

Vito A. Kaminskas
Site Vice President

DTE Energy Company
6400 N. Dixie Highway, Newport, MI 48166
Tel: 734.586.6515 Fax: 734.586.4172
Email: kaminskasv@dteenergy.com



10 CFR 20.1703(b)

February 12, 2015
NRC-15-0019

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

- References:
- 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43
 - 2) Southern Company, Letter to NRC, "Re: Change of Ownership of Supplier Company," September 17, 2013 (ML13262A432)
 - 3) Delta Protection/Bacou Dalloz, MURUBLU05NP, "Topical Report Submittal of Delta Protection MURUROA Blu Single Use Encapsulating Suits," October 27, 2005 (ML053060280)
 - 4) U.S. Nuclear Regulatory Commission, "Final Safety Evaluation for Delta Protection/Bacou Dalloz Topical Report (TR) MURUBLU05NP, "Topical Report for Delta Protection MURUROA BLU Suit Systems," April 10, 2006 (ML060950499)
 - 5) Delta Protection/Bacou Dalloz, (TR-A) MURUBLU05NP, "Final Topical Report For Delta Protection MURUROA Blu Suit Systems," July 5, 2006 (ML061910495)
 - 6) U.S. Nuclear Regulatory Commission, "Guidance for Review of Licensee Requests to Use Delta Protection BLU Suit Systems Based on the Approved Topical Report," August 18, 2006 (ML062340554)

Subject: Request for Use of MURUROA Supplied Air Suits Models
MTH2 & V4F1 and the MURUROA BLU Suit Systems

Pursuant to 10 CFR 20.1703(b), DTE Electric Company (DTE) hereby requests authorization for use of the MURUROA supplied air suits, Models MTH2 and V4F1, and the MURUROA BLU Suit Systems, which have not been tested or certified by the National Institute for Occupational Safety and Health (NIOSH). These suits have been identified as having benefits from contamination control, heat stress reduction, and respiratory protection viewpoints. Upon Nuclear Regulatory Commission (NRC) approval, these suits will be included as an option in the Fermi 2 respiratory protection program.

Pursuant to 10 CFR 20.1705, DTE requests an Assigned Protection Factor (APF) of 5,000 associated with the use of the MURUROA MTH2 and V4F1 suits. In addition, DTE requests an APF of 2,000 associated with the use of the MURUROA BLU Suit Systems.

The design of all three suits includes two methods to quickly open the suit in order to breathe outside air in the event that a loss of supplied air occurs. The suits will not be used in environments that are immediately dangerous to life or health. Therefore, the requirement in 10 CFR 20.1703(f) for standby rescue personnel does not apply to the use of these suits.

These suits were originally manufactured by Delta Protection, a Bacou Dalloz Company; however, since 2013, they have been manufactured by Honeywell Safety Products, Inc. As previously reported to NRC by Southern Company (Reference 2), the change in manufacturer does not impact the manufacturing form, fit, or function of the suits.

On October 27, 2005, Delta Protection submitted a proprietary Topical Report (TR) (Reference 3) to the NRC requesting approval for the use of MURUROA BLU suit systems. NRC issued the final safety evaluation (SE) (Reference 4) approving use of the MURUROA BLU suit systems with an APF of 2,000 and without the use of standby rescue personnel on April 10, 2006. Delta Protection submitted a final, public version of the TR on July 5, 2006 (Reference 5). On August 18, 2006, NRC staff issued an internal guidance letter (Reference 6) listing 7 commitments for licensees to include in requests for use of the MURUROA BLU suit systems.

As required by NRC staff in Reference 6, the use of the MURUROA BLU suits will be consistent with the limitations delineated in the TR MURUBLU05NP (Reference 3) and the "Approved Device Configurations and Conditions of Use" specified in Section 4.0 of the NRC staff's SE (Reference 4) dated April 10, 2006, for TR MURUBLU05NP.

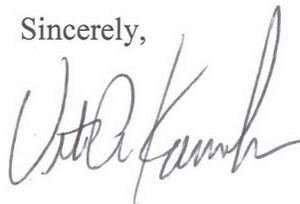
Enclosure 1 provides documentation supporting this request for the MURUROA MTH2 and V4F1 suits.

Enclosure 2 describes regulatory commitments that DTE has identified for use of all three suits. These actions will be completed prior to use and will be captured in the Fermi 2 Regulatory Action and Commitment Tracking System (RACTS) to ensure and track implementation.

In order to use these suits during the next refueling outage in fall 2015, DTE is requesting approval by June 30, 2015. This will allow time for procedure changes and training to be completed prior to the outage.

Should you have any questions or require additional information, please contact Mr. Christopher Robinson, Licensing Manager at (734) 586-5076.

