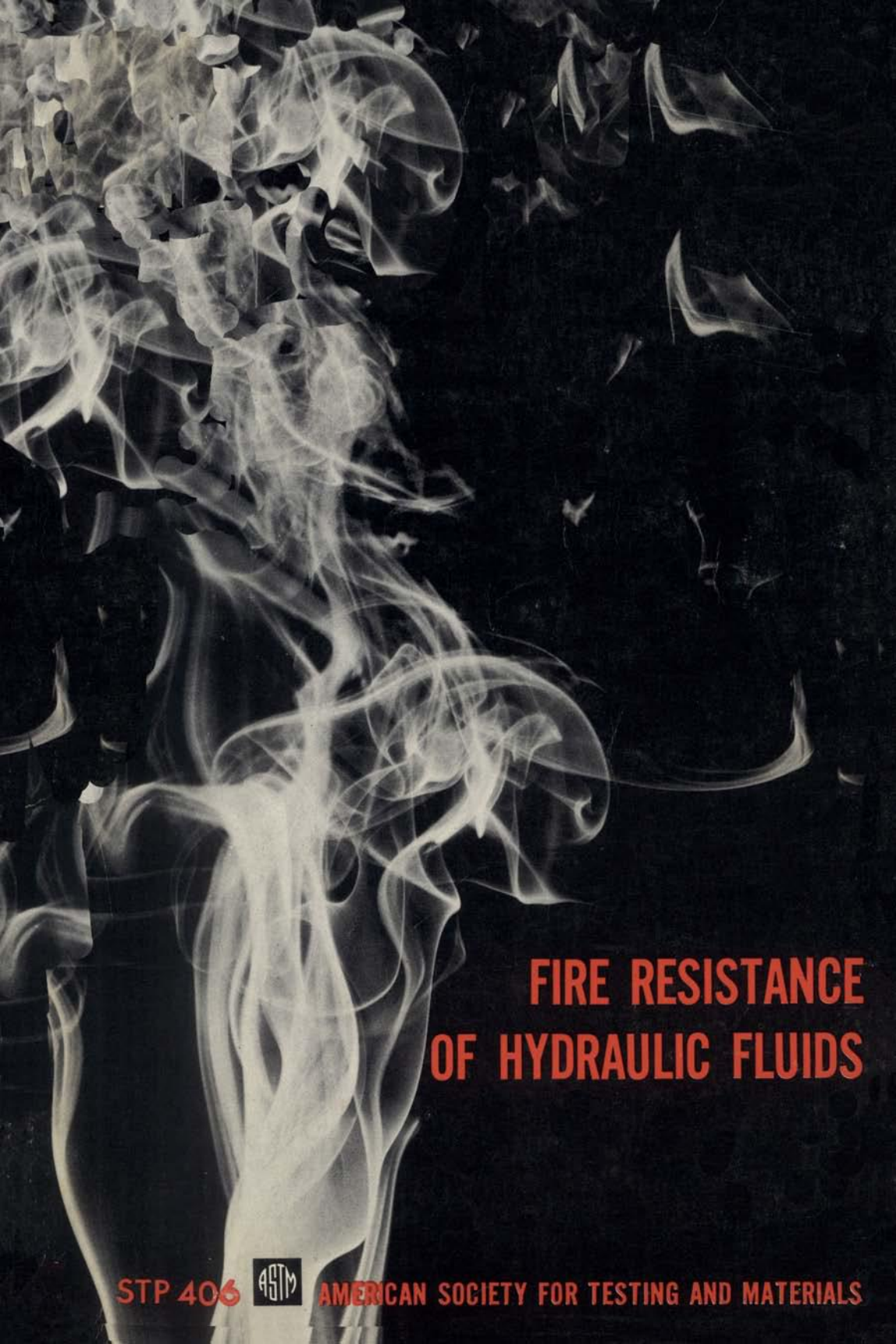

FIRE RESISTANCE OF HYDRAULIC FLUIDS

STP 406 ASTM AMERICAN SOCIETY FOR TESTING AND MATERIALS

FIRE RESISTANCE OF HYDRAULIC FLUIDS

A symposium
presented at a meeting of
Committee D-2 on Petroleum Products and Lubricants,
AMERICAN SOCIETY FOR TESTING AND MATERIALS,
and Committee A-6 on Aerospace Fluid Power Technology, SOCIETY OF AUTOMOTIVE ENGINEERS
New Orleans, La., Jan. 26 and 27, 1966

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FOREWORD

This Symposium on Test Methods for Fire Resistance of Hydraulic Fluids and Lubricants was presented Jan. 26 and 27, 1966 at the ASTM Committee D-2 Week in New Orleans, La. The symposium was sponsored by ASTM Committee D-2 on Petroleum Products and Lubricants and SAE Committee A-6 on Aerospace Fluid Power Technology.

A. R. Lansdown, English Ministry of Aviation, was presiding officer at the first session; R. L. Leslie, Vickers, Inc., presided at the second session; and R. E. Hatton, Monsanto Co., presided at the third session. The Symposium Committee consisted of these three with Dr. Hatton serving as chairman.

During the symposium, a number of motion pictures were shown, which graphically illustrated various fire resistance test methods. These movies pointed out the great difficulty of reducing performance in fire resistance tests to words or to mathematical ratings. The papers include references to most of the movies shown. However, to complete the record, brief descriptions of two movies not so included are given here.

S. P. Polack of the U. S. Bureau of Mines presented a film which demonstrated test methods used in Bureau of Mines Schedule 30, Subchapter E, Part 35 on Fire-Resistant Hydraulic Fluids. Three tests were included: autogenous-ignition temperature test, temperature-pressure spray-ignition test, and test to determine effect of evaporation on flammability (often referred to as the pipe cleaner test). The performances of two fluids — petroleum oil and a water-oil emulsion — were shown in each of the tests. In all cases the emulsion-type fluid showed significantly better fire-resistance properties.

R. E. Hatton of Monsanto Co. presented a movie showing performance of four types of aircraft hydraulic fluids — hydrocarbon, silicate ester-type, phosphate ester, and halogenated polyaryl — in a simulated hot aircraft brake. The fluid was introduced into an aircraft brake unit modified so that it could be heated internally by electric heaters. Fluid was poured into the interior of the brake assembly through a small hole. Burning on contact with the heated brake and flame propagation characteristics were both determined. The temperature was 850 C (1560 F); with fluid flow rates of 500 and 2000 ml/min. The four fluids showed wide differences in fire resistance. The hydrocarbon burned on contact and carried flame from the brake, the silicate-ester burned less vigorously but did propagate flame, the phosphate ester flashed on the drum but did not propagate flame, and the halogenated polyaryl fumed but did not flash or ignite.

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