



**NFPA Recommended Standard  
NFPA/T3.29.2 R2-2000 (R2019)**

Third edition  
15 March 2000

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AN INDUSTRY STANDARD FOR FLUID POWER

**Pressure switch – 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 pressure  
switch**

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## Foreword

This Foreword is not part of NFPA Recommended Standard *Pressure switch – 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 pressure switch, NFPA/T3.29.2 R2-2000*

The project was initiated on 11 February 1997 and the Technical Board approved the TSP 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 1998. 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. NFPA headquarters prepared the ballot draft on 2 August 1999. There were no negative ballots and the Technical Board granted final approval on 18 November 1999.

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## Introduction

In fluid power systems, power is transmitted and controlled through a fluid (liquid or gas) under pressure within an enclosed circuit. During operation, pressure switches in a system may be loaded from internal pressure, gravity, inertia, thermal variations and external forces. The nature of these loads can vary from a single static application, to continuously varying amplitudes, repetitive loadings and even shock.

It is important to know how well a pressure switch can withstand these loads but this standard addresses only loading due to internal pressure on the pressure containing envelope.

There are many ways in which internal pressure loads are imposed on a pressure switch. This standard considers a broad range of waveforms but within prescribed time limits, temperatures, environmental conditions and only upon certain metals.

It is anticipated that these limitations could still provide sufficient common ground for comparing products. This rating method, therefore, provides the system designer with certain information to assist in a selection of pressure switches for an application. The designer still has the responsibility to consider the other loading characteristics described above and to determine how they might affect the pressure switches ultimate pressure retaining capability.

There are many standards already in existence for pressure switches and this standard is not intended to displace them. Instead, a method of fatigue verification and for establishment of burst pressure ratings is provided.

This standard serves as a universal "verification test" to give credibility to the many in-house and other methods of determining pressure switch pressure ratings. The credibility is based upon the fundamental nature of fatigue of metals with its statistical treatment and a mathematical development of the theory developed in NFPA/T2.6.1 R2 for use of the pressure rating verification. Nevertheless, design knowledge of the pressure switch population and its representative samples, including consistency in materials, shapes, fabrication techniques, etc., is necessary to maximize accuracy in the verification method.

This standard describes specific methods for testing the pressure containing envelope of pressure switches, verifying their fatigue pressure ratings, and establishing burst pressure ratings. It also provides specific means to determine some of the 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 pressure switches. Application of this pressure rating method will require use of both documents.

This version of NFPA/T3.29.2 R2 replaces the earlier editions and uses the same basic theory. Products rated under the earlier edition may not be rated to the same values under this edition. See clause 12 for the differences in rating identification.

# **Pressure switch – 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 pressure switch**

## **1 Scope**

**1.1** This standard provides:

- test procedures for conducting a verification of the fatigue and establishment of burst pressure ratings on pressure switch envelopes;
- test and statistical methods for generating fatigue distribution data;
- common requirements and an industry wide philosophy in judging one type of pressure capability for fluid power pressure switches;
- Uniform methods of product comparison.

**1.2** This standard limits conditions as follows:

- constant amplitude, pressure induced loading of the elements that constitute or maintain the pressure containing envelope;
- product life of at least 100,000 cycles;
- defined conditions for pressure levels and pulse durations;
- temperatures from the charpy impact transition temperature to the threshold of creep sensitivity;
- environments which are chemically compatible with the materials of the pressure containing envelope;
- materials that are aluminum, magnesium, steel, iron, copper based alloys, cobalt, titanium, stainless steels, nickel steels and Monel. Specifically excluded are creep sensitive materials such as: zinc, plastic, rubber, and sealing devices.

**1.3** This standard does not include functional performance of a pressure switch, nor the ability to maintain a set point, when either the rated fatigue pressure or the rated burst pressure has been applied to the pressure containing envelope.