NFPA Recommended Standard
NFPA/T3.20.8 R2-2000 (R2014)
Third edition
15 March 2000

AN INDUSTRY STANDARD FOR FLUID POWER

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)

Descriptors: quick-acting coupling hydraulic fluid power fluid power pressure cyclic test pressure rated fatigue pressure rated burst pressure burst test pressure rating by similarity pressure rating by test pressure rating.

published by

NATIONAL FLUID POWER ASSOCIATION, INC.

6737 W. Washington St., Suite 2350 / Milwaukee, WI 53214 USA
PHONE: +1 414 778 3344 / FAX: +1 414 778 3361 / E-mail: nfpa@nfpa.com

All standards, recommended practices, information reports, and bibliographies (collectively, “NFPA Documents”) are advisory only. Use thereof by anyone for any purpose is entirely voluntary and in any event without risk of any nature to the National Fluid Power Association (NFPA), its officers, directors or authors of such work. There is no agreement by or between anyone to adhere to any NFPA Document. In formulating and approving NFPA Documents, NFPA and/or its councils and committees will not investigate or consider citations, references or patents which may or may not apply to such subject matter since prospective users of such NFPA Documents alone are responsible for establishing necessary safeguards in connection with utilization of such matters, including technical data, proprietary rights or patentable materials.

The information and data contained in NFPA Documents has been obtained from sources believed to be reliable. However, it should not be assumed that all acceptable or applicable sources of information, procedures, methods or techniques are contained in NFPA Documents, or that additional measures may not be required under certain circumstances or conditions.

NFPA Documents and/or policies and procedures are subject to periodic review and may be changed without notice. NFPA Documents are only current as of their publication date. NFPA Documents, after publication, may be revised or withdrawn at any time and current information on all NFPA Documents may be received by calling or writing NFPA. Additionally, the various codes and regulations referenced in NFPA Documents may be amended from time to time and it should not be assumed that the versions referenced therein are the most current versions of such codes and regulations. Please consult the appropriate regulatory authorities for the most up-to-date versions.

NFPA Documents imply a consensus of those substantially concerned with their scope and provisions and are intended as a guide to aid the manufacturer, the consumer and the general public. The publication of NFPA Documents does not in any respect preclude anyone, whether they have participated in the development of or approved such NFPA Documents or not, from manufacturing, marketing, purchasing, or using of products, processes or procedures not conforming to the NFPA Documents. NFPA Documents do not constitute or indicate a warranty of any sort, express or implied, including but not limited to a warranty or representation as to quality, merchantability or fitness for a particular use or purpose.

Participation by federal agency representative(s) or person(s) affiliated with the industry is not to be interpreted as government or industry endorsement of an NFPA Document(s).

NOTICE

NFPA Documents do not express or imply any judgment, certification or endorsement of or with respect to, the safety, design or performance of any product, component, or its use.

NFPA does not examine, investigate, test, recommend, or certify the design, use or safety of any product or component, even those which may incorporate one or more NFPA Documents. NFPA Documents therefore have no application to and do not express or imply any recommendation, representation or warranty, with respect to the safety, design, use, performance, or functional interchangeability of components or products which incorporate NFPA Documents.

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.

Project Group Members who developed this standard:

John Berninger
Project Chairman and T2.6 Chairman
Parker Hannifin Corp.

James Miller
Section Chairman
Deere & Company

Richard Medvick
Section Vice Chairman
Swagelok

Paul Schacht
Section Chairman
Bosch Automation Technology

Barry Verdegan
Technical Auditor
Nelsen Industries, Inc.

June VanPinsker
Technical Coordinator
National Fluid Power Association

Shirley C. Seal*
Manager of Standards Development – Industry/National
National Fluid Power Association

*Retired

/jmv

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.

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

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.