

Deviation Request ETSO-C89a#1 for an ETSO approval for CS-ETSO applicable to CREW MEMBER OXYGEN REGULATOR, DEMAND (ETSO-C89a)

Consultation Paper

1 Introductory Note

The hereby presented deviation requests shall be subject to public consultation, in accordance with EASA Management Board Decision No 7-2004 as amended by EASA Management Board [Decision No 12-2007](#) products certification procedure dated 11th September 2007, Article 3 (2.) of which states:

“2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency.”

2 ETSO-C89a#1 CREW MEMBER OXYGEN REGULATOR, DEMAND

2.1 Summary of Deviation

Deviates from SAE AS8027 §3.2.2.4 Outlet Leakage and SAE AS8027 §3.2.2.5 Overall Leakage.

2.2 Original Requirement

ETSO-C89a references to SAE AS8027

SAE AS8027 §3.2.2.4 Outlet Leakage: *With any pressure in the specified operating range applied to the oxygen supply port, the leakage at the outlet port shall not exceed 0.01 lpm-NTPD. Bleed flows required to operate pilot type devices shall be excluded from this requirement.*

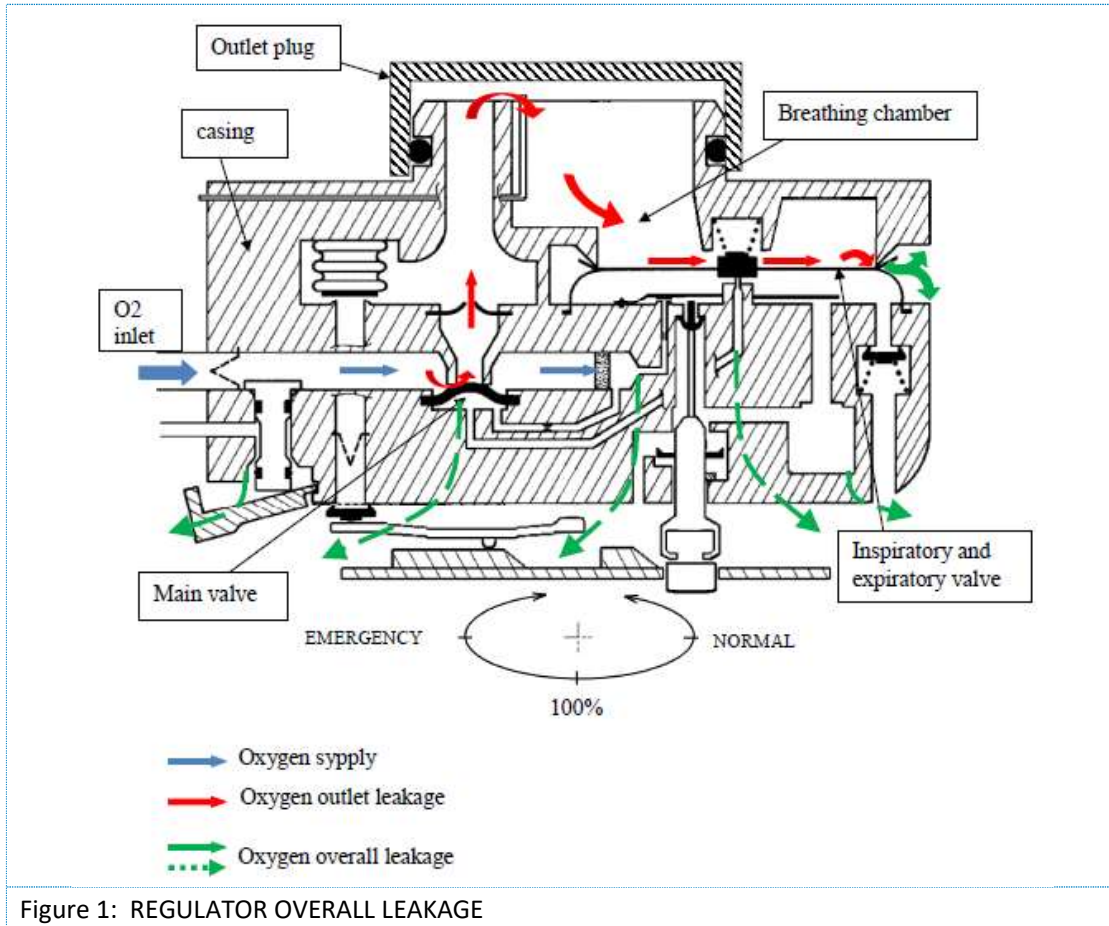
SAE AS8027 §3.2.2.4 Overall Leakage (external + internal): *With the maximum, specified pressure applied to the oxygen supply port, the overall leakage shall not exceed 0.01 lpm-NTPD. Bleed flows required to operate pilot type devices shall be excluded from this requirement.*

2.3 Industry

The exhalation valve being part of the regulator, the regulator outlet leakage (SAE AS8027 §3.2.2.4) and the regulator overall leakage (SAE AS8027 §3.2.2.5) cannot be measured separately. As detailed in Figures 1 and 2, the outlet leakage becomes an overall leakage as soon as the outlet port is plugged or restricted.