Sincerely,



- Enclosures: 1) Documentation Supporting the Request for Use of Honeywell MURUROA MTH2 and V4F1 Supplied Air Suits
2) Regulatory Commitments to Complete Prior to Use of MURUROA MTH2, V4F1, and BLU Suits

cc: Director, Office of Nuclear Reactor Regulation
NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 5, Region III
Regional Administrator, Region III
Michigan Public Service Commission,
Regulated Energy Division (kindschl@michigan.gov)

Enclosure 1 to NRC-15-0019

**Documentation Supporting the
Request for Use of Honeywell MURUROA MTH2
and V4F1 Supplied Air Suits**

Request for Use of Honeywell MURUROA MTH2 and V4F1 Supplied Air Suits

Table of Contents

1.0 Introduction

1.1 Purpose

1.2 Background

1.2.1 Regulatory Requirements

1.2.2 Suit Construction

1.2.3 Safety Features of the MURUROA MTH2 and V4F1 Suits

1.2.4 Implementation

2.0 Technical Justification

2.1 Evaluation

3.0 References

4.0 Conclusions

5.0 Enclosure 1 Attachments

1. General Description MURUROA V4 Fully Enclosed Suit (5 pages)
2. MURUROA MTH2 US Instructions for Use (4 pages)
3. MURUROA V4F1 AND MTH2-V4 Instructions for Use (1 page)
4. European Standard EN 1073-1; 1998 Protective clothing against radioactive contamination (12 pages)
5. Test Results carried out on full encapsulated suits MTH2 and V4F1 (5 pages)
6. MURUROA MTH2 and V4F1 Certificate No. 0073/197/162/01/96/0001 and Certificate No. 0073/197/162/12/97/0028 (21 pages)
7. Instructions for Donning and Removal the MURUROA V4 Fully Enclosed Suit (5 pages)

1.0 INTRODUCTION

1.1 PURPOSE

10 CFR 20, Appendix A, “Assigned Protection Factors for Respirators,” states that an air supplied suit may be used in a continuous-flow mode; however, an Assigned Protection Factor (APF) has not been designated. Footnote (g) indicates that a suit can be used in a respiratory protection program if the minimum program requirements are met, e.g., 10 CFR 20.1703, “Use of Individual Respiratory Protection Equipment.” 10 CFR 20.1703 states that use of non-National Institute for Occupation Safety and Health (NIOSH) equipment is acceptable only if approved for use by the Nuclear Regulatory Commission (NRC). Since 10 CFR 20, Appendix A does not specify an APF for these air-supplied suits, 10 CFR 20.1705, “application for Use of Higher Assigned Protection Factors,” requires licensees to submit a request to the NRC in order to use a specific APF.

With regard to precedent, one or both of the MURUROA MTH2 and V4F1 suits have been accepted by the NRC for many licensees over the past 10 years, including Millstone, VC Summer, Columbia, Cooper, Diablo Canyon, and Callaway as well as for the Exelon, Entergy, Duke, TVA, FirstEnergy, and Southern Nuclear Company fleets. Furthermore, over 60,000 MURUROA suits each year are used in western European nuclear power plants.

1.2 BACKGROUND

1.2.1 Regulatory Requirements

DTE Electric Company (DTE) proposes to use the MURUROA MTH2 and V4F1 suits manufactured by Honeywell Safety Products, Inc. (previously manufactured by Delta Protection). The change in manufacturer does not impact the manufacturing form, fit, or function of the suits. The purpose of this submittal is to request approval for the use of these particular suits and for authorization to use an APF of 5,000 when using the suits.

The following regulatory requirements are relevant to this request.

10 CFR 20.1703(a), “Use of Individual Respiratory Protection Equipment,” states that if a licensee assigns or permits the use of respiratory protection equipment to limit the intake of radioactive material, “the licensee shall use only respiratory protection equipment that is tested and certified by NIOSH, except as otherwise noted in this part.”

10 CFR 20.1703(b) states that if the licensee wishes to use equipment that has not been tested or certified by NIOSH, or for which there is no schedule for testing or certification, the licensee shall submit an application to the NRC to authorize use of the equipment except as provided in this part.

10 CFR 20.1703(f) requires the use of a standby rescue person whenever one-piece air-supplied suits are used from which an unaided person would have difficulty extricating himself or herself.

10 CFR 20.1705, "Application for Use of Higher Assigned Protection Factors," requires that a licensee shall obtain authorization from the NRC before using assigned protection factors in excess of those specified in 10 CFR 20, Appendix A.

10 CFR 20, Appendix A, "Assigned Protection Factors for Respirators," Item II, "atmosphere Supplying Respirators (particulate, gases and vapors)," indicates that for a suit in a continuous flow operating mode, no APF is assigned and no NIOSH approval schedule is currently available for the evaluation of such suits. This equipment may be used in an acceptable respiratory protection program as long as all the other minimum program requirements, with the exception of fit testing, are met, i.e., 10 CFR 20.1703.

Based on these regulatory requirements, DTE hereby requests NRC approval for the use of the MURUROA MTH2 and V4F1 suits without a standby rescue person and requests an APF of 5,000 for these suits.

