



ENGINEERING
TEST REPORT

REPORT NUMBER:

TR-021666A

Eaton Hydraulics
Cerkezkoy

TITLE: EC881-4 to -16 Hose produced at EATON Cerkezköy Hose Plant
Summary Test Report

DATE: June-2017

TECHNICIAN: MİTHAT İVRİNDİLİOĞLU

LAB. TEAM LEADER: TEMEL ÖZTÜRK

ENGINEER: Nivedita Singh

ENGINEERING SUPERVISOR:

Dipak Singh

This report shall not be reproduced, except in full without the written approval of
Eaton Test Laboratory



ENGINEERING

TEST REPORT

REPORT NUMBER:

TR-021666A

REFERENCES:

Hose Specification:

- EN857 Type 2SC
- SAE517 100R2

EATON Internal Test Reports:

- 4: TR 019918
 - 6: TR 018291
 - 8: TR 018292
 - 10: TR 019919
 - 12: TR 019466
 - 16: TR 019920
- Adhesion, cold flex, OD flatness, Aging, Ozone : TR 019580.

**TEST SPECIMENS:**

Hose EC881-4
Fitting Type Crimp, TTC
Crimp Diameter / Socket $16.45 \pm 0,15\text{mm}$
Manufacturing Location EATON POLİMER KAÜÇUK (Turkey)

Hose EC881-6
Fitting Type Crimp, TTC
Crimp Diameter / Socket $19.75 \pm 0,15\text{mm}$
Manufacturing Location EATON POLİMER KAÜÇUK (Turkey)

Hose EC881-8
Fitting Type Crimp, TTC
Crimp Diameter / Socket $23.65 \pm 0,15\text{mm}$
Manufacturing Location EATON POLİMER KAÜÇUK (Turkey)

Hose EC881-10
Fitting Type Crimp, TTC
Crimp Diameter / Socket $27.55 \pm 0,15\text{mm}$
Manufacturing Location EATON POLİMER KAÜÇUK (Turkey)

Hose EC881-12
Fitting Type Crimp, TTC
Crimp Diameter / Socket $31.55 \pm 0,15\text{mm}$
Manufacturing Location EATON POLİMER KAÜÇUK (Turkey)

Hose EC881-16
Fitting Type Crimp, TTC
Crimp Diameter / Socket $39.55 \pm 0,15\text{mm}$
Manufacturing Location EATON POLİMER KAÜÇUK (Turkey)



ELONGATION / CONTRACTION TEST

PROCEDURE	<p>A) On the depressurized assembly, mark an exact 25 centimeter gage length on the outside diameter of the hose and centered on the hose (minimum distance of 50 mm from the socket)</p> <p>B) Pressurize the sample with water or system fluid for 30 seconds minimum at the hose operating pressure.</p> <p>C) With the hose assembly still under pressure, measure and record the distance between the gage marks with a steel scale.</p> <p>D) Calculate percent elongation (positive value) or contraction (negative value) as described below: Elongation or contraction is expressed as a percentage. It shall be calculated using the following formula: $[(L_f - L_o)/L_o] * 100$ where, L_o = original, unpressurized length L_f = final, pressurized length</p>
TEMPERATURE	Room temperature
TEST FLUID	Hydraulic Oil
TEST PRESSURE	Operating Pressure (see below)
TOLERANCE	+2% Elongation - 4% Contraction

HOSE	TEST PRESSURE [bar]	PASSED [YES / NO]
EC881-4	450	YES
EC881-6	400	YES
EC881-8	360	YES
EC881-10	350	YES
EC881-12	330	YES
EC881-16	280	YES



ENGINEERING
TEST REPORT

REPORT NUMBER:
TR-021666A

BURST PRESSURE

PROCEDURE

The assemblies were attached by one end to a pressure source and extended straight without restraint. The free end was suitably capped or plugged and pressure was applied at a uniform rate (pressurization time not to exceed 30 seconds) until failure.

