

NORSOK STANDARD

SUBSEA INTERVENTION SYSTEMS

U-007
Rev. 2, June 1998

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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 eliminate 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 supported by OLF (The Norwegian Oil Industry Association) and TBL (Federation of Norwegian Engineering Industries). NORSOK standards are administered and issued by NTS (Norwegian Technology Standards Institution).

The purpose of NORSOK standards is to contribute to meet the NORSOK goals, e.g. by replacing individual oil company specifications and other industry guidelines and documents for use in existing and future petroleum industry developments.

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 Subject to implementation into international standards, the NORSOK standard will be withdrawn.

INTRODUCTION

This NORSOK standard U-007, rev. 2, replaces U-CR-007, rev. 1, January 1996.

The successful development of ISO standard 13628, part 8 - ROV interfaces with subsea production systems (presently at WD stage) and in part 9 - ROT intervention systems (presently at DIS stage) has, by references to these ISO standard 13628 parts 8 and 9, enabled deletion of the majority of the text in the present revision of this NORSOK standard.

1 SCOPE

This standard defines functional requirements for unmanned subsea intervention systems and interfacing equipment, covering the following tasks:

- Component and module replacement
- Tie-in, including related equipment
- Complementary tasks, such as inspection, cleaning, hot stabbing, valve operation, etc.

Intervention system as defined herein covers the following main classes of equipment:

- Deck handling and deployment equipment
- Intervention controls
- Various subsea equipment
- Intervention tools

Wellbore intervention and internal flowline inspection is not covered by this standard.

2 NORMATIVE REFERENCES

The following standards include provisions which, through reference in this text, constitute provisions of this NORSOK standard. Latest issue of the references shall be used unless otherwise agreed. Other recognized standards may be used provided it can be shown that they meet or exceed the requirements of the standards referenced below:

ISO 13628	Part 8 - Design and operation of subsea production systems, ROV interfaces with subsea production systems (presently WD stage).
ISO 13628	Part 9 - ROT Intervention systems (presently DIS stage)

3 DEFINITIONS AND ABBREVIATIONS

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.

Definitions, terms and abbreviations in ISO 13628-9 applies to this NORSOK standard.

4 REQUIREMENTS

4.1 General

The functional and technical requirements of ISO 13628, part 8 and 9 applies to the elements within the various options of intervention systems and interfacing equipment covered by this standard.

4.2 Subsea Electrical Connection System

The following requirements apply to the ROV operated electrical connection system:

- a) If a dual chamber electrical connector is not used for dielectric fluid protection of the couplers, a dedicated actuation tool with flushing capability of the electrical couplers shall be provided.
- b) The electrical connectors shall be parked in a safe position during the pull-in and connection and shall be protected from damage by ROVs.
- c) Parking places shall be incorporated as appropriate.
- d) The electrical connectors shall be arranged to enable individual replacement by ROV.
- e) The electrical connector receptacles in the termination head shall have ROV removable protection caps.
- f) Sufficient space shall be left for inspection and possible cleaning of the electrical connectors in the termination head.
- g) The protective caps and dummy receptacles for the electrical connectors shall include means of flushing with di-electric fluid if dual chamber electrical couplers are not used.

4.3 ROV Tools requirements

- a) Proven components and interfaces shall be used where possible.
- b) The tools shall include all elements required for performing the planned operations.
- c) The ROV tools should be operated without any additional surface support.
- d) The ROV tools shall be designed to enable flushing of the hydraulic circuits.
- e) High contrast colours shall be used to highlight moving parts such as tool and valve handles.
- f) ROV mounted equipment shall allow usage of a variety of commercially available ROVs.
- g) The ROV tools shall allow for efficient operation by a typical work ROV.
- h) The submerged weight of the ROV tools shall be within the weight carrying capacity of a typical ROV.