1.2.2 Suit Construction

The MURUROA MTH2 and V4F1 Supplied-Air Containment Suit meet International Organization for Standardization (ISO) 8194, "Radiation protection - Clothing for protection against radioactive contamination – Design, selection, testing and use," and the European Standard EM 1073-1 "Protective Clothing Against Radiation Contamination."

The suits have the following desirable features (Ref. Attachments 1 and 2):

- One-piece single use suit that includes integral gloves and booties with tie straps
- Made of flexible PVC with reinforced elbows, knees and crotch areas
- Dual zippers - metal zipper inside and plastic zipper outside
- Clear Poly Vinyl Chloride (PVC) helmet that provides distortion-free vision and large enough for wearing a headset
- Welded sleeve to insert communication cable
- A removable strip near the mouth that could be used for emergency breathing in case of loss of supplied air
- An egress strip stretching from left arm, over the head, to right arm that is used for undressing and for self-exit in an emergency such as loss of supplied air
- Air intake located at the waist with a built-in regulator that can adjust, but not block, airflow
- Two exhaust valves that ensure that suit remains airtight should an event block/pinch the air supply line

- Low noise level
- Air flow to arms, legs, and face

Air hoses of any length can be used, but air shall be supplied to the suits at 42 PSI (3 bar) to 85 PSI (6 bar). A regulator at the inlet is used to adjust the airflow. To ensure user safety, the regulator cannot shut off the air supply. There are two patented exhaust valves on the back of the suit, one behind the neck and one at the lower back. The exhaust valves prevent any aspiration of contaminants if supplied air is lost.

The MURUROA suits are approved for use with 16 different fittings in Europe and with Snap-Tit, Schrader, Foster, Hansen and CEJN type fittings, which are commonly used in North America.

1.2.3 Safety Features of the MURUROA MTH2 and V4F1 Suits

All MURUROA suit models are lightweight (2.5 lbs), made of fire-retardant material and can be used in temperatures up to 140 degrees F per European Standard EN 1073-1. The suits have built-in gloves, booties with binding ties, and reinforced elbows, knees, and crotch. A transparent helmet with 6 inch X 8 inch clear faceplate provides distortion-free view. Dual magnetic ventilation valves provide needed ventilation and relief of excess pressure in the event the suit is squeezed/pinched unexpectedly. In case of loss of air, the user can remove the mouth strip and move the opening close to his or her face or enlarge the opening to breath outside air. Alternatively, the user can pull the escape strip from either forearm, over the head and towards the other forearm, and rip the suit in two halves. This escape strip is normally used for egress from the suit when the work activity has been completed. The escape strips make a standby rescue person unnecessary. However, workers wearing air supplied suits are typically under continuous surveillance by Health Physics technicians using remote video monitoring or under direct Health Physics surveillance at the job location due to radiological conditions. The ability to eliminate a standby rescue person is also an ALARA consideration since the work areas where air supplied suits are used are typically areas with higher radiation and contamination levels.

The MURUROA suit design does not permit its use in an immediately dangerous to life and health (IDLH) atmosphere. Suits will be designated for single use only and will be used during normal (non-emergency) operations. DTE plans to use this suit for protection against radioactive particulate contamination only. The MURUROA suits offer a safer and more efficient means to protect workers in areas of high radiological contamination and in areas where there is a potential for airborne contamination. The MURUROA suits are also not designed for use with any personal cooling units such as a Vortex tube, but can be used with a cooling vest supplied by the manufacturer, if desired.

1.2.4 Implementation

The MURUROA MTH2 and V4F1 Suits will be integrated into the existing Fermi 2 radiological respiratory protection program using the manufacturer's recommendations. Workers will be trained on the MURUROA MTH2 and V4F1 suit features, donning, use and removal of the suits, cautions and use of the mouth strip and tear off strips for routine and emergency egress.

Radiation protection personnel will be trained on selection, approval, issue, equipment set-up, operation, and maintenance instructions for the MURUROA MTH2 and V4F1 suits.

Any defects discovered associated with the suits or their use will be entered into the Fermi 2 Corrective Action Program and reported to the manufacturer, as appropriate. Industry notification will be made through the Operating Experience (OE) Program.

DTE will integrate the manufacturer's recommendations for use and storage of the MURUROA MTH2 and V4F1 suits into the existing 10 CFR Part 20 compliant respiratory program at Fermi 2.

10 CFR 20.1703(c) (4) (vii) requires, among other things, written procedures governing respirator storage and quality assurance. DTE will implement the provisions in the manufacturer's "Instructions for Use" with the minor clarification that the suits will be inspected and removed from the protective packaging outside of the place's radiological controlled areas, in a way that maintains the integrity of the suits but does not lead to the unnecessary generation of solid radioactive waste.

DTE will establish lesson plans to train workers and radiation protection technicians on the MURUROA MTH2 and V4F1 suit features, donning, use and removal, and use of mouth-strip and tear-off strips for routine and emergency egress, such as loss of supplied air.

