

Contents

Page

Foreword	v
10 Air-operated pumps	1
10.0 Introduction	1
10.0.1 Purpose	1
10.0.2 Scope	1
10.1 Types and nomenclature	1
10.1.1 Types of air-operated pumps	1
10.1.2 Configuration of pumping devices	1
10.1.3 Nomenclature	2
10.2 Definitions	4
10.2.1 Rate of flow	4
10.2.2 Pressures	6
10.2.3 Suction conditions	9
10.2.4 Air consumption	12
10.2.5 Temperatures	12
10.2.6 Compressed-air properties	12
10.2.7 Liquid properties	13
10.3 Design and application	13
10.3.1 Typical services	13
10.3.2 Diaphragm and bellows type pumps – design and operating features	14
10.3.3 Rate of flow	15
10.3.4 Accuracy	15
10.3.5 Pump controls	15
10.3.6 Wetted parts selection	15
10.3.7 Effect of viscosity and specific gravity on pump performance	16
10.4 Installation, operation, and maintenance	17
10.4.1 Installation	17
10.4.2 Operation	20
10.4.3 Safety	20
10.4.4 Maintenance	22
Figures	
10.1.1 — Types of air-operated pumps	1
10.1.1.1 — Air-operated double diaphragm pump configuration	2
10.1.1.2 — Air-operated bellows pump configuration	2
10.1.3.3.2 — Diaphragm with integral outer piston plate	3
10.1.3.6 — Types of check valves	4

10.2.1.6 — Effective diaphragm area	6
10.4.1 — Suggested installation	18
10.4.1.3a — Flooded suction installation	18
10.4.1.3b — Suction lift installation	19
10.4.1.6 — Suggested submerged installation	19
10.4.2.1 — Duplex pump operation	21
Tables	
10.2a — Symbols	5
10.2b — Subscripts	6
10.4.4.2a — Diaphragm pump malfunctions – cause and remedy	23
10.4.4.2b — Bellows pump malfunctions – cause and remedy	24