DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Part 1910

Servicing Multi-Piece Rim Wheels

AGENCY: Occupational Safety and Health Administration, U.S. Department of Labor.

ACTION: Final standard.

SUMMARY: By this final standard the Occupational Safety and Health Administration (OSHA) establishes procedures for the servicing of multi-piece rim wheels fitted on vehicles used on and off highways. Multi-piece rim wheels consist of two or more detachable rim components, one of which is a side or locking ring designed to hold the tire on the rim base when the tire is inflated. These wheels are used on motor vehicles, such as trucks, trailers, buses and motor homes, for either on-highway or off-highway usage. The major hazard in servicing multi-piece rim wheels is the possibility of an employee being struck by a wheel component which has been thrown from an inflated wheel during an unintended explosive separation. This standard includes requirements for training of all tire servicing employees, establishment of a safe practice procedure for servicing multi-piece rim wheels, use of restraining devices and criteria for interchangeability of rim components.

EFFECTIVE DATE: This standard will become effective April 28, 1980.

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SUPPLEMENTARY INFORMATION: For additional copies of this regulation contact: OSHA Office of Publications, U.S. Department of Labor, Room S–1212, Washington, D.C. 20210, Telephone: 202–523–8677.

A. Background

1. Multi-piece Rims

Multi-piece rims are used in conjunction with tube-type tires, most frequently on trucks, tractors, buses, trailers, campers and off-highway type vehicles. Multi-piece rims consist of two or more components which, when assembled and the tire is inflated, are held together by the force of the air pressure in the tire. Multi-piece rims may consist of up to five or six components on large wheels for off-the-road vehicles.

A multi-piece rim consists of a rim base, the largest part of the metal structure supporting the tire, and one or more detachable side rings serving as a flange to keep the inflated tire on the rim base. The rim base, side ring, lock rings, and tire are collectively referred to as a "wheel."

For multi-piece rims, the rim base and the side or locking rings are the primary components which support the tire's bead. This is referred to as a split side ring in two piece assemblies and a solid side ring and split lock ring in three piece assemblies. In the case of two piece assemblies, the circumferentially continuous outer small component is termed a side ring. (See Society of Automotive Engineers, SAE J393, which defines rim terminology.)

There are basically four multi-piece wheel designs. In the first design (exemplified by Goodyear's "KW" type rim) the rim base is split radially and the side ring is circumferentially continuous. In the second design (exemplified by Firestone's, Kelsey's and Budd's "RH5°" and "KL" rims) both the rim base and the side ring are circumferentially continuous. The third type rim (exemplified by Goodyear's "LW" type rim) is a two piece assembly composed of a demountable rim base and a split side ring. The fourth design in the larger sizes (exemplified by Firestone's "Commander 5°" rim) is a three piece assembly composed of rim base, a side and a lock ring.

2. History of the Regulation

OSHA concern for developing a standard to protect employees engaged in servicing multi-piece rim wheels was initiated by an internal report of "Hazards Not Covered by a Standard" from OSHA field personnel in the Louisville, Kentucky office. This was followed by a similar report from OSHA field personnel in Columbus, Ohio.

Since these reports were received, OSHA has monitored reports of accidents and injuries related to multi-piece rim wheels. In addition, petitions for the promulgation of a standard relating to the servicing of multi-piece rim wheels were submitted to OSHA in 1976 by the Rubber Manufacturers Association (RMA) and the Firestone Tire and Rubber Company. The National Highway Traffic Safety Administration (NHTSA), U.S. Department of Transportation (DOT), stated its support for the promulgation of such a standard and has, by written request, urged OSHA to regulate the servicing of multi-piece rim wheels in the workplace.

NHTSA is currently investigating the safety hazards associated with the use of multi-piece rims. It issued an advance notice of proposed rulemaking on March 5, 1979 (44 FR 12072) to determine whether to require certain performance levels for tire and rim component retention and whether to ban the production of multi-piece rims. NHTSA's actions are not directed at working conditions of employees and therefore are not an exercise of statutory authority by a federal agency under Section 4(b)(1) of the Occupational Safety and Health Act which would preempt action by OSHA.

NHTSA does not intend that its regulations displace OSHA's coverage of tire servicing personnel. NHTSA has articulated this intent by that agency's recognition that numerous accidents occur because of improper servicing, coupled with NHTSA's formal request that OSHA promulgate a standard for servicing of multi-piece rims in the workplace [Ex. 2: (30–17)].

On April 24, 1979, after a review of the available data, OSHA published a proposed permanent standard for the servicing of multi-piece rim wheels (44 FR 24252). The proposal contained requirements for training of all tire servicing employees, establishment of safe operating procedures for servicing multi-piece rim wheels, use of restraining devices and criteria for serviceability and interchangeability of rim components. A period for receipt of written comments on the proposed standard and issues raised therein was established, extending through July 6, 1979.

To assist participants in preparing their written comments and to give interested persons an opportunity to obtain clarification of the proposal, OSHA scheduled a public meeting for June 19, 1979, more than two weeks prior to the end of the comment period. During the meeting several participants submitted further comments on the proposed standard. A transcript of the meeting was prepared and is part of the record of this rulemaking.

Fifty-nine written comments were received by the end of the comment period. Most of the comments favored the adoption of the proposed standard in principle. A number of comments offered recommendations for minor modification of certain of the provisions of the proposal. There were no requests for a hearing under section 6(b)(3) of the OSHA Act.

A Regulatory Assessment was prepared in accordance with Executive Order 12044 (43 FR 12661, March 24, 1978), and was made available to the public, as noted in the preamble to the

proposed standard (44 FR 24246). (See Section D, Regulatory Assessment, below). Opportunity was given to interested persons to comment on the subject matter and contents of that report.

This final standard on servicing of multi-piece rim wheels is based on a full consideration of the entire record of the rulemaking proceeding including the materials relied on in the proposal, the transcript of the public meeting, and all written comments and exhibits received. All materials in the record are available for public review and copying at the OSHA Docket Office, Room S6212, U.S. Department of Labor, 3rd Street and Constitution Avenue, NW., Washington, D.C. 20210, telephone (202) 523–7894.

3. Hazards

Although accidents may occur at any time when handling multi-piece rims, the primary danger arises during the process of inflating the tire. An inflated tire is a high pressure vessel; for example, a popular size 10.00 x 20 tire when inflated at 105 pounds per square inch gauge (psig) (7.38 kg/cm²) creates a force in excess of 40,000 pounds (18,144 kg) against the rim flange. This force, according to test data provided by the Insurance Institute for Highway Safety (IIHS), accelerated a locking ring to 130 mph (209 km/hr) and raised a 215 pound (97.5 kg) anthropomorphic dummy 10 feet (3.05 m) upward from a wheel resting horizontally on the pavement.

The principal hazard in mounting, installing, storing, and handling multi-piece rim wheels arises when they are assembled together and the unit is inflated to its required pressure or beyond. If a component is not set or seated in its proper position in relation to the other components, the rings or the removable flanges may separate violently from the assembly. Such separation may cause lock rings, or other components to be hurled violently through the air, with the likelihood of striking a person and causing serious injury or death. Such accidents are most likely to occur while a tire that has just been mounted on a rim is being inflated or immediately after it has been inflated.

