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Hydraulic fluid power – Industrial systems – Practice for the use of high water content fluids

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Foreword

This Foreword is not part of NFPA Recommended Standard *Hydraulic fluid power — Industrial systems — Practice for the use of high water content fluids*, NFPA/T2.13.5-1991.

Many new hydraulic systems are using high water content fluids as the hydraulic media. The personnel who are responsible for designing these systems or maintaining them have limited knowledge in the unique properties of these fluids.

The Fluids Coordinating Committee, T2.13, at its 19 March 1981 meeting recommended that a project be initiated to establish a recommended practice for the conversion to and use of hydraulic fluids which typically contain over 80 % water.

The title, scope and purpose of the project was approved on 13 May 1981 and the number T2.13.5 was assigned to the project.

Draft No. 1 was circulated and reviewed on 27 September 1982. Draft No. 2 was circulated and reviewed at the 14 March 1983 Project Group meeting. Draft No. 3 was circulated and reviewed on 3 October 1983 with the recommendation that Draft No. 3 be submitted to the NFPA Technical Staff to prepare the General Review Draft. Project Group Chairman, Ralph Perez (Lubrizol Corp.), forwarded the Final Working Draft No. 3 to Headquarters on 18 June 1984.

NFPA Technical Staff prepared the General Review Draft on 27 November 1985. Several comments were received on the first general review draft. The document was revised accordingly. At the 16 June 1988 meeting of the Fluids Technology Committee it was recommended that the document be submitted to the NFPA Technical Board for approval to ballot. The Technical Board supported this recommendation at their 15 September 1988 meeting.

The NFPA Headquarters Staff prepared T2.13.5 for Ballot on 18 November 1988. No negative comments were received. On 16 February 1989 T2.13 recommended that the document be submitted to the NFPA Technical Board for final approval.

On 16 March 1989 the NFPA Technical Board voted unanimously to approve the document as an NFPA Recommended Practice.

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Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. One class of liquid is the High Water Content Fluids.

Most existing industrial power equipment has been designed to run on petroleum oil. Consequently, conversion to a High Water Content Fluid is not recommended without a thorough evaluation of the system, and the replacement of critical components with those that have been designed to run on fluids which typically contain between 80 % and 98 % water. Therefore, this practice must be read carefully.

ISO 6743/4, Lubricants, industrial oils and related products - (class L) - Classification - Part 4: Family H (Hydraulic systems), has defined two major categories of High Water Content Fluids; Class HFAE for oil-in-water emulsions with water content over 80 % and class HFAS for chemical solutions with water content above 80 %. Hydraulic fluids with water content below 80 % are covered in ANSI standard B93.5M entitled, *Practice for the Use of Fire Resistant Fluids in Industrial Hydraulic Fluid Power Systems*.

As a result of the long term development of this new class of fluids, various designations have received widespread usage. Some of the more common designations for High Water Content Fluid include: 95/5, 5-95, High Water Base Fluid, HWBF, HWCF and High Water Fire Resistant.

Information which is provided in fluid supplier's specification sheets shows that High Water Content Fluids can vary widely in physical and chemical properties, degradability and lubrication values. It is therefore, recommended that before a given fluid is selected, it is matched as closely as possible to the requirements of the intended application and is approved by the component manufacturers.

Since this document presents only generalized recommended practices for the use of High Water Content Fluids, it is suggested that the user consult the component manufacturer for detailed recommendations concerning approved equipment and design limitations as well as the fluid supplier for specific procedures for installing and maintaining the hydraulic media.

Hydraulic fluid power — Industrial systems — Practice for the use of high water content fluids

1 Scope and field of application

This recommended practice provides a general educational publication covering the following aspects of High Water Content Fluids used in hydraulic fluid power systems:

- product description;
- mixing and control of water quality and concentration;
- operating temperature;
- foaming and aeration;
- corrosive properties;
- effects on protective coatings;
- wear resistant characteristics;
- viscosity control;
- fluid stability;
- safety in exposure to fluid;
- spills;
- contamination;
- effects on elastomers;
- piping and accessory precautions;
- changing fluids in a system;
- system design.

This recommended practice will:

- provide a composite reference of pertinent general data, properties and characteristics of the types of High Water Content Fluids considered for use in fluid power systems;
- facilitate the design of industrial fluid power systems that use High Water Content Fluids;
- improve the operation and increase the reliability of fluid power systems using High Water Content Fluids;