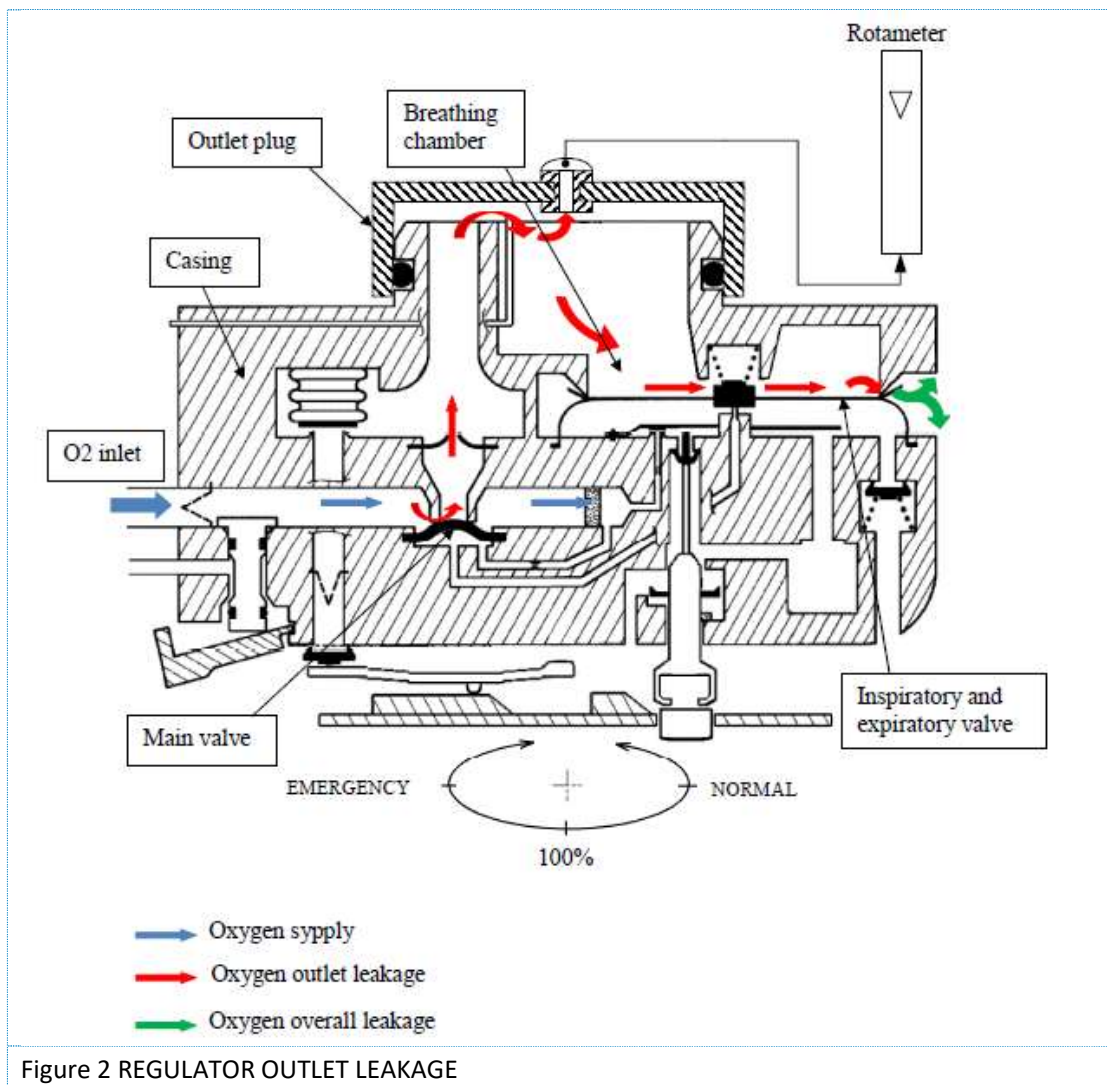
Industry propose to perform only one regulator leakage test and cumulate the maximum outlet leakage (0.01 L/min NTPD as per SAE AS8027 §3.2.2.4) and the maximum overall leakage (0.01 L/min NTPD as per SAE AS8027 §3.2.2.5). Though, the maximum regulator leakage considered for the test is 0.02 L/min NTPD.

Due to expiratory valve, it is not possible to identify and measure separately outlet leakage and overall leakage.



To perform the overall leakage, the regulator outlet is plugged. If the regulator has an outlet leakage, the only possibility is a leak from the oxygen supply inlet to the regulator outlet between the main valve and the casing. With the outlet plug, the leak will increase the pressure in the breathing chamber and will be considered as expiration by the expiratory valve.

The expiratory valve will open under the breathing pressure chamber increase (around 0.7 mbar) and the outlet leakage becomes a part of the regulator overall leakage.



Due to expiratory valve, it is not possible to identify and measure separately outlet leakage and overall leakage.

To perform the outlet leakage, the regulator outlet is restricted, and the leakage measured with a rotameter. If the regulator has an outlet leakage, the only possibility is a leak from the oxygen supply inlet to the regulator outlet between the main valve and the casing. With the outlet restriction, the leak will increase the pressure in the breathing chamber and will be considered as expiration by the expiratory valve.

The expiratory valve will open under the breathing pressure chamber increase (around 0.7 mbar) and the outlet leakage becomes an overall leakage not measured by the rotameter.

For information, this deviation has already been accepted by EASA under reference ETSO.DevP.55 related to ETSO-C89 [ETSO Authorization EASA.21O.10033821] and FAA for mask regulator MF20 Series [TSO document ref: GE/vk/12/04/Intertechnique (04/12/1998)].

2.4 Equivalent Level of Safety

The new generation of crew oxygen mask regulator design, being the regulator integrated with the mask, the exhalation valve is part of the regulator itself, therefore the regulator outlet and overall leakage cannot be measured separately as explained in the industry position, and the proposed test methodology provides an equivalent level of safety.

2.5 EASA position

We accept the deviation.