Accidents that have caused the greatest number of injuries appear to have been due to improper mounting, use of damaged parts, or mismatch of component parts. Accidents may also occur because of overinflating the tire or striking the lock rings or rims with a hammer. Many accidents appear to have resulted from a lack of knowledge on the part of the employee servicing the tire as to proper handling techniques and the dangers involved in servicing multi-piece rim wheels. In written comments, the State of North Carolina said, "A large portion of the accidents, injuries, and fatalities related to multi-piece rim wheels are traceable to untrained, inadequately trained, or improperly trained personnel." [Ex. 3: (21)]

4. Accident Data

Incidents which result in a serious or fatal injury to a mechanic engaged in servicing a multi-piece rim wheel often are only reported locally. Therefore, the data available is believed to be limited to only a portion of the total injuries and fatalities which occur. The May 1974 issue of "Learn and Live," a monthly publication of the Industrial Safety Division of the Florida Department of Commerce, reported that the fatality toll in Florida from servicing multi-piece rims had risen to eleven over a period of ten and one half years. By the end of 1978, the toll had risen to fifteen.

On September 28, 1973, NHTSA's Office of Defects Investigation issued a report on its investigation of multi-piece rim failures (ODI Case No. 215). This report covered 29 accidents due to improper assembly procedures that resulted in serious injury or a fatality, involving KB and KW type wheels. The report indicated that many of the shop personnel who worked with the multi-piece rims in question may not have been aware of all the safety precautions to be followed when mounting or demounting these wheels.

On December 21, 1973, NHTSA issued a report on its investigation of RH5° wheel failures (ODI Case No. 150) that included investigation of 81 incidents which resulted in serious injury or fatality to employees engaged in servicing these wheels. This report recommended several courses of action which included discontinuance of the manufacture of this type of wheel; development and distribution of a poster illustrating the safety precautions to be used during multi-piece rim wheel assembly; and development and distribution of a matching chart showing the compatibility of parts of multi-piece rim wheels produced by different manufacturers. (NHTSA developed a safety precautions chart, and multi-piece rim wheel matching chart, after their report was issued. The contents of these charts are utilized by OSHA in the training and servicing provisions of this final standard.)

In addition to the pre-1973 accident reports supplied in the NHTSA investigations OSHA's Office of Management Data Systems and Statistical Coordination received reports of 10 fatal accidents involving servicing of multi-piece rim wheels which occurred during 1976 and 1977. These data were compiled from workers' compensation reports from 10 states.

Data supplied by RMA which are listed in Table 3–2 of the Regulatory Assessment indicate that 13% of all multi-piece rim accidents result in fatalities, 63% result in injuries and property damage, and no-injury accidents constitute the remaining 24% of the 165 cases reported for the years 1972–1975. Similarly, IIHS data indicate that fatalities constitute 18%, injuries 67% and property damage and no-injury accidents represent the remaining 15% of the 241 cases reported for the years 1968–1977. Neither data base is considered totally representative of the nation because the actual number of split-rim accidents is not ascertainable, nor can the annual frequency of occurrence be predicted with a high degree of accuracy. Since the reported accidents do not represent a statistical sampling, but are only cases known to each organization, these numbers are considered to represent a lower limit of accident experience.

A review of accident descriptions provided by IIHS indicates that 53% of accidents under OSHA jurisdiction have occurred while the tire was being mounted/demounted, 31% while the wheel was being installed/removed and the remainder (16%) when the wheel was being handled or moved. Five of the 241 accidents that were evaluated, occurred while a safety cage or restraint was being used. A breakdown of the 16% category of accidents which occurred during handling indicates that numerous accidents occurred while moving an inflated tire in the service area, measuring tire pressure, removing the valve core or simply while an inflated tire was stored at rest. In some cases, multi-piece wheels being serviced exploded and either injured or killed experienced tire service personnel. However, it would appear that in many cases, these employees had never received any training, nor had they ever been informed of the inherent hazards and the safety practices to be followed.

Although the data presented may not be statistically representative of all multi-piece wheel accidents, they provide an insight into the relative frequency of fatalities and injuries. Injuries have not been classified into categories of severity, but an examination of IIHS accident reports suggests the existence of a very high proportion of fatalities and severe injuries, including many permanent disabilities.

Until now, there have been no specific OSHA general industry standards that apply to the handling and servicing of multi-piece rims. In the construction

safety and health standards, § 1926.600(a) requires that a tire rack, cage, or equivalent protection be provided and used when inflating tires on multi-piece rims. Section 1926.600 is not affected by the standard being published today.

B. Summary and Explanation of the Standard and Major Issues

The following section discusses the individual requirements of the multi-piece rim wheel standard, including analysis of the major issues raised during the proceeding, the record evidence and the policy considerations underlying the various provisions of the standard.

The final standard sets requirements for training of all tire servicing employees, safe practice and procedures and the use of restraining devices. These and other portions of the standard, including those on criteria for interchangeability of rim components have been revised and clarified from the proposal as described in detail below.

The language of the standard essentially follows that of the proposal except for revisions based on OSHA's review of the entire rulemaking record, including written comments and testimony submitted at the public meeting.

Virtually all persons who participated in the rulemaking by submitting comments and/or appearing at the public meeting agreed with OSHA's determination that the principal causes of accidents involving multi-piece rim wheel separations could be eliminated by proper training of employees, availability and utilization of restraining devices and necessary tools and equipment and adherence to recommended safe procedures.

(1) *Scope-paragraph (a).* This standard is intended primarily to provide protection to employees engaged in servicing of multi-piece rim wheels used on trucks, buses or other large vehicles. It applies also to the servicing and maintenance of all other multi-piece rim wheels, wherever they are used. Workplaces covered by the construction industry standards are subject to § 1926.600, and are not intended to be covered by the general industry standard published today.

The proposed standard would only have covered the servicing of rims 16 inches or greater in diameter. However, the rulemaking record clearly indicates that the danger of an unintended explosive separation of a multi-piece rim wheel exists for rims less than 16 inches as well.

The Michigan Department of Labor reported one fatality and three severe injuries which occurred when multi-piece rim wheels less than 16 inches (40.6 cm) in diameter were being serviced. [Ex. 3:(8)]. In addition, IIHS stated in its comments regarding the scope of the proposal that

> the concept that smaller multipiece [sic] rims are somewhat different, is generally not true. All multipiece [sic] rims depend upon the same balance of interlocking metal components. [Ex. 3: (23)]

Comments were submitted documenting the general use of smaller, multi-piece rim wheels on trailer which transport cars, livestock and furniture, as well as "bob-tailed" tractors used to haul mobile homes. [Ex. 3:(13)]. Several manufactures, including The National Wheel and Rim Association and Firestone Tire and Rubber Company, also recommended changes in the scope of the standard, based on the fact that 15 inch (38.1 cm) rims are used in significant numbers. [Ex. 3:(18); 3:(33); 3:(39)] Accordingly, the standard's scope has been modified to apply to the servicing of all multi-piece rim wheels without regard to their size, as along as they contain a lock ring or side ring. This provision reflects the determiniation that it is the assembly of multiple pieces and not the size of the wheel which is relevant to the explosion hazard.

