



AEROSPACE STANDARD

AS595™

REV. D

Issued 1959-02
Revised 2010-08
Reaffirmed 2015-10

Superseding AS595C

(R) Aerospace – Civil Type Variable Delivery, Pressure Compensated, Hydraulic Pump

RATIONALE

AS595D has been reaffirmed to comply with the SAE five-year review policy.

TABLE OF CONTENTS

1.	SCOPE.....	4
1.1	Field of Application.....	5
2.	REFERENCES.....	5
2.1	Applicable Documents.....	5
2.1.1	SAE Publications.....	5
2.1.2	European Aviation Regulations.....	6
2.1.3	FAA Publications.....	6
2.1.4	ISO Publications.....	6
2.1.5	Joint Aviation Authorities Committee Documents.....	6
2.1.6	RTCA Publications	7
2.1.7	U.S. Government Documents	7
2.2	Related Publications	7
2.2.1	SAE Publications.....	7
2.3	Definitions	7
3.	REQUIREMENTS	10
3.1	General	10
3.1.1	System Specification.....	10
3.1.2	System Characteristics	10
3.1.3	Airworthiness Requirements	11
3.2	Qualification	11
3.3	Functional Requirements	11
3.3.1	Hydraulic Fluid	11
3.3.2	Rated Discharge Pressure.....	11
3.3.3	Maximum Full-Flow Pressure	12
3.3.4	Inlet Pressures	14
3.3.5	Case Drain Pressures.....	14
3.3.6	Case Drain Flow.....	14
3.3.7	Rated Fluid Temperature	14
3.3.8	Minimum Continuous Fluid Temperature.....	15

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2015 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724 776 4970 (outside USA)

SAE values your input. To provide feedback
on this Technical Report, please visit

[standards/AS595D](#)

This is a preview. Click here to purchase the full publication.

SAE WEB ADDRESS:

3.3.9	Rated Output Flow	15
3.3.10	Rated Speed	15
3.3.11	Rated Endurance	15
3.3.12	Torque and Heat Rejection	15
3.3.13	Rated Endurance	18
3.3.14	Torque and Heat Rejection	18
3.3.15	Efficiency.....	18
3.3.16	Discharge Pressure Pulsations.....	18
3.3.17	Variable Delivery Control	18
3.3.18	Response Time	18
3.3.19	Stability.....	19
3.3.20	Maximum Transient Discharge Pressure.....	19
3.3.21	Depressurization	20
3.3.22	Balance	21
3.3.23	Adjustment	21
3.3.24	Safety Wire Sealing.....	21
3.3.25	Directionally Critical Components	21
3.3.26	Pump Dry Running.....	21
3.4	Environmental Requirements.....	21
3.4.1	Altitude	21
3.4.2	Ambient and Pad Temperatures	21
3.4.3	Vibration	21
3.4.4	Operational Shocks and Crash Safety.....	22
3.4.5	Other Environmental Conditions	22
3.4.6	Fire Resistance	22
3.4.7	Sonic Fatigue	22
3.4.8	Acoustic Noise	22
3.5	Installation Requirements	22
3.5.1	Dimensions	22
3.5.2	Weight	22
3.5.3	Mounting	23
3.5.4	Drive Coupling.....	23
3.5.5	Ports.....	23
3.6	Detail Requirements	23
3.6.1	Materials.....	23
3.6.2	Corrosion Protection	24
3.6.3	Castings	24
3.6.4	Reclaimed Materials	24
3.6.5	Seals	24
3.6.6	Standard Parts	24
3.6.7	Marking	24
3.6.8	Electro-Conductive Bonding	25
3.7	Strength Requirements	25
3.7.1	Proof and Ultimate Pressure Requirements	25
3.7.2	Impulse (Fatigue) Requirements	25
3.7.3	Combined Pressure and Structural Load Requirements	26
3.8	Design and Construction.....	26
3.9	Maintainability	26
3.10	Reliability Requirements	26
4.	QUALITY ASSURANCE PROVISIONS.....	26
4.1	Responsibility for Inspection	26
4.2	Classification of Tests	26
4.3	Test Stand Requirements	26
5.	ACCEPTANCE TESTS.....	27
5.1	Examination of the Product.....	27
5.2	Test Program and Inspection Methods.....	27
5.2.1	Proof Pressure Tests	27