DTE will follow the manufacturer's instructions for use ensuring that the minimum operating air pressure and airflow is being supplied to the suit prior to working in them, specifically ensuring that the minimum pressure will be monitored during regular use. Air hoses of any length can be used, but air shall be supplied to the MURUROA MTH2 and V4F1 between 42 PSI (3 bar) to 85 PSI (6 bar). A regulator at the inlet can adjust the air flow from 18 cubic feet per minute (CFM) to 39 CFM. To ensure user safety, the regulator cannot shut off the air supply. Noise level is kept between 76 dB at maximum air flow to 58 dB at minimum air flow.

2.0 TECHNICAL JUSTIFICATION

2.1 EVALUATION

DTE has reviewed the following application documents, which are included as attachments:

1. General Description MURUROA V4 Fully Enclosed Suit

2. MURUROA MTH2 US Instructions for Use
3. MURUROA V4F1 AND MTH2-V4 Instructions for Use
4. European Standard EN 1073-1; 1998 Protective clothing against radioactive contamination
5. Test Results carried out on full encapsulated suits MTH2 and V4F1
6. MURUROA MTH2 and V4F1 Certificate No. 0073/197/162/01/96/0001 and Certificate No. 0073/197/162/12/97/0028
7. Instructions for Donning and Removal the MURUROA V4 Fully Enclosed Suit

Based on a review of this documentation, the suits represent a better design than the currently approved “bubble hood” and “rain suit” combination and provide better worker protection with the data supporting an APF of at least 5,000. A key element of this review was the application of the European Standard and the Certificate issued by the Institute for Nuclear Protection and Security for the MURUROA suits. The European Standard (Attachment 4) requires that the suit material be tested for resistance to abrasion, flex cracking, puncture, blocking, tear, and flammability; strength of seams, joints, and assemblies; damage resistance of exhaust valves; design flow rates for pressure range of supplied air; noise level; and quality of the visor. According to the testing standard, three workers should perform standard exercises; each wearing two different suits inside a chamber filled with a test agent (Sodium Chloride) and measures the leakages during the exercise regimen lasting 20 minutes. Operating parameters are set to manufacturer’s instructions. Standard exercises include walking on a treadmill at 2 mph (3 minutes), moving arms up and down above head while looking upward (3 minutes) and squatting continuously (2 minutes). To ensure worker’s comfort, two additional practical exercises – walking at 2 mph (5 minutes) and loading a bucket with wood chips from the base of a hopper and emptying it into the opening on top (15 minutes) – should be performed by two workers at specified airflow rates. Certificate No. 0073/197/162/01/96/0001 and Certificate No. 0073/197/162/12/97/0028 (Attachment 6) state that the MURUROA MTH2 and V4F1 passed in all categories tested and provided a protection factor greater than 50,000. It should be noted that the term “protection factor” used in the European Standard is equivalent to the “fit factor” used in the United States and is not the same as the Assigned Protection Factor used in 10 CFR 20.

Donning and removal instructions for the MURUROA MTH2 and V4F1 suits are provided in Enclosure 1 Attachment 7.

The NRC approved the use of the MURUROA V4F1 and MTH2 suits with an APF of 5,000 for many licensees over the past 10 years, including Millstone, VC Summer, Columbia, Cooper, Diablo Canyon, and Callaway as well as for the Exelon, Entergy, Duke, TVA, FirstEnergy, and Southern Nuclear Company fleets.

3.0 REFERENCES

1. 10 CFR 20.1703, “Use of Individual Respiratory Protection Equipment”
2. 10 CFR 20.1705, “Application for Use of Higher Assigned Protection Factors”
3. 10 CFR 20, Appendix A, “Assigned Protection Factors for Respirators”

4.0 CONCLUSIONS

DTE requests approval for the use of the MURUROA MTH2 and V4F1 suits pursuant to 10 CFR 20.1703(a) and (b), which require use of respiratory protection equipment that is either tested and certified by NIOSH or approved for use by the NRC. Based on a review of industry and manufacturer test documentation, DTE has determined that the MURUROA MTH2 and V4F1 model air supplied suits offer a safer and more efficient means to protect workers in areas of either high radiological contamination and/or high potential for airborne contamination. Ease of removal of the MURUROA suit provides more desirable self-rescue features. The ability to eliminate a standby rescue person is also an ALARA consideration since the work areas where air supplied suits are used are typically areas with higher radiation and contamination levels. Additionally, the MURUROA suit provides a means to undress that minimizes the potential for personnel contamination events. Furthermore, the MURUROA MTH2 and V4F1 suits have been designed to handle variable pressures at the inlet thus providing more flexibility of operations during outages.

To ensure proper use of the suits, a list of regulatory commitments has been generated and will be entered into the Fermi 2 Regulatory Action and Commitment Tracking System (RACTS) to track and assure implementation prior to use (see Enclosure 2).