Several comments recommended that the scope of the standard should include aircraft wheels, which consist of more than one piece. [Ex. 3:(5); 3:(6)] However, a review of manufactures' descriptive rim and wheel material and field visits to commerical and military airports have revealed that aircraft wheels are not similar to the "multi-piece rim wheels" covered by the standard. Aircraft wheels consist of a two-piece disk design with mounting bolts to hold the two halves together. [Ex. 3:(37)] They do not have locking rings, and do not use the air pressure of the tire to hold the rim components together. In addition, different tools and procedures are required for bolted wheels. Therefore, bolted wheels do not present the type or degree of explosion hazard addressed by this standard. [Ex. 3:(44)] This standard will only cover multi-piece rim wheels containing a lock ring, or side ring and base. In order to clarify the scope in this regard the proposed definition of multi-piece rim wheels is being revised in the final standard. (See discussion of paragraph (b) "Definitions", below).

(2) *Definitions-paragraph (b).* The definitions are stated as commonly used in the tire industry; however, some have been modified slightly to accommodate the regulatory nature of this standard.

Throughout the relevant literature, the term "mounting" has two different meanings. In one case, "mounting" a tire means assembling a tire with an appropriate rim and tube, while in the other case it means attaching a wheel to an axle. A review of nationwide accident reports indicates that the word "mounting" is used in both senses throughout the United States. For the purposes of this standard, OSHA uses the terms "mount and demount a tire" to mean the assembly and disassembly of a wheel and its components. "Install and remove a wheel" means to attach and remove an assembled wheel to/from a vehicle axle hub. This choice of definitions lessens the possibility of confusion associated with the "demounting a tire" vs. "dismounting a wheel" usage, while still conforming to NHSTA and tire manufacturer terminology. The term "dismounting" is not used in this standard, but is replaced with "removal."

In order to clarify the scope of the standard, as noted above, the proposed definition of a multi-piece rim wheel is being changed. As defined in the proposal, a multi-piece rim wheel is a vehicle wheel rim consisting of two or more parts, at least one of which is detachable, designed to hold the tire in place on the rim. To clarify that this standard does not cover the types of multi-piece rim wheels that are bolted together, [Ex. 3:(4); 3:(37)], this definition is revised in the final standard to read as follows:

> "Multi-piece rim" means a vehicle wheel rim consisting of two or more parts, one of which is a side or locking ring designed to hold the tire on the rim by interlocking components when the tube is inflated, regardless of the sizes of the component parts.

The proposed definition of a "rim manual" is being clarified and amended to provide that any manual which contains appropriate instructions and safety precautions from the manufacturer or other qualified organization is acceptable as a rim manual. OSHA agrees with the comments which stated that the definition in the proposal was too restrictive, since it might have been interpreted as being limited to a publication supplied directly by the manufacturer.

The term "charts" is used in the final standard instead of the term "wall charts" because of the many formats in which the necessary information may be found. In addition, because multi-piece rim wheels are serviced frequently at remote locations away from the employer's premises, the use of the term

"wall charts" might be confusing in instances where there are no "walls" in the service area.

The proposed definition of "wall charts" was limited to the DOT wall charts on matching rim components and on safety precautions, and other publications containing the same instructions as these two charts. The definition is revised in the final standard to clarify that the term includes all publications, whether or not published by DOT, which contain at a minimum the same instructions as the DOT publications, for the type of multi-piece rim wheel being serviced.

Several comments stated that the proposed definition of the "service area" was too narrow, in that it did not take into account the remote locations (away from the employer's premises) where multi-piece rim wheels are routinely and frequently serviced. OSHA recognizes that the servicing activity at these remote locations is at least as hazardous as at the employer's premises, that the operations conducted are essentially the same, and that the same training, tools and procedures are applicable. In view of the above, the final standard has been modified to define a service area as any location where a multi-piece rim wheel is serviced. OSHA recognizes that this change in the definition of service area may create a greater demand for portable restraining devices. However, such devices are readily available. [Ex. 2:(3); 3:(21); 3:(59)] (See Regulatory Assessment pp. 19–23.)

The term "trajectory path" has been redefined. A review of the accident reports has revealed that because of the nature of an explosive separation of a wheel, the direction of the separated rim components is not entirely predictable. Therefore, the proposed definition has been changed to indicate that the trajectory is the potential path a component may be expected to follow and that it may deviate from the perpendicular. Likewise Appendix A has been changed to reflect possible trajectories but in no way is meant to limit the trajectory to those illustrated.

The term "trajectory path" is being revised to "trajectory," since the added word "path" would be redundant.

(3) *Training—paragraph (c).* The standard requires every employee who services multi-piece rim wheels to be trained by the employer in proper techniques and practices applicable to the type of wheel being serviced. Training is required because many tire mechanics do not understand the potential danger involved in servicing multi-piece rim wheels, and because of the need to remind employees of the hazards and appropriate measures. The need for training is substantiated by a review of accident cases in which there appears to be a lack of knowledge of safe operating practices.

Firestone Tire and Rubber Company said, "In our view, training is the only method to ensure the safety of those who will be working with truck and bus tires and rims." [Ex. 3:(33)]

OSHA considers that training, in conjunction with the use of a restraining device and clip-on chuck, can contribute significantly to a reduction of accidents.

This standard does not specify the details of the training program, but simply requires the development and maintenance of employee proficiency in given elements of servicing. A mechanic's level of proficiency can be established by demonstration of his familiarity with and ability to use the information contained in the charts and in this standard.

The training provisions of the standard are stated in performance language, allowing the employer flexibility in complying with the requirement for training. This places the burden of providing adequate training and the responsibility for evaluating the employee's proficiency solely on the employer. Employees are adequately trained if they have thorough knowledge of and can apply the information contained in the charts and in this standard.

The proposal contained no explicit requirement that an employee who demonstrates his ability to service multi-piece rim wheels must maintain that ability. This omission is remedied in the final standard. It is clear that an employee must maintain his ability to service multi-piece rim wheels as long as he is involved in this work.

Virtually all of the comments concurred that proper training of employees is a necessary prerequisite to a safe operation. Goodyear Tire and Rubber Company stated that

> proper and thorough training is essential toward achieving a reduction in the rate of accidents. In view of the consequences of improper handling and technique, this training must be as specific as possible, and should be embodied within a well-defined procedure. [Ex. 3:(40)]

Others commented that specific training criteria be developed. Suggestions included on-the-job training; requiring a refresher course once a year; maintaining a record of training for each employee; and having employees sign a statement acknowledging receipt of this training. [Ex. 3:(18); 3:(21); 3:(25)]

OSHA has considered the fact that some employees may need relatively little training and practical experience to grasp the proper methods, techniques and practices and would need little or no periodic refresher training. Others may require additional initial training and periodic refresher training to retain their knowledge of safe methods and procedures.