5.2.2	Break-in Run	28
5.2.3	Load Cycles	28
5.2.4	Tear Down Inspection	28
5.2.5	Fluid Contamination Test	28
5.2.6	Calibration	29
5.2.7	Electro-Conductive Bonding	29
5.3	Preparation for Shipment	30
5.4	Storage and Packing.....	30
6.	QUALIFICATION TESTS	30
6.1	Qualification Procedure.....	30
6.1.1	Qualification by Similarity	30
6.1.2	Pump Qualification Test Report.....	30
6.2	Range of Qualification Tests.....	30
6.3	Expanded Envelope Acceptance Tests	31
6.4	Fluid Immersion Test	31
6.5	Calibration	31
6.5.1	Pump Inlet Pressurized.....	31
6.5.2	Flow Rate and Driving Torque Values	31
6.5.3	Heat Rejection Test	31
6.6	Maximum Pressure, Response Time and Pressure Pulsation Tests	32
6.6.1	System Impedance	32
6.6.2	Maximum Pressure Test	32
6.6.3	Determination of Response Time	33
6.6.4	Pressure Pulsation Test.....	33
6.7	Minimum Inlet Pressure Test	33
6.8	Solenoid Tests	34
6.9	Endurance Test.....	34
6.9.1	Accelerated Endurance Test.....	34
6.9.2	Fluid for Endurance Test.....	35
6.9.3	Filtration for Endurance Test.....	35
6.9.4	Means to Monitor Pump Condition.....	35
6.9.5	Dimensional Check	35
6.9.6	Calibration	35
6.9.7	Start-Stop Cycles	35
6.9.8	Air Ingestion	36
6.9.9	Failure of Parts.....	36
6.9.10	Teardown Inspection.....	36
6.9.11	Additional Endurance Test.....	36
6.10	Low Temperature and Thermal Shock Tests.....	36
6.10.1	Low Temperature Test.....	36
6.10.2	Thermal Shock Test.....	37
6.11	Other Environmental Tests	37
6.12	Fire Resistance Test - Engine Driven Pump Only	37
6.13	Structural Tests	37
6.13.1	Proof Pressure Test.....	37
6.13.2	Ultimate Pressure Test	38
6.13.3	Combined Pressure and External Load Test.....	38
6.13.4	Pressure Impulse Test	38
6.14	Vibration Tests	38
6.14.1	Mounting of the Test Pump.....	38
6.14.2	Resonant Frequency Vibration Test	38
6.14.3	Cyclic Frequency Vibration Test	38
6.14.4	Other Vibration Tests	39
6.15	Drive Coupling Shear Test.....	39
7.	NOTES.....	39
7.1	Revision Status	39

FIGURE 1	PRESSURE/DELIVERY CHARACTERISTICS OF A FLAT-CUT-OFF PRESSURE COMPENSATED VARIABLE DELIVERY HYDRAULIC PUMP	12
FIGURE 2A	NOMOGRAPH OF MAXIMUM RECOMMENDED VALUES FOR RATED SPEEDS AGAINST PUMP DISPLACEMENT (AMERICAN UNITS).....	15
FIGURE 2B	NOMOGRAPH OF MAXIMUM RECOMMENDED VALUES FOR RATED SPEEDS AGAINST PUMP DISPLACEMENT (METRIC UNITS).....	16
FIGURE 3	TYPICAL VARIATION OF PRESSURE AGAINST TIME – TRANSIENT FROM MAXIMUM FULL-FLOW PRESSURE TO RATED DISCHARGE PRESSURE	19
FIGURE 4	TYPICAL VARIATION OF PRESSURE AGAINST TIME – TRANSIENT FROM RATED DISCHARGE PRESSURE (ZERO-FLOW) TO MAXIMUM FULL-FLOW PRESSURE	19
FIGURE 5	NAMEPLATE DATA.....	24
FIGURE 6	ADDITIONAL NAMEPLATE DATA.....	24
TABLE 1	ENDURANCE TEST CONDITIONS	34