5.0 ATTACHMENTS

1. General Description MURUROA V4 Fully Enclosed Suit (5 pages)
2. MURUROA MTH2 US Instructions for Use (4 pages)
3. MURUROA V4F1 AND MTH2-V4 Instructions for Use (1 page)
4. European Standard EN 1073-1; 1998 Protective clothing against radioactive contamination (12 pages)
5. Test Results carried out on full encapsulated suits MTH2 and V4F1 (5 pages)
6. MURUROA MTH2 and V4F1 Certificate No. 0073/197/162/01/96/0001 and Certificate No. 0073/197/162/12/97/0028 (21 pages)
7. Instructions for Donning and Removal the MURUROA V4 Fully Enclosed Suit (5 pages)

Enclosure 1, Attachment 1

GENERAL DESCRIPTION MURUROA V4 FULLY ENCLOSED SUIT
(5 pages)

N°: Do / USA / 1	MURUROA V4 FULLY ENCLOSED SUIT GENERAL DESCRIPTION	
INDICE : a		
DATE D'APPLICATION : 06/09/01		
PAGE : 1/4 <i>3/10/14</i>		

MURUROA SUIT

The Mururoa suit is a single use garment designed to be used in radioactively contaminated environments. It has been widely used in western European Nuclear Power Plants for more than 20 years, without any major problem (the French state company: Electricité de France use 60,000 garments each year).

The Mururoa suit is a fully enclosed PVC plastic, supplied-air and pressurized suit, that offers excellent protection factor (~100,000) against any solid, liquid, or gas pollutant, minimizing discomfort and heat stress and increasing the worker's efficiency.

The Mururoa suit is C.E. approved and complies with CE standard EN:1073-1 "Protective clothing against Radioactive Contamination"
 It also fulfils the requirements of the I.S.O. 8194 standard "Radiation Protection-Clothing for protection against Radioactive contamination-Design selection ,testing and use"

N°: Do / USA / 1	MURUROA V4 FULLY ENCLOSED SUIT	 DELTA PROTECTION 01 04 66 89 18 36
INDICE : a		
DATE D'APPLICATION : 06/09/01		
PAGE : 2/45 <i>EMM 3/11/14</i>		
GENERAL DESCRIPTION		

VENTILATION / EXHAUST

In the supplied-air Mururoa suit, the ventilation system is composed of

- An airflow control valve, preset to a minimum flow of 250 litres/minute (9 CFM) at 3 bar (42 PSIG), located on the right hip and covered with a protection flap. This flow can be adjusted, from 250 to 1150 litres (9 CFM to 41 CFM) per minute. 1150 litres is obtained with the tap fully opened at the feeding pressure of 6 bar (85 PSIG) (refer to graph in annex 11).
- A silencer bag which attenuates the noise level less than 58 dBa at 250 litres/minutes to 76 dBa at 1150 litres/minute.
- A manifold system welded to the suit and distributing the air to the helmet, the legs and the arms.
- An exhaust by two world patented valves placed in the helmet and in the back. These valves ensure a remarkable airtight seal in case of accidental air-feed cut off, or when putting the suit in under pressure through abrupt movements. The valves regulate the overpressure in the garment between 3 mbar (0.042 PSIG) and 10 mbar (0.142 PSIG) for supply air pressure between 3 bar (42 PSIG) and 6 bar (85 PSIG)
- The benefits of this system are
 - High heat removal through superior airflow
 - Non irritating diffuse ventilation
 - Resistance free breathing
 - High level of comfort for long and strenuous jobs in contaminated areas
 - Very low noise level

N°: Do / USA / 1

INDICE : a

DATE D'APPLICATION : 06/09/01

PAGE : 3/45 *3/11/14*

MURUROA
V4 FULLY ENCLOSED SUIT
GENERAL DESCRIPTION



DESIGN CHARACTERISTICS

- One piece PVC, fire proof suit. (Thickness 20/100mm for technical data concerning the material, refer Annex I of this document)
- Welded PVC gloves
- Incorporated overboots with strengthened sole
- Binding ties on the overboots
- Reinforced elbows, knees and crotch
- Dual zipper system:
 - metal zipper for mechanical strength
 - PVC zipper for air and gas tightness (0.30 PVC thickness)
- Supple transparent PVC helmet, fitted with a transparent distortion free, PVC face plate 6"x 8" giving almost the same optical quality as glass.
- Quick release strip from forearm, overhead to forearm, for easy removal. This is used both for undressing or emergency egress. (Emergency egress takes less than 3 seconds).
- Quick release strip for access to the mouth.
- Welded sleeve for communication cable.

N°: Do / USA / 1	MURUROA V4 FULLY ENCLOSED SUIT GENERAL DESCRIPTION	 DELTA PROTECTION ☎ 04 66 89 18 36
INDICE : a		
DATE D'APPLICATION : 06/09/01		
PAGE : 4/45 <i>AME 3/11/14</i>		

GENERAL CONSIDERATIONS

THE MURUROA SUIT IS AVAILABLE IN SIX SIZES

Size 0 1,55 m	→	1,62 meter	5 feet 1 inch	→	5 feet 4 inches
Size 1 1,60	→	1,68 meter	5'3"	→	5'6"
Size 2 1,68	→	1,74 meter	5'6"	→	5'8"
Size 3 1,74	→	1,82 meter	5'8"	→	6'0"
Size 4 1,82	→	1,92 meter	6'0"	→	6'3"
Size 5 1,92	→	2,05 meter	6'3"	→	6'8"

But if any individual selects a suit size different from the recommended size, the operating and safety characteristics will not change.