In the final standard, the training requirement has been revised to assure that an employee receives sufficient training to enable him to safely perform the tasks which are involved in servicing multi-piece rim wheels. In addition to the initial training required in the proposal, the final standard places a continuing obligation on the employer to evaluate the capability of his employee and conduct additional training as necessary to assure that the employee maintains his competence at servicing multi-piece rim wheels. This not only insures that the initial training was effective, but also provides a means of determining the need for remedial or refresher training.

(4) *Tire servicing equipment—paragraph (d).* The unintended explosive separation of multi-piece rim wheel components is the primary cause of most occupational accidents associated with these wheels. A majority of the accidents under OSHA jurisdiction have occurred while the tire was being inflated following assembly. Accordingly, a significant reduction of injuries can be attained through use of a restraining device, such as a cage, specifically designed to protect employees from lethal airborne wheel components. An accepted practice for employee protection is to use a cage surrounding the wheel in such a manner as to prevent any wheel component from being hurled beyond the cage boundaries. The standard requires use of a restraining device while inflating a tire off the vehicle, except that a tire may be inflated to 3 psig (.21 kg/cm^2) without a restraining device for the sole purpose of seating the wheel components. (See discussion on safe operating procedures, paragraph (f)).

Due to the magnitude of forces associated with a wheel separation, strength requirements for restraining devices are necessary. Specifying these requirements necessitates knowing the amount of potential energy stored in the compressed air of a tire that will be transferred to the restraining device during a separation. For example, an analysis of high speed film in which the rim base gutter cone angle was machined to favor an explosive separation indicated that 8,200 ft.-lbs. (11,119 Joules) of energy was released when a 10.00 x 20 test tire was inflated to 105 psig (9.38 kg/cm^2). Calculations of the total pneumatic energy in the tire

indicated 75,000 ft.-lbs. (101,700 Joules) of available potential energy. After the energy transfer is determined for a particular size wheel, selection of an appropriate factor of safety will lead to a properly-designed restraining device for use with that wheel.

OSHA proposed that the generally accepted minimum factor of safety, 1.5 for machinery, be used for the largest wheel that a restraining device could hold. Several comments recommended that such design details for specific restraining devices be certified by professional engineers. [Ex. 3: (10); 3: (35); 3: (40);]. Another comment recommended that the design be specified only by the performance objective rather than by detailed design specifications which may become obsolete as technology changes. [Ex. 3: (47)]

The proposed requirement for restraining devices to be capable of withstanding a force of 150% of the maximum tire size that the device can hold is revised in the final standard. Although a safety factor is necessary, it does not appear practical to require an employer to have a cage designed to withstand an impact several orders of magnitude beyond that which would ever be encountered during its use. Some restraining devices are built so that their capacity (the size of tire capable of being held) is greater than the size tire actually used in the device. This is usually done to ease the job of manual tire handling by providing extra room within the device. If the device had to be strong enough to restrain the explosive force of any tire capable of being held in the device, as required in the proposal, the device might be unnecessarily heavy, thereby exposing the employee to other hazards during its manual handling. Since the device can be rated for a maximum size tire which provides a margin of safety, the final standard has been written to provide that the restraining device must be able to withstand at a minimum 150% of the force of an unexpected wheel separation for the tire being handled, whether or not that wheel is the maximum size the device can hold. This provides the same margin of safety (1.5) as proposed, but more accurately reflects the actual usage of the restraining device in applying that margin.

In its proposal OSHA proposed to permit use of machinery or equipment other than cages as restraining devices. At that time the agency solicited information as to the availability and effectiveness of such other types of restraining devices.

Several comments supported the effectiveness of the cage type restraining device, including the portable cages currently available, but stressed that the standard should not restrict technology in developing other methods of restraint. [Ex. 3: (18); 3: (33)]

Ten comments were received on the issue of whether hydraulic lift rails are adequate restraining devices. Four were totally opposed to the use of hoist rails, whereas the others stated that they could be used under certain limited circumstances.

Those that were opposed stated that the use of hoists for this purpose is not safe, and that a hoist rail would have to be extensively modified to be used effectively and would provide only limited opportunity for use. [Ex. 3: (21); 3: (25); 3: (47)] Those who said a hoist could be used under certain circumstances contended that a hoist rail is better than nothing, but emphasized that it should be used only if it meets acceptable standards, including adequate size, strength, location and positioning [Ex. 3: (40); 3: (47)].

OSHA recognizes that most hoist rails have not been designed or specifically modified for use as restraining devices and that they are therefore unacceptable for this purpose. However, the final standard is written as a performance standard so as not to restrict the use of any specific type of device, including hoist rails, provided that the device is specifically designed to restrain multi-piece rim wheels. Whichever device is used must be capable of restraining the components of a multi-piece rim wheel during explosive separation, and must meet the 150% margin of safety.

The standard prohibits the use of any restraining device with cracks in welds or components, or with bent or broken components, because such defects may cause equipment failure when subjected to dynamic loading. Stress concentrations around some cracks may cause the 1.5 factor of safety to be exceeded for the material; thus, if a cracked member of a restraining device is loaded to its original design value, the material at the apex of the crack may become overstressed, resulting in failure of the device.

The provisions for removal of damaged restraining devices from service are expanded in the final standard to establish additional, more specific criteria for such removal. OSHA has determined that there are defects other than cracks in welds or components which would also affect the ability of the restraining device to perform its intended function. Components which are broken or bent due to mishandling, abuse or a prior accident, or are excessively corroded (pitted) cannot be relied upon to perform their intended function. Therefore, the final standard requires that restraining devices with these defects be removed from service.

Many of the defects which would make the restraining device incapable of performing its function can be remedied or repaired once the device is out of service. However, it is essential that the repaired device be examined by a qualified person in order to assure that the device's restraining capability has not been impaired. To insure that the restraining device is capable of performing its intended function, the standard requires that, after repairs are made, the device must be checked and certified as meeting the strength requirements of paragraph (d)(1)(i) by the manufacturer or a registered professional engineer before being placed back into service. As the designer of such equipment, the manufacturer is capable of determining a satisfactory method of repair. In addition, since the laws of most jurisdictions regulating the registration of professional engineers set standards of conduct and require levels of competence, it has been determined that allowing certification either by a professional engineer or by the manufacturer will permit the use of repaired equipment while assuring that repairs do not compromise the strength of the restraining device.

As stated in the proposal, inflation of tires installed on vehicles presents another major safety hazard. Many of the comments expressed concern that a restraining device was needed which could be used both during inflation of tires installed on vehicles and during handling of a wheel after inflation, but before its installation on a vehicle.

Most of the comments which addressed this question indicated that there is no practical method to provide such protection on the vehicle. [Ex. 3: (18); 3: (25); 3: (33); 3: (35); 3: (40)]

Other comments also indicated that there is no satisfactory restraining device for use while transporting and storing tire and wheel assemblies. [Ex. 3: (21); 3: (35); 3: (39)].

