ISO 9206:2018 (E)

Aerospace — Fixed displacement hydraulic motors — General specifications

Contents

Foreword

1 Scope

2 Normative references

3 Terms and definitions

4 Classification

5 General requirements

5.1 Order of precedence
5.2 Hydraulic system characteristics
5.3 Airworthiness regulations
5.4 Qualification

6 Functional requirements

6.1 Hydraulic fluid
6.2 Pressures
6.2.1 Rated supply pressure
6.2.2 Rated differential pressure
6.2.3 No-load break-out pressure
6.2.4 Motor outlet port pressure
6.2.4.1 Nominal return pressure
6.2.4.2 Rated motor return pressure
6.2.5 Case drain pressure
6.2.5.1 Rated case drain pressure
6.2.5.2 Maximum case drain pressure
6.3 Flows
6.3.1 Rated consumption
6.3.2 Case drain flow
6.3.3 Shaft seal leakage flow
6.3.4 External leakage
6.4 Speed and direction of rotation
6.4.1 Speed
6.4.1.1 Rated speed
6.4.1.2 Overspeed
6.4.1.3 Maximum no-load speed
6.4.1.4 Direction of rotation
6.5 Torque
6.5.1 Rated torque
6.5.2 Break-out torque
6.5.3 Stalling torque
6.5.4 Torque pulsations
6.6 Motor overall efficiency
6.7 Dynamic characteristics
6.7.1 General
6.7.2 Dynamic braking
6.7.3 Rapid reversals
6.8 Passive operation
6.9 Rated temperature
6.10 Acoustic noise level
6.11 Rated endurance
6.12 Environmental requirements

7 Detail design requirements

7.1 Dimensionally critical components
7.2 Maintainability features
7.3 Seals
7.4 Lubrication
7.5 Balance
7.6 Self-contained failure
7.7 Safety wire sealing
7.8 Electro-conductive bonding
7.9 Marking
7.9.1 Nameplate
7.9.2 Fluid identification
7.9.3 Ports

8 Strength requirements

8.1 General
8.2 Proof pressure
8.2.1 Motor case
8.2.2 Motor inlet port
8.2.3 Motor outlet port
8.3 Ultimate pressure
8.3.1 Motor case
8.3.2 Motor inlet port
8.3.3 Motor outlet port
8.4 Pressure impulse (fatigue)
8.5 Port strength

9 Construction requirements

9.1 Materials
9.1.1 General
9.1.2 Metals
9.1.2.1 General
9.1.2.2 Motors for type I systems
9.1.2.3 Motors for type II and III systems and for commercial aircraft applications
9.2 Corrosion protection
9.2.1 General
9.2.2 Ferrous and copper alloys
9.2.3 Aluminium alloys
9.3 Castings

10 Installation requirements

10.1 Dimensions
10.2 Mass
10.3 Mounting
10.4 Orientation
10.5 Coupling shaft
10.6 Ports

11 Maintenance requirements

11.1 Maintenance concept
11.2 Service life limitations and storage specifications

12 Reliability requirements

12.1 Equipment compliance
12.2 Requirements

13 Quality assurance provisions

13.1 Responsibility for inspection
13.2 Classification of tests
13.3 Test stand requirements

14 Acceptance tests

14.1 General

14.2 Examination of the product
14.3 Test programme
14.3.1 General
14.3.2 External leakage requirements
14.3.2.1 General leakage
14.3.2.2 Shaft seal leakage
14.3.3 Break-in run
14.3.4 Proof pressure and overspeed tests
14.3.4.1 Overspeed test
14.3.4.2 Operational test at overpressure
14.3.4.3 Inlet port proof pressure test
14.3.4.4 Case port proof pressure test
14.3.5 Operational tests at rated conditions
14.3.6 Teardown inspection examination
14.3.6.1 Sampling requirements
14.3.6.2 Inspection procedure
14.3.7 Run-in
14.3.8 Performance data
14.3.9 Fluid contamination test
14.3.9.1 General
14.3.9.2 Inline particle counters
14.3.9.3 Filter patch test
14.3.9.3.1 General
14.3.9.3.2 Filter sampling method
14.3.9.3.3 Patch preparation
14.3.9.3.4 Patch comparison
14.3.10 Electro-conductive bonding
14.4 Storage and packaging

15 Qualification procedures

15.1 General
15.2 Qualification procedure
15.2.1 Qualification by analogy
15.2.2 Motor qualification test report
15.2.3 Samples and program of qualification tests
15.3 Qualification testing
15.3.1 Dimensional check
15.3.2 Expanded envelope acceptance tests
15.3.3 Overspeed test
15.3.4 Operational test at overpressure
15.3.5 Calibration
15.3.5.1 General
15.3.5.2 Dynamic characteristics
15.3.5.3 Torque and flow rate
15.3.5.4 Dynamic braking
15.3.5.5 Rapid reversals
15.3.5.6 Passive operation
15.3.5.7 Stalling torque and internal leakage
15.3.6 Endurance testing
15.3.6.1 General
15.3.6.2 Start-stop tests
15.3.6.3 Endurance in operating reversibility (bi-directional motors only)
15.3.6.4 Hydraulic fluid
15.3.6.5 External leakage permissible during endurance testing
15.3.6.6 Filtration during endurance testing
15.3.6.7 Filter checks
15.3.6.8 Part failure
15.3.6.9 Recalibration
15.3.7 Environmental tests
15.3.7.1 General
15.3.7.2 Low-temperature tests
15.3.7.3 Thermal shock test
15.3.7.4 Fire resistance test
15.3.8 Structural tests

15.3.8.1 Vibration tests
15.3.8.1.1 General
15.3.8.1.2 Position of a motor under test
15.3.8.1.3 Motor operation during vibration tests
15.3.8.1.4 Resonant-frequency vibration
15.3.8.1.5 Cyclic vibration
15.3.8.1.6 Other tests
15.3.8.2 Fatigue (pressure impulse) tests
15.3.8.3 Port strength
15.3.8.4 Proof pressure test at rated fluid temperature
15.3.8.5 Ultimate pressure test
15.3.8.6 Coupling shear test
15.3.9 Supplementary tests

Page count: 36