WEIGHT	1200 grams (2.64 LBS)
FEEDING PRESSURE	6 bar (85 PSIG)
FLOW	450 up to 1150 Lit/minute (16 - 41 CFM)

STORAGE

- The suit should be used by the third year from the date of manufacture.
- It must be stored in its original packaging.
- The storage temperature has to stay between 0°C and 60°C (32°F - 140°F)
- If the storage temperature was below 5°C (41°F) the suit must be stored approximately 3 hours at a room temperature until the suit become flexible.
- The usage temperature range + 5° C and + 55°C (41° - 131°F) depends on air fed temperature

N°: Do / USA / 1	MURUROA V4 FULLY ENCLOSED SUIT GENERAL DESCRIPTION	 DELTA PROTECTION 01 04 66 89 18.36
INDICE : a		
DATE D'APPLICATION :06/09/01		
PAGE :5/4 ⁵ <i>QV0</i> 3/11/14		

MATERIAL PROPERTIES

Technical characteristic of PVC material 20/100 mm using French standards, which would correspond to ANSI standards.

<i>Characteristic</i>	<i>Standards</i>	<i>Results</i>		<i>Units</i>
Density	NFT 51063	1.38		gm/cm ³
Traction Resistance	NFT 54102	≥ 143		N/cm ²
Stretch before tear	NFT 54102	≥ 178		%
Tear resistance	NFT 46007	≥ 45		N/cm ²
Weld resistance than material resistance	NFT 54122	Peel 50	Tear 65	%
Resistance to cold	NFT 51102	-10		°C
Vapour permeability	NFH 00030	34.1		g/m ² /24h
Volatility on activated charcoal	NFT 51167	≤ 6		%
Spark perforation	NFC 26225	9.2		KV

Enclosure 1, Attachment 2

MURUROA MTH2 US INSTRUCTIONS FOR USE
(4 pages)

NO/CC8414XY T

ISSUE: e

DATE: 03-14

PAGE 1/4

MTH2 US
INSTRUCTIONS FOR USE
EPI CC8414 XYT

Honeywell

HONEYWELL PROTECTIVE CLOTHING

Z.A du Berret
30200 BAGNOLS-SUR-CÈZE - FRANCE

☎ (33) 04 66 89 18 36

✉ (33) 04 66 89 36 31

GARMENT PROTECTING AGAINST PARTICULATE RADIOACTIVE CONTAMINATION, VENTILATED-PRESSURISED TYPE, FOR SINGLE USE, IN ACCORDANCE WITH STANDARD EN 1073-1 (MARCH 1998).

Warning:

- The choice and use of an item of personal protective equipment must comply with European Directive no. 89/656/EEC of 30/11/1989.
- The employer must have first analysed and assessed the risks involved in the intervention and those generated by the use of the personal protective equipment selected.
- In doing so, he may by default base his assessment on the recommendations of the standard concerning the choice, use, servicing and maintenance of respirators published by AFNOR under the N° S 76-005 CR 529. The operator's analysis must also take into account any obstacles to the rapid removal of the equipment in the event of an incident as well as the radiological consequences for the worker concerned by this removal.

Foreword:

- This single-use garment has been developed to provide protection against particulate radioactive contamination according to standard EN 1073-1.
- This garment is to be used under the supervision of the person in charge of the intervention, who must have ensured in advance that:
 - This garment offers adequate protection for the category of risks encountered during the intervention.
 - The wearer is in possession of the necessary alarm devices him to check that the minimum air flow recommended by the manufacturer is reached or exceeded before or during the use of the equipment. (for the necessary equipment, please contact us)
 - The air supply hoses are compliant with standard NF EN 14 594 and are of sufficient length.
 - "Breathable Air" intakes (compliant with standard EN 12 021) fitted with connectors compatible with those on the garment are in fact placed at different places where the user may have to go; and that these air intakes provide a sufficient quantity of air (the pressure measurements are taken at the inlet into the garment in normal conditions of temperature and pressure):
 - minimum rate 400 litres/min. at 4.8 bar.
 - maximum rate 1050 litres/min. at 4.8 bar.
 - that the whole of the intervention is done under supervision (human presence or by audiovisual means) and that all the appropriate first aid and rescue equipment is available in case of any incident during the intervention.

DONNING

- The wearer, assisted by a dresser, makes a visual inspection of the condition of the suit and its components, then removes the transport protection (cardboard on the visor, inside the suit and detachable "crystal" on the visor).
- He pulls on the bottom of the suit via the back closure.
- He connects up to the breathable air network passing his air line through the loop situated at the back of the suit at supply system height.
- The dresser then closes the two zippers and applies a strip of adhesive to the full length of the zippers to ensure they are sealed; he ties the laces of the overboots around the ankles. The suit must be used with textile overboots.
- The wearer checks the air supply, the correct operation of the flow regulator and overpressure valves by crouching rapidly several times.
- He may now enter the work zone.