As indicated by the North Carolina Department of Labor in their comments:

> Although separation may occur during handling and storage between the service and installation operations, it is rare, especially if proper servicing and inspection procedures are followed. [Ex. 3: (21)]

After careful consideration, OSHA has determined that there is no practical method available to restrain wheel components while tires installed on vehicles are inflated or between the

inflation of a demounted wheel and the time the wheel is installed on a vehicle. The most practical procedure to assure employee safety during that time period is simply for the employee to minimize his exposure to the trajectory. (As noted in paragraph (f), wheels that have been driven underinflated at 80% or less of their recommended pressure or which have obvious or suspected damage to the tire or wheel components must be deflated before removal.)

The final standard requires the use of a restraining device only during the inflation of an assembled wheel off the vehicle. In order to provide protection when multi-piece rim wheels are serviced on the vehicle, the standard also requires that the employer provide equipment such as the clip-on-chuck and sufficient length of hose which permits the employee to be clear of the possible trajectory of each wheel component during inflation. During inflation and all other operations involving multi-piece rim wheels, the standard also requires the employee to stay out of the trajectory, unless the employer can show that it is necessary for the employee to be in the trajectory to service the tire.

The requirement that charts and rim manuals be made available remains largely unchanged from the proposal. The availability of current charts and rim manuals will assure ready reference for tire mechanics encountering unusual situations or rim matching problems.

In the proposed standard OSHA raised the issue as to whether a warning label for multi-piece rims should be specified. Section 6(b)(7) of the Occupational Safety and Health Act addresses ". . . the use of labels, or other appropriate forms of warning . . ." associated with employee exposure to hazards. Lock rings, side rings and rim bases, because of their size and operational use, do not lend themselves to being labeled. The manufacturer's name, size, type of rim and manufacturing date are presently required to be on each multi-piece rim in accordance with Federal Motor Vehicle Safety Standard 120. This information is imprinted into the metal components; however, due to surface rust and mud, legibility is reduced commencing with the use of the wheel. In addition, rim manufacturers claim that stamping letters into rim components creates stress raisers, a hazard in itself, and recommend that the imprinting of rim components be minimized.

Warning labels are usually affixed to equipment presenting a particular hazard. However, in this case, the majority of comments felt that the use of a warning label or tag on wheel components is impractical and infeasible. [Ex. 3: (18); 3: (33); 3: (35); 3: (40); 3: (47)]. Other comments stated that warning labels would be unnecessary if the training of those servicing multi-piece rim wheels was adequate. [Ex. 3: (56)]

In light of the technical and practical problems as noted in the record, OSHA has concluded that warning labels should not be required in this standard. It is OSHA's feeling that the required training will identify the potential hazards and dangers of servicing multi-piece rim wheels and will reinforce the prescribed correct and safe procedures to be followed.

The proposed requirement which specified that proper tools be used for repair or servicing of wheels is being revised because of confusion as to what constitutes a proper tool. A review of several rim manuals has shown that each one contains lists or otherwise identifies the safest, most acceptable tools for use in servicing the particular multi-piece rim wheels covered in the manual. The final standard, therefore, requires that only tools listed or identified in the respective rim manuals be used for servicing.

(5) *Wheel component acceptability—paragraph (e).* The standard requires that wheel and rim components not be interchanged between different manufacturers' wheel models, except as provided on the charts.

The proposal would have required that side or lock rings that are bent out of shape, corroded or broken not be used and that they be removed from the service area, and that any rim component containing visible cracks be removed from use and discarded.

After review of the proposal, OSHA recognized that the criteria for rejection of wheel components due to "corrosion" were not clear. Many wheel components in use will exhibit some surface rust when exposed to the rigors of usage but there is little likelihood that this surface rust, when not on a mating surface of the rim, will adversely affect the performance of the wheel. However, if the parts become so rusted as to actually affect internal grains of the metal structure (pitting the metal surface), OSHA doubts the continued reliability of the component. Therefore, the final standard clarifies this point by prohibiting the use of components which are pitted by corrosion, bent out of shape, or broken.

Wheel components must be inspected prior to assembly. The final standard, as did the proposal, requires that the mating surfaces of the rim gutter, rings and tire must be free of any surface rust, scale or rubber build-up prior to assembly and inflation.

Although the proposal stated that damaged components, be removed from the service area, some comments did not feel that was sufficient [Ex. 3: (18); 3: (25); 3: (31); 3: (40)]. The final standard goes further and requires that once components are damaged so as to require their removal from service, they are to be rendered unusable and discarded. OSHA believes that this will eliminate the possibility of inadvertent substitution of one unserviceable part for another unserviceable part and that adherence to this procedure will significantly reduce the potential hazard in servicing multi-piece rims.

(6) *Safe operating procedures—paragraph (f).* The standard requires that every employer instruct all his employees engaged in servicing multi-piece rim wheels in the practices and procedures prescribed in these standards.

Paragraph (f)(2) of the proposal would have required all tires which were driven underinflated (presumably, even if only slightly underinflated) to be deflated to 10 psig (.70 kg/cm^2) or less before removal from the axle. However, an additional paragraph, (f)(10), stated that *all* tires must be deflated prior to removal from the vehicle axle. It is clear that these two conflicting paragraphs have caused confusion. [Ex. 3: (26); 3: (30); 3: (36); 3: (38); 3: (54)]. These provisions were drafted too broadly and did not properly reflect the agency's intent. The intent of the proposal was to provide that when tires are driven while underinflated to a point where damage to the tire and wheel may have occurred, or when such damage otherwise is known or suspected to exist, the tire must be completely deflated prior to removal of the wheel from the vehicle axle.

Several comments expressed concern that both wheels on a dual assembly would have to be deflated before removal, even if only one had been driven underinflated or exhibited damage, if the provisions of proposed paragraph (f)(10) were followed. [Ex. 3: (10); 3: (38); 3: (46)] OSHA agrees that this would be impractical and inefficient and in some cases would expose the employee to the unnecessary risk of deflating and inflating another multi-piece rim wheel.

The final standard has been clarified to state that total deflation and removal is required only for the servicing of installed multi-piece rim wheels which exhibit obvious or suspected damage to the tire or wheel components or which have been driven underinflated at 80% or less of their recommended pressure.

Accordingly, deflation of both tires on dual assemblies is required by the final standard only if both tires meet any of these conditions.

The proposed requirement for deflating a tire before demounting is amended in the final rule to specify that the deflation must be accomplished by removing the valve core. Removal of the valve core assures the complete deflation of the tire. If the valve is only pressed to release pressure, air may still remain in the tire. Removal of the valve core also allows the tube, in the event of localized deformation during the demounting process, to either exhaust or take in more air, thereby eliminating localized areas of pressure and stress on the multi-piece rim components. [Ex. 3: (20); 3: (39)]

The proposed requirement prohibiting employees from entering into the trajectory during deflation is changed in the final standard to provide that employees must remain out of the trajectory unless the employer can show that it is necessary for the employee to be in the trajectory to service the tire. It is recognized that removal of the valve core requires the employee to place his hand into the trajectory. Once the valve core is removed, the employee must stay completely out of the trajectory until the tire is completely deflated.