TEMPERATURE

Room temperature

TEST FLUID

Hydraulic Oil

SAMPLE	MIN. BURST PRESSURE REQUIRED [bar]	PASSED YES / NO
EC881-4	>1,800	YES
EC881-6	>1,600	YES
EC881-8	>1,440	YES
EC881-10	>1,400	YES
EC881-12	>1,320	YES
EC881-16	>1,120	YES

STANDARD IMPULSE TEST**PROCEDURE**

All sizes through -12 sizes shall be bent in a 180° arc with a radius at the inside of the bend equal to the specified minimum bend radius. All sizes larger than -12 shall be bent in a 90° arc with the radius at the inside of the bend equal to the specified minimum bend radius. The rate of pressure impulse shall be 35 - 75 cycles per minute and the impulse pressures as measured by an electronic measuring device, shall conform to the graph in Figure 1. If the engineering document specifies cool-down leakage, it shall be performed during impulse testing as specified in ES 2850T15.

MEDIUM

Hydraulic Oil

BEND ANGLE180° size -4, -6, -8, -10, -12
90° size -16**OIL TEMPERATURE**

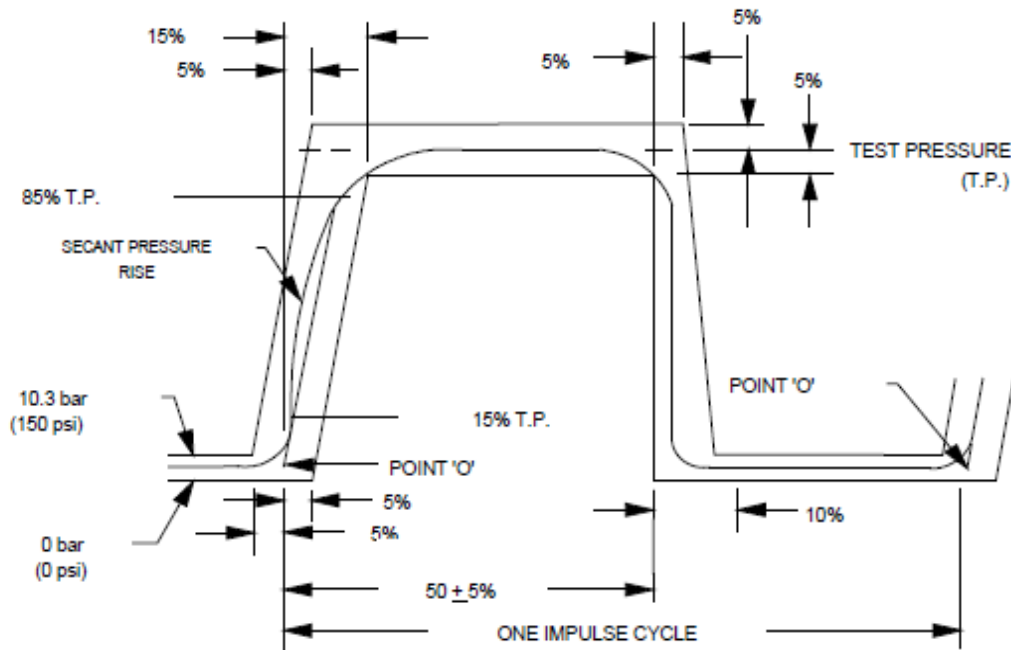
100°C

FREQUENCY

1,0 Hz ± 0,25

HOSE	BEND RADIUS [mm]	IMPULSE PRESSURE [bar]	CYCLES [-]	PASSED YES / NO
EC881-4	33	540	1000,000	YES
EC881-6	42	480	1000,000	YES
EC881-8	60	432	1000,000	YES
EC881-10	68	420	1000,000	YES
EC881-12	80	396	1000,000	YES
EC881-16	150	336	1000,000	YES

IMPULSE TEST (CONTINUED)
FIGURE 1 – IMPULSE PRESSURE TRACE



SECANT PRESSURE RISE	The straight line drawn through two points on the pressure rise curve, one point at 15% of the test pressure and the other at 85% of the test pressure. SECANT PRESSURE RISE shall be targeted at 11.7x test pressure (with a tolerance of $\pm 10\%$).
POINT "0"	The intersection of the Secant Pressure Rise with 0 pressure.
PRESSURE RISE RATE	This slope of the Secant Pressure Rise expressed in bar per second.



