shall be visually inspected or tested through other means for each production run, batch, or lot to ensure that the finished product meets the flame-resistance test.

§7.406 Flame test apparatus.

The principal parts of the apparatus used to test for flame resistance of electric cables, signaling cables and splices shall include:

(a) *Test chamber.* A rectangular enclosure measuring 17 inches deep by 14½ inches high by 39 inches wide and completely open at the top and front. The floor or base of the chamber shall be fabricated or lined with a noncombustible material that will not extinguish burning matter which may fall from the test specimen during testing. The chamber shall have permanent connections mounted to the back wall, sides, or floor of the chamber which extend to the sample end location. These are used to energize the electric cable and splice specimens. They are not used, but may stay in place, when testing signaling cables.

(b) *Specimen holder (support).* A specimen holder (support) consisting of three separate metal rods each measuring approximately 3/16 inch in diameter (nominal) to support the specimen. The horizontal portion of the rod which contacts the test specimen shall be approximately 12 inches in length.

(c) *Gas ignition source.* A standard natural gas type Tirrill burner, with a nominal inside diameter of ⅜ inch, to apply the flame to the test specimen. The fuel for the burner shall be natural gas composed of at least 96 percent combustible hydrocarbons, with at least 80 percent being methane.

(d) *Current source.* (For electric cables and splices only). A source of electric current (either alternating current or direct current) for heating the power conductors of the test specimen. The current source shall have a means to regulate current flow through the test specimen and have an open circuit voltage not exceeding the voltage rating of the test specimen.

(e) *Current measuring device.* (For electric cables and splices only). An instrument to monitor the effective value of heating current flow through the power conductors of the specimen within an accuracy of ±1 percent.

(f) *Temperature measuring device.* (For electric cables and splices only). An instrument to measure conductor temperature within an accuracy of ±2 percent without the necessity of removing material from the test specimen in order to measure the temperature.

§7.047 Test for flame resistance of electric cables and cable splices.

(a) *Test procedure.* (1) For electric cables, prepare 3 specimens of cable, each 3 feet in length, by removing 5 inches of jacket material and 2½ inches of conductor insulation from both ends of each test specimen. For splices, prepare a splice specimen in each of 3 sections of MSHA-approved flame-resistant cable. The cable shall be of the type that the splice kit is designed to

repair. The finished splice shall not exceed 18 inches or be less than 6 inches in length for test purposes. The spliced cables shall be 3 feet in length with the midpoint of the splice located 14 inches from one end. Both ends of each of the spliced cables shall be prepared by removing 5 inches of jacket material and 2½ inches of conductor insulation. The type, amperage, voltage rating, and construction of the cable shall be compatible with the splice kit design. Each splice shall be made in accordance with the instructions provided with the splice kit.

(2) Prior to testing, condition each test specimen for a minimum of 24 hours at a temperature of 70±10°F (21.1±5.5°C) and a relative humidity of 55±10 percent. These environmental conditions shall be maintained during testing.

(3) For electric cables, locate the sensing element of the temperature measuring device 26 inches from one end of each test specimen. For splices, locate the sensing element 12 inches from the midpoint of the splice and 10 inches from the end of the cable. The sensing element must be secured so that it remains in direct contact with the metallic portion of the power conductor for the duration of the flame-resistant test. If a thermocouple-type temperature measuring instrument is used, connect the sensing element through the cable jacket and power conductor insulation. Other means for monitoring conductor temperature may be used, provided the temperature measurement is made at the same location. If the jacket and conductor insulation must be disturbed to insert the temperature measuring device, each must be restored as closely as possible to its original location and maintained there for the duration of the testing.

(4) Center the test specimen norizontally in the test chamber on the three rods. The three rods shall be positioned perpendicular to the longitudinal axis of the test specimen and at the same height, which permits the tip of the inner cone from the flame of the gas burner, when adjusted in accordance with the test procedure, to touch the jacket of the test specimen. The specimen shall be maintained at this level for the duration of the flame test. The two outermost rods shall be placed so that 1 inch of cable jacket extends beyond each rod. For electric cables, the third rod shall be placed 14 inches from the end of the test specimen nearer the temperature monitoring location on the specimen. For splices, the third rod shall be placed between the splice and the temperature monitoring location at a distance 8 inches from the midpoint of the splice. The specimen shall be free from external air currents during testing.