The proposed requirement that an employee not lean or rest his body or any equipment against the restraining device remains unchanged in the final. If a tire explodes within the restraining device, the suddenly-applied force exerted against the frame will immediately be transferred to the object or person resting against it. Except for the force absorbed by the containment of the exploding wheel components, the effects of the force upon the person or object leaning against the frame will be almost as severe as if the frame was not present. This process can be compared to a pool ball being hit by a fast moving cue ball. The energy of the rings is transferred to the tool, object or person leaning against the restraining device.

The proposed requirement that before assembly and inflation of the wheel and tire, a rubber lubricant shall be applied to the bead and rim mating surfaces to reduce sliding friction received little comment and remains unchanged in the final standard.

The proposed safe operating procedure to assure proper seating of the components has been carried forward in the final standard. After a tire has been inflated in a restraining device and while the tire is still so protected, the tire, rim and rings are to be inspected to make sure they are properly seated and locked. If further adjustment work on the rim or rings is necessary, the tire must be deflated before proceeding with any adjustment.

The proposed prohibition against hammering, striking or forcing wheel components while the tire is inflated was strongly supported by many participants in this rulemaking and therefore remains unchanged in the final standard. [Ex. 3: (23); 3: (25); 3: (31); 3: (50)]

The proposed requirement for the servicing of tires off the vehicle has been changed. The proposal would have allowed tires to be inflated to not more than 10 psig (.70 kg/cm ^{2}) outside the restraining device for the sole purpose of seating the tube, flap and tire, lock ring. This provision raised serious concern among public participants.

The Goodyear Tire and Rubber Company stated that 10 psig was more air than needed to perform the desired tasks and that a minimum amount of air (no more than 3 psig (.21 kg/cm^2)) should be put in a tire while the wheel is not in a safety cage. They stated that even 10 psig. (.70 kg/cm^2) is enough tire pressure to cause injury should a side ring not be properly seated. [Ex. 3: (40)]

The American Trucking Association also expressed concern that 10 psig (.70 kg/cm^2) was excessive and recommended a lower air pressure for seating. [Transcript (Tr): 13–14]

Based upon the concerns expressed in the comments, the allowable air pressure for seating the lock ring or rounding out the tube outside a restraining device has been reduced from the proposed 10 psig to 3 psig.

For pressures at or below 3 psig (.21 kg/cm^2), the danger of an explosive separation is minimal. The low risk of injury during the seating process must be compared to a higher risk of injury due to an explosive separation if the rings are not properly seated. When a tire is placed into a restraining device, the lock rings may slip out of the gutter, thus setting the stage for a subsequent explosive separation. Therefore, to assure proper seating of lock rings, the standard permits partial inflation outside of a restraining device, as noted earlier.

The proposal required that whenever any part of a rim base, rings or lugs is to be subjected to a high temperature heat source, such as from a welding or brazing torch, the tire must be completely deflated. This provision was intended to address those instances where heat is used to release components which are frozen due to age, rust, or defect. However, if this is done while the tire is inflated, an explosion may result because the heat increases the air pressure in the tire. [Ex. 3: (23); 3: (33)]

The practice of using heat on wheel components received serious criticism from RMA, Budd Company, and The National Wheel and Rim Association. These parties objected to any application of heat to a component, as it would have a detrimental effect on the strength, yield modulus and other characteristics of the metal. [Ex. 3: (18); 3: (25); 3: (31)]

OSHA recognizes that the application of heat may adversely affect the design and function of wheel components. There are alternative methods of releasing frozen lugs that are in general use in the industry such as penetrating oil or graphite solution. [Ex. 3: (23); 3: (25)] Therefore, the final standard has been revised to prohibit entirely the use of heat on wheel components.

The proposed requirement that mounted wheels with inflated tires be moved or stored so that the trajectory does not pass through a service area has been deleted from the final rule, based upon the comments which pointed out the infeasibility of complying with this requirement. [Ex. 3: (32); 3: (37); 3: (47)] Such a requirement would also necessitate that personnel be moved every time a tire is moved and is not feasible. It has therefore been deleted from the final standard.

C. Regulatory Assessment

In the preamble to the proposal, OSHA noted that a regulatory assessment, which was prepared for the agency by Centaur Management Consultants, Inc., was available for review and comment. This assessment, which was developed pursuant to Executive Order No. 12044 (43 FR 12661, March 24, 1978), and DOL implementing procedures (44 FR 5570, January 26, 1979), examined the effects of compliance with the proposed standard on cost, productivity, employment, critical materials, energy and market structure. The major findings of the "Economic Impact Statement/ Assessment for Multi-Piece Rim Assemblies" include the following:

—The population at risk is approximately 322,000 persons. These persons are employed in 102,500 workplaces in ten industry segments. These persons will benefit from a safer workplace as a result of the standard.

—From 1968 to 1975, the wheel and rim industry reported a total of 295 injuries resulting from multi-piece rim accidents. A minimum of 22 fatalities resulted from these accidents.

—Provisions of the standard resulting in economic impact include the use of

restraining devices, clip-on-chuck assemblies and training.

—Capital costs resulting from compliance with the standard total $8,342,000. Total annualized costs including capital and training costs are estimated to total $3,810,000.

—Cost, productivity, employment, critical materials, energy and market structure impacts were examined. No significant impacts on any of these areas were found to result from compliance with the standard.

Based on estimated sales of restraining devices over the past 10 years, 24% of stationary workstations presently use cages or racks and 72% of mobile workstations presently use portable safety racks. It is estimated that those establishments currently using restraining devices also use clip-on-chucks with in-line valves. Therefore, approximately 77,700 establishments will have to purchase at least a $134 cage and a $21 clip-on-chuck for compliance with this standard. Wall charts and rim manuals are free to tire assemblers; consequently, only administrative costs are involved in their acquisition. The cost of training employees should not exceed an hour of employee time plus corresponding instructor time.

The major benefit to be attained by complying with this regulation is a significant reduction in the number of fatalities and permanent injuries which occur while servicing multi-piece rim wheels each year.

The benefit derived from using the proposed training technique is that it is applicable to both experienced employees and new hires, and it is flexible because employers may choose to conduct group training classes rather than individual instruction. In general, increased productivity, reduced insurance premiums, reduced workers compensation payments and fewer product liability suits can be expected through compliance with this standard.

Opportunity was given to interested persons to comment on and testify concerning the contents of the report and related issues. Since OSHA received no comments regarding the regulatory assessment, the determination that the standard on multi-piece rim wheels is not a "major" action in terms of economic impact remains unchanged. Based on the record, OSHA also concludes that the standard is both economically and as technologically feasible.

D. Effective Date

Based on the information in the regulatory assessment, and in the absence of any contentions to the contrary, it is anticipated that employers will have little difficulty in obtaining restraining devices, clip-on-chuck assemblies or training materials. There should be no need for extended delay for employers to implement the provisions of the standard. Therefore, the effective date of this standard is April 28, 1980.

