

# Leak Test SALE-01

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# SALE-01

- Identified as one telescope with *unusual gas consumption*
- The plan was to measure leaks on this telescope at the latest by the beginning of September
- Measurements **performed** on September the 2nd 2019
- We followed the **procedure provided by Upgrade Team**






# We started with SALE-01-Middle Chamber

## Leak measurement

Time	$\Delta P$ (mbar)	T (°C)
09:24	1,63	26,7
09:29	0,92	26,7
09:34	0,44	26,7
09:39	0,11	27
09:44	0,08	27
09:49	0,09	27,1

Clearly leaking

 **Significant leak** found on the **gas connector** (for wear)  
 Measurement repeated with "closed valve"  
 **No other leak founds**

Clearly not leaking

Time	$\Delta P$ (mbar)	T (°C)
12:15	1,66	29,1
12:20	1,66	29,1
12:25	1,66	29,1
12:30	1,66	29,1
12:35	1,66	29,1
12:40	1,66	29,2
12:45	1,66	29,2
12:50	1,68	29,2
12:55	1,68	29,2
13:00	1,68	29,1
13:05	1,68	29,1
13:10	1,68	29,3
13:15	1,68	29,3

We performed a 1 hour measurement at EEE operating overpressure (~1 mbar)

Time	$\Delta P$ (mbar)	T (°C)	P (mbar)	RH(%)	$V_{Corr}(ml)$	$\Delta V/h$ (ml/h)	$\Delta V/h$ (l/h)
13:56	1,10	29,5	1006	51			
14:56	1,17	29,3	1005	49			



LOOKS GOOD



# We continued with SALE-01-Bottom Chamber

Time	$\Delta P$ (mbar)	T (°C)
10:2	1,91	91
10:2	1,85	85
10:3	1,82	82
10:3	1,80	8
10:4	1,79	79
10:4	1,80	8
10:5	1,82	82
10:5	1,79	79
11:0	1,77	77
11:0	1,75	75
11:1	1,76	76
11:1	1,75	75
11:2	1,73	73

Quite stable

After correction of  $\Delta V$  by temperature

leak rate = 0.13 l/h

close to the 0.1 l/h limit

We performed a 1 hour measurement at EEE operating overpressure (~1 mbar)

Time	$\Delta P$ (mbar)	T (°C)	P (mbar)	RH(%)	$V_{\text{Corr}}$ (ml)	$\Delta V/h$ (ml/h)	$\Delta V/h$ (l/h)
11:54	1,05	28,8	1006	54	859,2	51,2	0,0512
12:54	1,00	29,2	1006	53	808		

LOOKS GOOD



...we had a lunch break too



# We finished with SALE-01-Top Chamber

## Leak measurement

Time	$\Delta P$ (mbar)	T (°C)
14:06	1,52	29,3
14:11	0,69	29,3

Clearly leaking

- **Significant leak** found on the **gas connector** (for wear)
- Measurement repeated with "closed valve"
- **No other leak founds**

After correction of  $\Delta V$  by temperature  
**leak rate = 0.07 l/h**  
 below the 0.1 l/h limit



LOOKS GOOD

1 hour measurement at EEE operating overpressure (~1 mbar) to be performed

Time	$\Delta P$ (mbar)	T (°C)
14:24	1,76	29,7
14:29	1,56	29,7
14:34	1,52	29,5
14:39	1,51	29,1
14:44	1,51	29,2
14:49	1,5	29,2
14:54	1,49	29,2
14:59	1,49	29,2
15:04	1,49	29,3
15:09	1,48	29,3
15:14	1,48	29,5
15:19	1,49	29,7
15:24	1,5	29,7



# Summary

- ✓ **SALE-01** showed an unusual gas consumption, so it was identified as one of the **problematic** telescopes
- ✓ We performed MRPCs leak test using the procedure (clear and easy) provided by the upgrade group
- ✓ We **found** two “weird&huge” leaks on two gas connectors and performed the leak test “bypassing the connector”
- ✓ Data analysis using agreed tools is quite easy: according to it and to a 1 hour measurement at EEE operating overpressure we state that **the chambers are ok**
- ✓ We need to check possible leaks on the remaining part of the system  
(bottles → pressure regulator → mixer → chamber)
- ✓ **Time estimation:** the leak measurement can be done in **1-2 days**
  - Time needed to find (and eventually cure) leaks **1 day**
  - Add **1 day** to repeat the measurement and check the system  
(bottles → pressure regulator → mixer → chamber)