DOFFING

- The suit can be removed using the strip provided for the purpose. To do this, as the garment is still being supplied with air, the undresser pulls on the orange strip that runs from one wrist to the other passing over the helmet and rolls down the front and back parts of the garment so as to trap the contamination and avoid any contact with the worker.
- In case of need the helmet must be able to be removed rapidly. Beware of any extra devices that may interfere with its removal (external harness, adhesive strips...).

IMPORTANT

- If the garment loses pressure during the intervention, if mist appears inside the helmet or if the worker feels excessively hot, he must leave the work zone immediately.
- Remember that: the suit remains pressurised for a few moments even if the air supply is cut off.
- Protective clothing manufactured to meet Standard EN 1073-1 provides protection against particulate radioactive contamination. **This protective clothing does not provide protection against radiation.**

STORAGE

In the original packaging; away from direct light; at a temperature between + 5°C and + 35 °C inclusiv e.
Possible storage time: 3 years in the original packaging.
To avoid the risk of deterioration (crushing, deformation, etc.), this Personal Protective Equipment should be stored in its initial packaging (cardboard box) until used.

NO/CC8414XY T	MTH2 US INSTRUCTIONS FOR USE EPI CC8414 XYT	Honeywell
ISSUE: e		
DATE: 03-14		
PAGE 2/4		

USAGE

The air supply (conform to the EN 12021 standard) should be between + 15°C and + 35°C.

EXPIRY DATE

The clothing should be used by the third year from the date of manufacture.

CLEANING

Not necessary for this type of equipment which is for a single use only.

EMERGENCY DEVICES

- The safety strip placed at the front of the helmet, when it is pulled off, allows the wearer to breathe the air outside the suit
- Tearing off the doffing strip allows the wearer to get out of the top half of the suit in less than 5 seconds.

ERGONOMICS/HARMLESSNESS OF THE MATERIALS

The composition and presentation of the materials used mean that they are not dangerous or harmful in any way (no risk of skin or respiratory damage...) for the wearer of the equipment.

The materials used in the manufacturing of the suit meet the REACH directive. However, we ask you to avoid direct contact between the materials and mucous membranes.

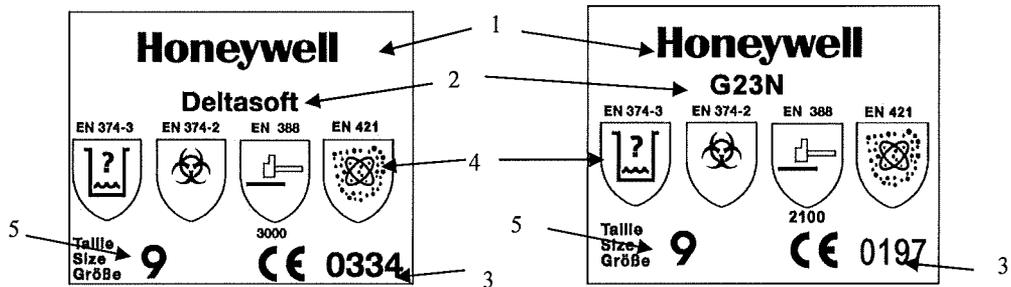
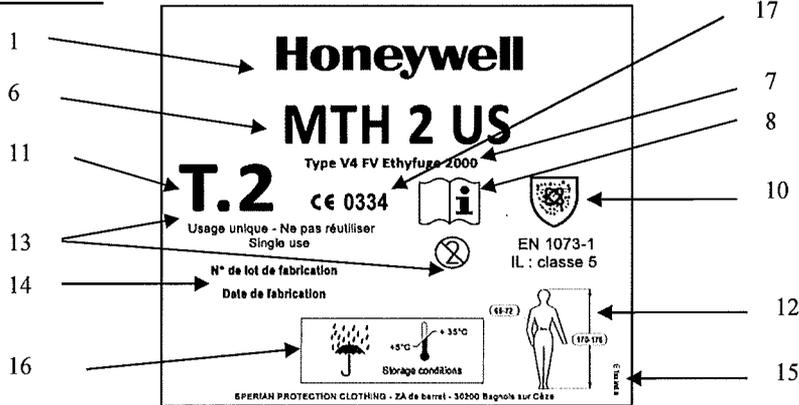
MATERIALS PERFORMANCE

