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Quick-action coupling – Pressure rating supplement to NFPA/T2.6.1 R2-2000, Fluid power components – Method for verifying the fatigue and establishing the burst pressure rating of the pressure containing envelope of a metal fluid power quick-action coupling

(Revision of NFPA/T3.20.8 R1-1996)

A NATIONAL INDUSTRY STANDARD FOR FLUID POWER

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Foreword

This Foreword is not part of NFPA Recommended Standard *Quick-action coupling – Pressure Rating Supplement to NFPA/T2.6.1 R2-2000, Fluid power components – Method for verifying the fatigue and establishing the burst pressure ratings of the pressure containing envelope of a metal fluid power quick-action coupling,* NFPA/T3.20.8 R2-2000

The project was initiated on 11 February 1997 and the TSP was approved by the Technical Board on 10 April 1997. The first draft was an update to coordinate the document with the updated NFPA/T2.6.1 R2. Both were issued for general review on 30 December 1999. Comments were reviewed at the T2.6 committee meeting of 9 February 1999, and proposed changes were reviewed by the T3.21 committee at its meeting of 18 May 1999. The ballot draft was prepared by NFPA headquarters on 2 August 1999. Negative ballots were reviewed at the T2.6 meeting on 22 September 1999. These were resolved and the Technical Board gave final approval on 18 November 1999.

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Introduction

In fluid power systems, power is transmitted and controlled through pressurized fluids, i.e., liquids or gases, within enclosed circuits. Quick-action couplings are used to join or separate fluid-conducting lines quickly without using tools or special devices.

During operation in systems, quick-action couplings may be loaded from internal pressure, gravity, inertia, thermal vibrations and external forces. These loads can vary from single static applications to continuously varying amplitudes, repetitive loadings and shock.

While it is important to know how well quick-action couplings can withstand all of these loads, this standard addresses only loadings due to internal pressure.

Internal-pressure loads are imposed on quick-action couplings in many ways. This standard considers a broad range of internal-pressure wave forms within prescribed time limits. It also limits temperatures and environmental conditions and it applies only to certain metals. It is anticipated that even with these limitations, this standard can provide sufficient common ground for comparing products.

This rating method provides system designers with certain information to assist in selecting quick-action couplings. Designers must still determine how the other loading conditions described above might affect the ultimate pressure-retaining capability of the quick-action couplings.

This standard is not intended to displace any existing pressure-rating standards. Instead, it serves as a universal “verification test”. It gives credibility to the many existing methods for determining quick-action coupling pressure ratings.

The credibility of this standard is based on the statistical treatment of metal fatigue as presented in the pressure-rating verification theory of NFPA/T2.6.1 R2.

To maximize the accuracy of this verification method, design knowledge of the quick-action coupling population and its representative samples is necessary. This must include knowledge of the consistency in materials, shapes, fabrication techniques, etc., of the population.

This standard describes specific methods for testing quick- action couplings, verifying their fatigue-pressure ratings, and establishing burst-pressure ratings. It also provides specific means to determine some optional parameters.

This standard is a supplement to the basic pressure-rating standard, NFPA/T2.6.1 R2. It follows the provisions of that document but is more specific to quick-action couplings. Application of this pressure-rating verification method requires use of both documents.

This version of NFPA/T3.20.8 R2 replaces earlier editions and uses the same basic theory. Products rated under the first (1974) edition may not be rated to the same values under this edition. See clause 15 for the differences in rating identification.

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1 Scope

1.1 This standard provides:

– test and statistical methods for generating fatigue-distribution data;

– test and statistical methods for verifying the pressure ratings of quick-action couplings;

– common requirements and an industry-wide philosophy for judging one type of pressure capability for quick-action couplings;

– uniform methods of product comparison.

1.2 This standard limits conditions as follows:

– pressure-induced loadings of constant amplitude;

– product life of at least 100,000 cycles;

– pressure levels and pulse durations as defined in NFPA/T2.6.1 R2, clause 8;

– temperatures that range from the Charpy impact transition temperature to the threshold of creep sensitivity;

– environments which are chemically compatible with the materials in the pressure-containing envelope;

– materials that are aluminum, magnesium, iron, steel, stainless steel, cobalt, titanium, copper-based alloys, nickel-based alloys, or monel. Specifically excluded are creep-sensitive materials such as zinc, plastic, rubber and sealing devices;

– quick-action couplings which are connected and disconnected by a linear or rotational motion, or both;

– quick-action couplings with or without sealing means when uncoupled.

1.3 This standard encourages manufacturers to use this common method to enhance the credibility of their pressure ratings.