E. Appendices

Two appendices have been included in this permanent standard for information purposes. Nothing contained in the appendices should be construed as establishing a mandatory requirement not otherwise imposed by the standard, or as detracting from an obligation which the standard does impose.

The information contained in Appendix A illustrates possible trajectories of wheel components during an explosive separation. Appendix B contains information concerning ordering of wall charts.

The contents of the proposed appendices have been clarified where necessary.

F. Authority

This document was prepared under the direction of Eula Bingham, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, Third Street and Constitution Avenue, NW., Washington, D.C. 20210.

Accordingly, pursuant to section 6(b) of the Occupational Safety and Health Act of 1970 (84 Stat. 1593; 29 U.S.C. 655) Secretary of Labor's Order No. 8–76 (41 CFR 25059), and 29 CFR part 1911, Part 1910 of Title 29, Code of Federal Regulations is amended by adding a new § 1910.177 as set forth below.

Signed at Washington, D.C., this 18th day of January 1980.

Eula Bingham,

Assistant Secretary of Labor.

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS

A new § 1910.177 is added to 29 CFR Part 1910, to read as follows:

§ 1910.177 Servicing multi-piece rim wheels.

(a) *Scope.* This section applies to the servicing of vehicle wheels which have tube-type tires mounted on multi-piece rims as defined below in paragraph (b) of this section.

(b) *Defintions.* "Charts" means the United States Department of Transportation, National Highway Traffic Safety Administration (NHTSA) publications entitled "Safety Precautions for Mounting and Demounting Tube-Type Truck/Bus Tires" and "Multi-Piece Rim/Wheel Matching Chart," or any other publications containing, at a minimum, the same instructions, safety precautions and other information contained on those charts that are applicable to the types of multi-piece rim wheels being serviced.

"Installing a Wheel" means the transfer and attachment of an assembled wheel onto a vehicle axle hub. "Removing" means the opposite of installing.

"Mounting a Tire" means the assembly or putting together of rim components, tube, liner (flap) and tire to form a wheel, including inflation. "Demounting" means the opposite of mounting.

"Multi-piece rim" means a vehicle wheel rim consisting of two or more parts, one of which is a side or locking ring designed to hold the tire on the rim by interlocking components when the tube is inflated, regardless of the sizes of the component parts.

"Restraining device" means a mechanical apparatus such as a safety cage, rack, or safety bar arrangement or other machinery or equipment specifically designed for this purpose, that will constrain all multi-piece rim wheel components following their release during an explosive separation of the wheel components.

"Rim manual" means a publication containing instructions from the manufacturer or other qualified organization for correct mounting, demounting, maintenance and safety precautions peculiar to the multi-piece rim being serviced.

"Service" or "servicing" means the mounting and demounting of multi-piece rim wheels, and related activity such as inflating, deflating, installing, removing, maintaining, handling or storing of multi-piece rim wheels, including inflating and deflating of wheels installed on vehicles.

"Service area" means that part of an employer's premises used for the servicing of multi-piece rim wheels, or any other place where an employee services multi-piece rim wheels.

"Trajectory" means any potential path or route that a lock ring, side ring, rim base and/or tire may travel during an explosive rim separation, and includes paths which may deviate from that perpendicular to the assembled position of the components on the rim base at the time of separation. (See Appendix A for examples of expected trajectories).

"Wheel" means an assemblage of tire, tube, and multi-piece rim components.

(c) *Employee training.* (1) The employer shall provide a training

program to train and instruct all employees who service multi-piece rim wheels in the hazards involved in servicing multi-piece rim wheels and the safety procedures to be followed.

(i) The employer shall assure that no employee services any multi-piece rim wheel unless the employee has been trained and instructed in correct procedures of mounting, demounting, and all related services, activities, and correct safety precautions for the rim type being serviced, and the safe operating procedures described in paragraph (f) of this section.

(ii) Information to be used in the training program shall include, at a minimum, the data contained on the charts and the contents of this standard.

(iii) Where an employer knows or has reason to believe that any of his employees is unable to read and understand the charts or rim manual, the employer shall assure that the employee is instructed concerning the contents of the charts and rim manual in a manner which the employee is able to understand.

(2) The employer shall assure that each employee demonstrates and maintains his ability to service multi-piece rim wheels safely, including performance of the following tasks:

(i) Demounting of tires (including deflation);

(ii) Inspection of wheel components;

(iii) Mounting of tires (including inflation within a restraining device);

(iv) Use of the restraining device;

(v) Handling of wheels;

(vi) Inflation of tires when a wheel is mounted on the vehicle; and

(vii) Installation and removal of wheels.

(3) The employer shall evaluate each employee's ability to perform these tasks and to service multi-piece rim wheels safely and shall provide additional training as necessary to assure that each employee maintains his proficiency.

(d) *Tire servicing equipment.* (1) The employer shall furnish and shall assure that employees use a restraining device in servicing multi-piece rim wheels.

(i) Each restraining device shall have the capacity to withstand the maximum force that would be transferred to it during an explosive wheel separation occurring at 150 percent of maximum tire specification pressure for the wheels being serviced.

(ii) Restraining devices shall be capable of preventing rim components from being thrown outside or beyond the frame of the device for any wheel position within the device.

(iii) Restraining devices shall be inspected prior to each day's use and after any explosive separation of wheel components and any restraining devices exhibiting any of the following defects shall be immediately removed from service:

(A) cracks at welds;

(B) cracked or broken components;

(C) bent or sprung components caused by mishandling, abuse or wheel separation; or

(D) pitting of components due to excessive corrosion.

(iv) Restraining devices removed from service in accordance with paragraph (d)(1)(iii) of this section, shall not be returned to service until they are inspected, repaired, if necessary, and are certified either by the manufacturer or by a Registered Professional Engineer as meeting the strength requirements of paragraphs (d)(1) (i) and (ii) of this section.

(2) A clip-on-chuck with a sufficient length of hose to permit the employee to stand clear of the potential trajectory of the wheel components, and an in-line valve with gauge or a pressure regulator preset to a desired value shall be furnished by the employer and used to inflate tires.

(3) Current charts shall be available in the service area.

(4) A current rim manual containing instructions for the type of rims being serviced shall be available in the service area.

(5) The employer shall assure that only tools recommended in the rim manual for the type of wheel being serviced are used to service multi-piece rim wheels.

(e) *Wheel component acceptability.* (1) Wheel components shall not be interchanged except as provided in the charts, or in the applicable rim manual.

(2) Wheel components shall be inspected prior to assembly. Rim bases, side rings or lock rings which are bent out of shape, pitted from corrosion, broken or cracked shall not be used and shall be rendered unusable and discarded.

(3) Mating surfaces of the rim gutter, rings and tire shall be free of any dirt, surface rust, scale or rubber buildup prior to mounting and inflation.

(f) *Safe operating procedure.* The employer shall establish a safe operating procedure for servicing multi-piece rim wheels and shall assure that employees are instructed in and follow that procedure. The procedure shall include at least the following elements:

(1) Tires shall be completely deflated before demounting by removal of the valve core.