- i) The ROV tool handles shall be easy replaceable and be adopted for various types of manipulators.
- j) The ROV tool shall include a reaction plate or similar arrangement preventing rotation of the tool when being held by the ROV.
- k) Transport boxes for ROV tools shall be robust and suitable for offshore transportation. A content list, drawings, parts list and general operation instructions shall be mounted in a laminated plastic cover fitted to the inside of the box.
- l) New ROV tool design shall be evaluated with regard to requirements for wet testing as part of FAT.
- m) The medium torque tool version for ROV operated valve shall be based on a torque range up to 2700 Nm. The high torque tool version for ROV operated valve shall be based on torque values up to 13500 Nm.
- n) Torque limiting facilities should be provided.
- o) The valve torque tool shall be fitted with a valve interface of shape, dimensions and tolerances according to relevant standards.
- p) The valve torque tool shall be designed for valves with non-rising stems
- q) Hub cleaning and inspection tools shall be based on high pressure water jet cleaning and mechanical brushing which shall include a connection port for injection of chemicals and internal cameras with lights for monitoring/inspection purposes.

4.4 ROV interface requirements

- a) ROV interfacing equipment shall be optimized for direct use of ROV manipulators.
- b) Grabber bars or docking platforms to allow the work ROV to dock or land in a stable position with good view and reach to the work task location, should be provided.
- c) ROV platforms should be flush and without any obstructions for the ROV.
- d) The vertical distance from the lowest point on the ROV frame down to an area to be inspected and/or cleaned by the ROV, shall be max. 300 mm unless special tools are employed.
- e) The horizontal distance from the front part of the ROV base mount of manipulator to a work location shall be minimum 500 mm and maximum 1500 mm.
- f) The general operational envelope for observation-ROV is 1,9 m x 1,5 m x 1,5 m (LxWxH) The operational envelopes with special equipment / tools fitted to be agreed on a case to case basis.
- g) The general operational envelope for work-ROV is 3,5 m x 2,9 m x 2,9 m (LxWxH) The operational envelopes with special equipment / tools fitted to be agreed on a case to case basis.
- h) The distance from the outskirts of structure to the task site shall be evaluated with respect to minimizing the need for flying the ROV backwards out of the structure.
- i) The surrounding/interfacing structures and equipment such as valve stems and mini-guideposts shall be designed to avoid potential snagging points for the ROV and its tether or umbilical.

- j) The ROV system and the surrounding/ interfacing structures shall be designed to minimize adverse impact on ROV operation from environmental conditions such as strong currents and poor visibility.
- k) Sensitive equipment/components located in areas, which may require intervention, shall be protected against ROV impact (1000 kg at 0,5 m/s).
- l) Low torque ROV operated valves shall be fitted with a handle suitable for operation directly by the ROV manipulator.
- m) The low torque valve handle shall be fitted with mechanical stops at either end-position preventing the valve to be overturned and overloaded. The stopping mechanism shall not protrude the front side of the valve panel.
- n) Valve handles and attachments for ROV manipulator operation shall for low torque valves as a minimum be designed and tested to a torque of 400 Nm, a bending moment of 1000 Nm and an axial force of 5000 N.
- o) The valve handle shall be used as the valve status indicator. Robust and clearly visible position marks for both handle positions shall be included. The distance between the indicator and the reference point should be 5 mm.
- p) Position indicators shall not exceed one revolution between end stops.
- q) Several valve- or actuator stems close to each other shall be grouped on the same ROV panel.
- r) The valve stem location shall allow sufficient access for the work ROV. An area equal to a circle of 300 mm around the valve spindle shall be free for any obstruction.
- s) The valve stem and reaction system for medium and high torque ROV operated valves shall be designed to transfer only rotational torque to the valve. Other loads such as axial force, sideways force and bending moments shall not be transferred to the valve/actuator.
- t) The torque tools shall provide a torque minimum 30 % higher than the maximum required operation/break out torque value measured at the torque tool interface. For valves up to 75 mm bore the valve design torque shall be minimum 100% greater than the maximum required operation torque measured at the torque tool interface.
- u) The medium and high torque ROV operated valves shall be designed and tested to take a bending moment of minimum 3000 Nm and an axial force of 3000 N at the ROV interface and still be operable within the specified torque values.

In addition to the requirements given here, special attention should be given to Chapter 11 of ISO 13628-8 which contains relevant parts.