

Contents	Page
1 Introduction.....	1
2 Scope and purpose	1
2.1 Scope	1
2.2 Purpose	1
3 Definitions.....	2
4 Safety considerations	3
4.1 Properties of oxygen	3
4.2 Oxidation hazards.....	3
4.3 Cryogenic hazards.....	4
4.4 Vaporization and pressure hazards.....	4
4.5 Incidents	4
4.6 Reapplication of used equipment	5
5 Pump design	5
5.1 User caution	5
5.2 Materials of construction.....	6
5.3 Cold-end components	7
5.4 Mechanical design.....	9
5.5 Shaft bearings	10
5.6 Pump motors	12
6 Installation	12
6.1 Primary installation safety method.....	12
6.2 Hazard zones	13
6.3 Barriers.....	15
6.4 Layout.....	15
6.5 Pipework.....	16
6.6 Additional considerations	18
7 Controls and instrumentation	18
7.1 General.....	18
7.2 Controls	18
7.3 Maintenance and analytical tools	19
8 Operation and maintenance	19
8.1 Warning signs.....	19
8.2 Training.....	20
8.3 Startup and operation	20
8.4 Condition assessment	21
8.5 Maintenance and repair.....	21
8.6 Filters/screens	22
9 References	22

Figures

Figure 1—Components of a centrifugal oxygen pump with a cold mechanical face seal	7
Figure 2—Liquid oxygen pump hazard zones.....	14

Table

Table 1—Acceptable materials of construction for centrifugal liquid oxygen pump (see 5.3).....	8
--	---