

NORSOK STANDARD

DIVING RESPIRATORY EQUIPMENT

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FOREWORD

NORSOK (The competitive standing of the Norwegian offshore sector) is the industry initiative to add value, reduce cost and lead time and remove unnecessary activities in offshore field developments and operations.

The NORSOK standards are developed by the Norwegian petroleum industry as a part of the NORSOK initiative and are jointly issued by OLF (The Norwegian Oil Industry Association) and TBL (Federation of Norwegian Engineering Industries). NORSOK standards are administered by NTS (Norwegian Technology Standards Institution).

The purpose of this industry standard is to replace the individual oil company specifications for use in future petroleum industry developments and operations, subject to the individual company's review and application.

The NORSOK standards make references to international standards. Where relevant, the contents of this standard will be used to provide input to the international standardisation process. Subject to implementation into international standards, this NORSOK standard will be withdrawn.

INTRODUCTION

This NORSOK standard is based on the "Guidelines for evaluation of breathing apparatus for use in manned underwater operations in the petroleum activities" which was published jointly by the Norwegian Petroleum Directorate and the Department of Energy (UK) 22 January 1991.

This NORSOK standard further supports the essential requirements of EU Council Directive of 21.12.89 relating to personal protective equipment (PPE) (89/686/EEC).

A given breathing apparatus can only be accepted by the recognised test centers when the individual components satisfy the requirements of the test specification which may be a complete standard or part of a standard, and practical performance tests have been carried out on complete apparatus where specified in the appropriate standard. If for any reason a complete apparatus is not tested then simulation of the apparatus is permitted provided the respiratory characteristics are similar to those of the complete apparatus.

1 SCOPE

This NORSOK standard applies to design and testing of breathing apparatus for use in manned underwater operations down to a depth of 400 meters. This standard may also be used for evaluating breathing apparatus used at depths exceeding 400 meters.

This NORSOK standard may be applied for testing and assessment of all breathing equipment for diving.

2 NORMATIVE REFERENCES

This NORSOK standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this NORSOK standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- EN 132 Respiratory protective devices - Definitions
- EN 134 Respiratory protective devices - Nomenclature of components
- EN 135 Respiratory protective devices - List of equivalent terms
- EN 144-1 Respiratory protective devices - Gas cylinder valves - Thread connection for insert connector
- EN 148-1 Respiratory protective devices - Treads for facepieces - Standard thread connection
- EN 148-2 Respiratory protective devices - Treads for facepieces - Centre thread connection
- EN 148-3 Respiratory protective devices - Treads for facepieces - Thread connection M 45 x 3.

3 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

For the purpose of this NORSOK standard the following definitions apply. They are taken from EN 132 as far as possible.

Shall	Verbal form used to indicate requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted, unless accepted by all involved parties.
Should	Verbal form used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or

	excluding others, or that a certain course of action is preferred but not necessarily required.
May	Verbal form used to indicate a course of action permissible within the limits of the standard.
Can	Verbal form used for statements of possibility and capability, whether material, physical or casual.
Ambient pressure (PA):	Pressure in the surrounding environment at the level of the diver's mouth (Measured in kPa). (For test purposes the ambient pressure is equal to the test pressure.)
Breathing gas:	Air or gas mixture suitable for breathing at the ambient pressure.
Hydrostatic imbalance (HI):	Pressure difference between the reference pressure (P_r) and the lung-centroid pressure (P_{lc}), $HI = P_r - P_{lc}$ (Measured in kPa). The hydrostatic imbalance may be positive, negative or zero, depending on the position of the demand valve (or equivalent device) and the orientation of the diver. The hydrostatic imbalance can only be measured when there is no respiratory gas flow.
Lung centroid pressure (P_{lc}):	Pressure maintaining the normal resting volume of the lungs (Measured in kPa). The lung centroid pressure may be measured at a point 1.24 kPa inferior to and 0.7 kPa posterior to the suprasternal notch or 2.84 kPa inferior to and 1.4 kPa posterior to the mouth.
Manned underwater operation:	Activity where humans stay below surface and/or are exposed to increased ambient pressure.
Over/under-pressure:	Maximum and minimum pressure to which the diver may be exposed in the event of failure of the apparatus (Measured in kPa.). The pressure is related to the reference pressure and will provide design parameters for emergency relief valves, shutoff valves and flow fuses. This pressure is <i>not</i> working pressure for normal operations.
Primary breathing apparatus:	Breathing apparatus in the mode which is normally used by a diver in water.
Respiratory minute volume:	Volume of breathing gas exhaled by the diver in the course of one minute (Measured in $l \text{ BTPS} \cdot \text{min}^{-1}$).
Supply pressure:	The overpressure of the breathing gas at the end of the umbilical where it is connected to the breathing apparatus on the diver's body, related to the ambient pressure (Measured in kPa).
Respiratory pressure:	Differential pressure measure in the diver's mouth during