ENGINEERING
TEST REPORT

REPORT NUMBER:
TR-021666A

ADHESION TESTING

PROCEDURE

According to EN28033

ADHESION REQUIRED

>2,5 N/mm

SAMPLE	MIN. ADHESION REQUIRED [N/mm]	PASSED YES / NO
Hose Inner Tube	>2,5	YES
Hose Cover	>2,5	YES

Note:

As adhesion testing is independent from the hose construction (compound related only), there is no specific size indicated.



ENGINEERING
TEST REPORT

REPORT NUMBER:
TR-021666A

COLD FLEXIBILITY TESTING

PROCEDURE

According to EN 24672

SAMPLE	AGING TEMPERATURE [°C]	AGING TIME [h]	CRACKING OBSERVED	PASSED YES / NO
Hose Inner Tube	-45	24	NO	YES
Hose Cover	-45	24	NO	YES

Note:

Cold flexibility testing has been performed with small size hoses only (to achieve highest strain while sample is bended) to ensure proper compound performance.



OD flatness at bend radii

PROCEDURE

According to BS EN 857

Measure the hose outside diameter with a calliper before bending the hose. Bend the hose to the minimum bend radius and measure the flatness with caliper

HOSE	BEND RADIUS [mm]	Max OD flatness	PASSED YES / NO
EC881-4	33	10%	YES
EC881-6	42	10%	YES
EC881-8	60	10%	YES
EC881-10	68	10%	YES
EC881-12	80	10%	YES
EC881-16	150	10%	YES



FLUID COMPATIBILITY TESTING (AGING)

PROCEDURE

According to ISO 1817

TUBE / COVER	MEDIUM TYPE	AGING TIME [h]	TEMPERATURE [°C]	MAX. ALLOWED VOLUME CHANGE [%]	PASSED YES / NO
Tube	IRM 903	168	100	25	YES
Tube	Water+Ethanol 50:50	168	70	25	YES
Tube	Water	168	70	25	YES
Cover	IRM 903	168	70	100	YES
Cover	Water+Ethanol 50:50	168	70	100	YES
Cover	Water	168	70	100	YES

Note:

As fluid compatibility testing is independent from the hose construction (compound related only), there is no specific size indicated.



ABRASION

PROCEDURE

According to ISO 6945

TEST TEMPERATURE

Room temperature

SAMPLE	WEIGHT [N]	CYCLES [-]	MAX. ALLOWED WEIGHT LOSS [g]	PASSED YES / NO
Hose Cover	25	2.000	0,5	YES

Note:

Abrasion testing according to ISO 6945 has been performed with similar hoses using the same cover recipe to ensure proper performance.



ENGINEERING
TEST REPORT

REPORT NUMBER:
TR-021666A

OZONE RESISTANCE

PROCEDURE

According to ISO 7326

OZONE CONCENTRATION

50pphm

TEST TEMPERATURE

40°C

TEST TIME

70 hrs

SAMPLE	COVER CRACKING OBSERVED	PASSED YES / NO
Hose Cover	No	YES

Note:

Ozone resistance according to ISO 7326 has been performed with similar hoses using the same cover recipe to ensure proper performance.



ENGINEERING

TEST REPORT

REPORT NUMBER:

TR-021666A

CONCLUSIONS:

All samples tested meet or exceed the performance requirements as detailed in this report.