(5) Adjust the gas burner to give an overall blue flame 5 inches high with a 3-inch inner cone. There shall be no persistence of yellow coloration.

(6) Connect all power conductors of the test specimen to the current source. The connections shall be secure and compatible with the size of the cable's power conductors in order to reduce contact resistance.

(7) Energize all power conductors of the test specimen with an effective heating current value of 5 times the power conductor ampacity rating (to the nearest whole ampere) at an ambient temperature of 104 °F (40 °C).

(8) Monitor the electric current through the power conductors of the test specimen with the current measuring device. Adjust the amount of heating current, as required, to maintain the proper effective heating current value within ±5 percent until the power conductors reach a temperature of 400 °F (204.4 °C).

(9) For electric cables, apply the tip of the inner cone from the flame of the gas burner directly beneath the test specimen for 60 seconds at a location 14 inches from one end of the cable and between the supports separated by a 16-inch distance. For splices, apply the tip of the inner cone from the flame of a gas burner for 60 seconds beneath the midpoint of the splice jacket.

(10) After subjecting the test specimen to external flame for the specified time, fully remove the flame of the gas from beneath the specimen without disturbing air currents within the test chamber. Simultaneously turn off the heating current.

(11) Record the amount of time the test specimen continues to burn after the flame from the gas burner has been removed. The duration of burning includes the burn time of any material that falls from the test specimen after the flame from the gas has been removed.

(12) Record the length of burned (charred) area of each test specimen measured longitudinally along the cable axis.

(13) Repeat the procedure for the remaining two specimens.

(b) *Acceptable performance.* Each of the three test specimens shall meet the following criteria:

(1) The duration of burning shall not exceed 240 seconds.

(2) The length of the burned (charred) area shall not exceed 6 inches.

§ 7.408 Test for flame resistance of signaling cables.

(a) *Test procedure.* (1) Prepare 3 samples of cable each 2 feet long.

(2) Prior to testing, condition each test specimen for a minimum of 24 hours at a temperature of 70±10 °F (21.1±5.5 °C) and relative humidity of 55±10 percent. These environmental conditions shall be maintained during testing.

(3) Center the test specimen horizontally in the test chamber on the three rods. The three rods shall be positioned perpendicular to the longitudinal axis of the test specimen and at the same height, which permits the tip of the inner cone from the flame of the gas burner, when adjusted in accordance with the test procedure, to touch the test specimen. The specimen shall be maintained at this height for the duration of the flame test. The two outermost rods shall be placed so that 1 inch of cable extends beyond each rod. The third rod shall be placed at the midpoint of the cable. The specimen shall be free from external air currents during testing.

(4) Adjust the gas burner to give an overall blue flame 5 inches high with a 3-inch inner cone. There shall be no persistence of yellow coloration.

(5) Apply the tip of the inner cone from the flame of the gas burner for 30 seconds directly beneath the specimen centered between either and support and the center support.

(6) After subjecting the test specimen to external flame for the specified time, fully remove the flame of the gas from beneath the specimen without disturbing air currents within the test chamber.

(7) Record the amount of time the test specimen continues to burn after the flame from the gas burner has been removed. The duration of burning includes the burn time of any material that falls from the test specimen after the flame from the gas has been removed.

(8) Record the length of burned (charred) area of each test specimen measured longitudinally along the cable axis.

(9) Repeat the procedure for the remaining two specimens.

(b) *Acceptable performance.* Each of the three test specimens shall meet the following criteria:

(1) The duration of burning shall not exceed 60 seconds.

(2) The length of the burned (charred) area shall not exceed 6 inches.

§ 7.409 Approval marking.

Approved electric cables, signaling cables, and splices shall be legibly and permanently marked with the MSHA-

assigned approval marking. For electric cables and signaling cables, the marking shall appear at intervals not exceeding 3 feet and shall include the MSHA-assigned approval number in addition to the number and size (gauge) of conductors and cable type. For cables containing electric conductors, the marking shall also include the voltage rating. For splices, the marking shall be placed on the jacket so that it will appear at least once on the assembled splice.