(2) Tires shall be completely deflated by removing the valve core, before a wheel is removed from the axle in either of the following situations:

(i) When the tire has been driven underinflated at 80% or less of its recommended pressure, or

(ii) When there is obvious or suspected damage to the tire or wheel components.

(3) Rubber lubricant shall be applied to bead and rim mating surfaces during assembly of the wheel and inflation of the tire.

(4) Tires shall be inflated only when contained by a restraining device, except that when the wheel assembly is on a vehicle, tires that are underinflated but have more than 80% of the recommended pressure, may be inflated while the wheel is on the vehicle if remote control inflation equipment is used and no employees are in the trajectory, and except as provided in paragraph (f)(5) of this section.

(5) When a tire is being partially inflated without a restraining device for the purpose of seating the lock ring or to round out the tube, such inflation shall not exceed 3 psig (0.21 kg/cm^2).

(6) Whenever a tire is in a restraining device the employee shall not rest or lean any part of his body or equipment on or against the restraining device.

(7) After tire inflation, the tire, rim and rings shall be inspected while still within the restraining device to make sure that they are properly seated and locked. If further adjustment to the tire, rim or rings is necessary, the tire shall be deflated by removal of the valve core before the adjustment is made.

(8) No attempt shall be made to correct the seating of side and lock rings by hammering, striking or forcing the components while the tire is pressurized.

(9) Cracked, broken, bent or otherwise damaged rim components shall not be reworked, welded, brazed, or otherwise heated.

(10) Whenever multi-piece rim wheels are being handled, employees shall stay out of the trajectory unless the employer can demonstrate that performance of the servicing makes the employee's presence in the trajectory necessary.

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APPENDIX A
TRAJECTORY

WARNING

STAY OUT OF THE TRAJECTORY AS INDICATED BY SHADED AREA

Note: Under some circumstances, the trajectory may deviate from its expected path

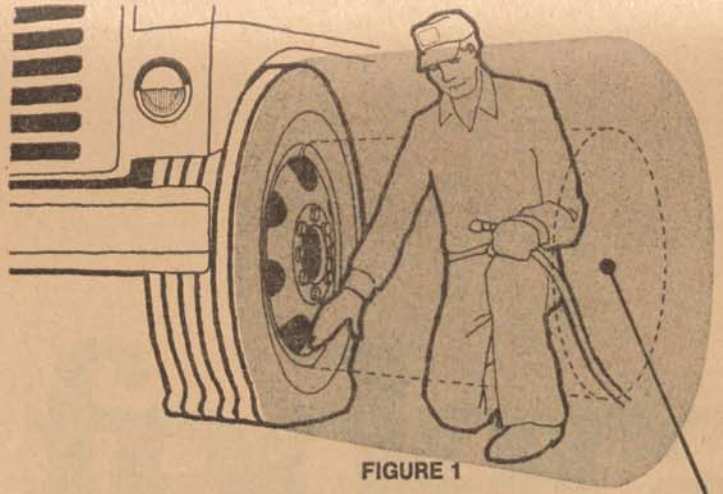
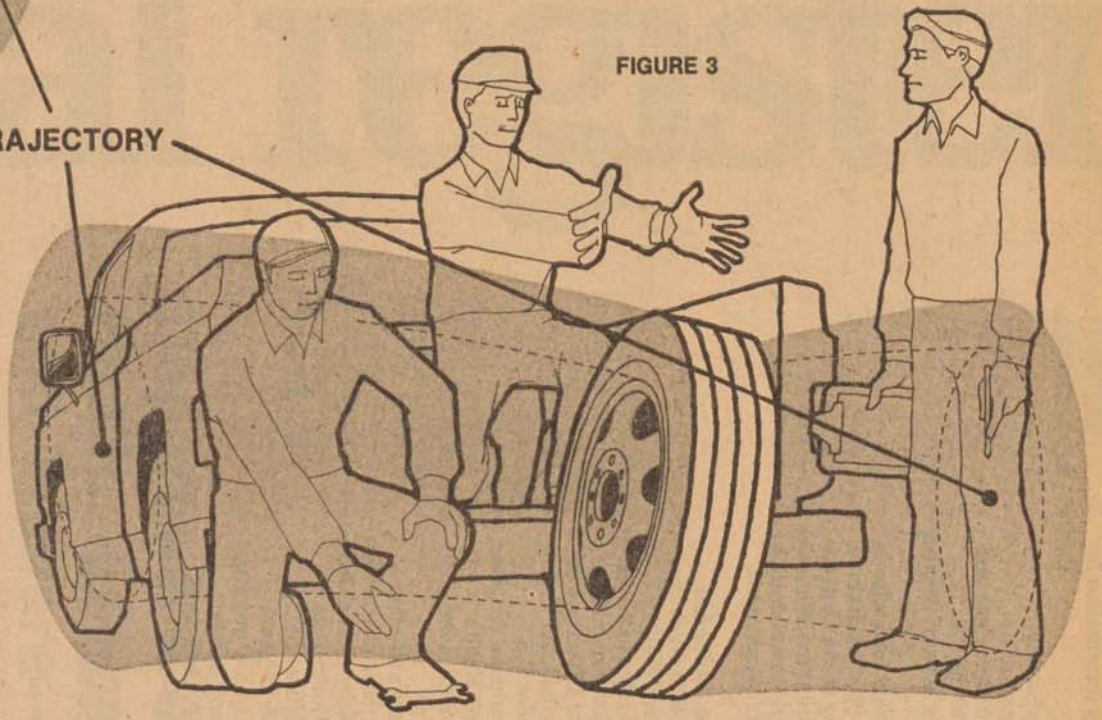


FIGURE 1

FIGURE 2

TRAJECTORY

FIGURE 3



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Appendix B—Ordering Information for NHTSA Charts

NHTSA has prepared safety information charts as part of a continuing campaign to alert truck and bus service personnel to the risk involved when working with multi-piece truck and bus wheels.

Individuals who service such wheels may obtain a single copy of each chart, without cost, by writing to the General Services Division/Distribution, National Highway Traffic Safety Administration, 400 Seventh Street SW., Washington, D.C. 20590.

Reprints of the above mentioned charts are also available through the Occupational Safety and Health Administration (OSHA) Area Offices. The address and telephone number of the nearest OSHA Area Office can be obtained by looking in the local telephone directory under U.S. Government, U.S. Department of Labor, Occupational Safety and Health Administration. Single copies are available without charge.

Service establishments and other organizations desiring these charts may order them in any quantity desired from the Superintendent of Documents, Government Printing Office (GPO), Washington, D.C. 20402, at a cost established by the GPO. GPO ordering number for the charts are: Safety Chart—050–003–00315–8, Cost: $2.25, Matching Chart—050–003–00316–6, Cost: $2.00.

(Sec. 6, 84 Stat. 1593 (28 U.S.C. 655); Secretary of Labor's Order 8–76 (41 FR 25059), 29 CFR Part 1911.)

[FR Doc. 80–2768 Filed 1–28–80; 8:45 am]

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