

Masks, Helmets and Suits Dirty Harry



Order code: **A999**

Dirty Harry: a diving system for use in contaminated waters

- **A Quantum improvement in Diving Safety**
- **Biological Pollution**
- **Nuclear Diving**

The “Dirty Harry” Contaminated Water Diving System is designed to provide a safe and efficient surface supplied system which minimises the risk of contact between the diver and the water in which he is diving.

The basic method of achieving this is by providing a closed circuit breathing system whereby the diver’s gas is returned to the surface and exhausted to the atmosphere rather than exhausting into the water.

As well as offering respiratory protection, a heavy duty rubber membrane drysuit which attaches directly to the helmet provides the diver with full skin protection.

Each Dirty Harry two diver system comprises:

- Two heavy duty rubber membrane drysuits complete with lockrings and drygloves
- Two 75 metre umbilicals (other lengths can be supplied upon request)
- Two Ultrajewel 601 17C Reclaim Helmets
- One Exhaust Control Panel

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Background

The need to utilise diving equipment to help isolate the diver from a range of possible in-water contaminants has long been recognised. Drysuits with hoods have been used with full-face masks with varying degrees of success for a number of years. Free flow diving helmets attached directly to drysuits have been another alternative, and surface demand diving helmets (similarly mated to a drysuit) and fitted with double-valved exhaust ports were also an option.

However, these systems all have a basic flaw: they exhaust directly into the surrounding water. In doing this they expose an obvious route for water ingress, as each time an exhaust valve opens, water (or water droplets) frequently enter the helmet. Anyone questioning this simply has to survey the average full-face mask or helmet at the end of a dive to witness a significant amount of water that is not simply sweat and condensation. Very few helmet divers ever really experience a 'dry dive'. Most divers experience a level of leakage into the diving mask or helmet which is normally regarded as acceptable in clean water. The water dump valve at the bottom of standard masks is for just this occurrence. However standard exhaust valves, ill fitting neckdams and poor neck clamp arrangements all permit water leakage into the helmet or mask.

Levels of contamination

At what point is water regarded as contaminated? Although no definition exists of the levels of the majority of contaminants that cause health problems in diving, it is obvious that diving in certain areas requires protection e.g.

- Sewage plants and outfalls
- Chemical spills into waterways
- Nuclear cooling ponds
- Chemical drum recovery

Protection:

Respiratory protection

Respiratory inhalation is the most rapid route for any contaminant or substance to enter the blood stream. Water droplets and water vapour can form within the diving helmet from any leaked water. Operation of the demist valve and turbulence of the gas mixture from within the helmet through operation of the breathing valve all contribute to creation of droplets. Even more straightforward is ingestion

of water through swallowing.

The primary contamination protection should be protection of the gas quality.

Skin protection

The second obvious method of contamination is into the bloodstream via the skin. Adequate protection from water contact to the skin is available by use of drysuits - obviously wetsuits are not suitable. However, there are a number of considerations even in the use of drysuits:

1. Suit material compatibility with the contaminant as certain chemicals will react with some suit materials.
2. Latex cuffs and neckseals may have similar compatibility problems to '1'
3. Suit inflation and in particular exhaust valves are regular sources of water leakage into the suit
4. Hand protection should be considered with the use of chemical compatible dry gloves

Good practice

We strongly recommend the use of two divers as a minimum in accordance to good diving practice (refer to ADC guidelines). The dive control panel and vacuum exhaust panel are therefore configured for two divers. The rationale behind this is that the standby diver must also be dressed in the same equipment as the working diver, as he would have to enter the same environment in the event of an emergency.

Introduction

The 'Dirty Harry' closed circuit diving system is designed to provide a safe and efficient surface supplied system which minimises the risk of contact between the diver and the water in which he is diving. The basic method of achieving this is by providing a closed circuit diving system whereby the divers exhausted gas is returned to the surface and exhausted into the atmosphere rather than exhausting into the water. The helmet is attached directly to the drysuit. The proven Ultrajewel 601/17E reclaim helmet is used in conjunction with a Diver Panel, Exhaust Control Panel and the 'Dirty Harry' drysuit which is available in various materials.

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Major Components and Function

Ultrajewel 601 Helmet Assembly The Ultrajewel 601 17C Reclaim Helmet consists of the Divex Ultraflow 601 demand regulator fitted to a Superlite 17C Helmet. The Ultrajewel 601 Helmet is suitable for diving depths up to 450msw (and conforms to the HSE/NPD Work of Breathing requirements) and is designed to provide fully closed-circuit demand and exhaust functions which minimize the risk of water from the diving environment entering the diver's helmet.

The Ultrajewel 17c Helmet has the patented Ultrajewel 601 exhaust regulator. This two stage valve provides added diver security

The Ultraflow balanced 2nd stage regulator overcomes pressure fluctuations in the supply system allowing the valve to provide adequate breathing gas under all conditions. Typically, the pressure losses experienced in many dive panels and umbilicals often lead to a regulator not conforming with the HSE/NPD Guidelines for Breathing Resistance. The Ultraflow regulator performs within these guidelines and over a wide range of pressures at the helmet (between 5-20 bar).

The helmet neck ring is bonded to the 'Dirty Harry' suit to prevent potential water ingress at the neckseal.

Umbilical

The 'Dirty Harry' umbilical PP070 is constructed from the following components:

- 1/2" RH-08 Return Line/Reclaim hose
- 3/8" DH-06 Air Supply Hose
- 1/4" DH-04 Pneumofathometer Hose
- 4 core comms cable.

A benefit of the Ultraflow regulator's ability to accept supply pressures up to 20 bar is that this enables a small hose

(1/4") to be used, if required, rather than the normal 3/8", hence reducing the umbilical size. Whereas the system is normally run on conventional hoses, we can offer (to special order) this specially designed small diameter umbilical for use by dive teams who have space and size limitations. With a diameter of only 32mm (1.25") and containing gas supply and return hoses, pneumo and comms, this umbilical is still smaller than many conventional open circuit systems.

Suits Dry suits made in three different materials are available to help overcome material compatibility problems that may occur in some chemical situations.

The suit materials are:

- Polyurethane
- Butyl Trilaminat
- Natural Rubber

A chemical compatibility chart relating to the material types should be used to enable correct selection. Unless otherwise specified the suit supplied as the standard product is the polyurethane suit. This material has the advantage that it is easily cleaned and resistant to most hydrocarbons (common in harbours en..

Important - Safety Notice.

We do not accept responsibility or liability for incorrect use of this equipment. Diving in polluted waters is extremely dangerous. It is essential that the contractor, user and diving team fully understand the type and level of contamination to be encountered in and around the dive site. It is essential that appropriately qualified professionals assess the suitability of the equipment to be used. The compatibility of the components and materials of the Dirty Harry system, and of course other equipment to be used, must be verified by appropriate persons

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