§ 7.410 Post-approval product audit.

Upon request by MSHA, but no more than once a year except for cause, the approval holder shall supply to MSHA for audit at no cost—

(a) 12 feet of an approved electric cable or approved signaling cable; or

(b) 3 splice kits of one approved splice kit design and 12 feet of MSHA-assigned cable that the splice kit is designed to repair.

§ 7.411 New technology.

MSHA may approve cable products or splice kits that incorporate technology for which the requirements of this subpart are not applicable if the Agency determines that they are as safe as those which meet the requirements of this subpart.

PART 18—ELECTRIC MOTOR-DRIVEN MINE EQUIPMENT AND ACCESSORIES

4. The authority citation for Part 18 continues to read as follows:

Authority: 30 U.S.C. 957, 961.

§ 18.1 [Amended]

5. Section 18.1 is amended by removing the phrase "cables, hoses, and conveyor belts," and inserting "hoses and conveyor belts,".

§ 18.2 [Amended]

6. Section 18.2 is amended by removing the phrase "cable, hose, or conveyor belt," and inserting "hose or conveyor belt" in the definitions of "Acceptance", "Acceptance marking", and "Applicant".

§ 18.6 [Amended]

7. Section 18.6(a) is amended by removing the phrase "cables, hose, or conveyor belt," and inserting "hose or conveyor belt,".

8. Section 18.6(b) is removed and reserved.

9. Section 18.6(i) is amended by removing the phrase "cable, hose, or conveyor belt," and inserting "hose or conveyor belt,", and removing the words "Cable—a sample having a minimum length of 12 feet;".

§ 18.9 [Amended]

10. Section 18.9(a) is amended by removing the phrase "cable, hose, or conveyor belt," and inserting "hose or conveyor belt,".

11. Section 18.35(a)(3) is revised to read as follows:

§ 18.35 Portable (trailing) cables and cords.

(a) * * *

(3) Be accepted as flame resistant under this part or approved under subpart K of part 7 of this chapter.

* * * * *

§ 18.64 [Removed]

12. Section 18.64 is removed.

13. Section 18.94(a)(2) is revised to read as follows:

§ 18.94 Application for field approval; contents of application.

(a) * * *

(2) The trade name and the flame-resistance acceptance or approval number of any cable, cord, hose, or conveyor belt installed on the machine for which prior acceptance or approval by MSHA has been issued.

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PART 57—SAFETY AND HEALTH STANDARDS—UNDERGROUND METAL AND NONMETAL MINES

14. The authority citation for part 57 continues to read as follows:

Authority: 30 U.S.C. 811, 957, and 961.

15. Section 57.4057 is revised to read as follows:

§ 57.4057 Underground trailing cables.

Underground trailing cables shall be accepted or approved by MSHA as flame resistant.

16. Section 57.22310 is revised to read as follows:

§ 57.22310 Electrical cables (I–C mines).

Electrical cables used to power submersible sump pumps shall be accepted or approved by MSHA as flame resistant, or be installed in continuous metal conduit or metal pipe. The ends of such conduit or pipe shall be sealed to prevent entry of explosive gas or dust.

17. Section 57.22311 is revised to read as follows:

§ 57.22311 Electrical cables (II–A mines).

Only jacketed electrical cables accepted or approved by MSHA as flame resistant shall be used to supply power to distribution boxes and electrical equipment operating in face and bench areas.

PART 75—MANDATORY SAFETY STANDARDS—UNDERGROUND COAL MINES

18. The authority citation for part 75 continues to read as follows:

Authority: 30 U.S.C. 811, 957, and 961.

19. Section 75.600–1 is revised to read as follows:

§ 75.600–1 Approved cables; flame resistance.

Cables shall be accepted or approved by MSHA as flame resistant.

20. In § 75.604, paragraph (d) is added to read as follows:

§ 75.604 Permanent splicing of trailing cables.

* * * * *

(d) Made using splice kits accepted or approved by MSHA as flame resistant.

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