Type of test		Reference standard	Level of Performance
ETHYFUGE 2000 24/100	Bending strength Abrasion resistance Puncture resistance Resistance to tear propagation Flammability test	EN 1073-1	Not applicable: single-use garment Class 6 (> 2000 cycles NF EN 530) Class 1 (>10 N NF EN 863) Class 4 (> 40 N NF EN ISO 9073-4) Requirements met (EN 1146)
SKY 50/100	Bending strength Abrasion resistance Puncture resistance Resistance to tear propagation Flammability test	EN 1073-1	Not applicable: single-use garment Class 6 (> 2000 cycles NF EN 530) Class 1 (>10 N NF EN 863) Class 5 (> 80 N NF EN ISO 9073-4) Requirements met (EN 1146)
Crystal PE- EVA 20/100	Bending strength Abrasion resistance Puncture resistance Resistance to tear propagation Flammability test	EN 1073-1	Not applicable: single-use garment Class 6 (> 2000 cycles NF EN 530) Class 1 (>10 N NF EN 863) Class 4 (> 40 N NF EN ISO 9073-4) Requirements met (EN 1146)
Results for whole suit		EN 1073-1	Class 5 garment Indicates the nominal protection factor of the (Class 5:average protection factor equal to 50 000) Weld strength: Class 4 (> 125 N – NF EN ISO 13935-2)

MTH2 US
INSTRUCTIONS FOR USE
 EPI CC8414 XYT



MARKING



POSITIONING:

The marking on the glove is situated on the back of the hand, the labels are on the exhaust valves situated on the helmet and on the back of the garment.

- 1: Manufacturer's name.
- 2: Identification of the model of glove.
- 3: CE marking. The glove meets the standards relating to type 11b production monitoring. "0334 or 0197" is the identification number of the body in charge of controlling production.
- 4:
- 5:

EN 374-3 Pictogram indicating that the glove provides protection against chemical risks. Results in tests according to EN 374-3 (1994)

	Deltasoft	G23N
Sulfuric acid 96%:	classe 2	classe 5
Sodium hydroxide 40%:	classe 6	classe 6
O-xylene	classe 0	N/A
Butan-1-ol:	classe 2	N/A
n-heptane	N/A	classe 1



EN 374-2 Pictogram indicating that the glove provides protection against micro-organic risks. Results in tests according to EN 374-2 (1993), air permeability test: passed.

NO/CC8414XY T

ISSUE: e

DATE: 03-14

PAGE 4/4

MTH2 US
INSTRUCTIONS FOR USE
EPI CC8414 XYT

Honeywell



EN 388 Pictogram indicating that the glove provides protection against mechanical risks. Results in tests according to EN 388 (1994):

	Deltasoft	G23N
Abrasion resistance	class 3	class 2
Cut resistance	class 0	class 1
Tear resistance	class 0	class 0
Puncture resistance	class 0	class 0



EN421 Pictogram indicating that the glove provides protection against particulate radioactive contamination, in accordance with standard EN 421(1994).

5: Size of the glove.

6: Identification of the model of garment.

7: Main material in the garment.

8: The "open book" pictogram means that you should consult the instructions for use.

10: EN 1073-1: Requirements and test methods for ventilated protective clothing against particulate radioactive contamination. IL: Class 5. Indicates the nominal protection factor of the garment (Class 5: Average protection factor equal to 50 000 inside the garment)



Pictogram indicating that the garment provides protection against particulate radioactive contamination, in accordance with standard EN 1073-1.

11: Size of the garment.

12: Gives the dimensions of the different sizes.

13: Single use clothing

14: Space for the date of manufacture, batch number and use-by date

15: Revision number of the label.

16: Storage conditions

17: CE marking. The garment meets the standards relating to type 11b production monitoring. "0334" is the identification number of the body in charge of controlling production.

CE type Certificate approval issued by	Production monitoring
<p>IRSN/CTHEN CEA Saclay Batiment 389 91 192 Gif sur Yvette Tel:01-69-08-69-95 Identification no. as a notified body: 0073</p>	<p>ASQUAL Quality Association of the textile-clothing industry Identification no. as a notified body: 0334</p>

Enclosure 1, Attachment 3

MURUROA V4F1 AND MTH2-V4 INSTRUCTIONS FOR USE
(1 page)

NO/841442T

INDICE : e

Mururoa V4F1 and MTH2-V4

DATE : 12/00

PAGE : 1/1

INSTRUCTIONS FOR USE

Preliminary remarks : This clothing is to be used under the authority of the person responsible for issuing the equipment for its dedicated use :

- the clothing offers the necessary protection for its intended use.
- Breathable air *network, hoses with connectors compatible with that of the clothing, are actually available on site and that they are capable of supplying a sufficient quantity of air :

minimum flow rate	600 liters/min. +/- 10% at 6 Bars ; (20 cfm at 85 psig)
maximum flow rate	1200 liters/min. +/- 10% at 6 Bars ; (40cfm at 85 psig)

DRESSING

- The wearer, with a helper, visually inspects the condition of the garment and its components, then removes the shipping protection (cardboard on the visor and inside the garment, and removable "plastic protection" from the visor).
- He enters through the rear opening of the garment and insures that his legs are in the garment.
- Connects to the breathable air network by passing the supply line through the loop at the rear of the garment, at the same height as the supply valve.
- Connects a communication device, if applicable, through the safety loop and communication loop and finishes dressing.
- The helper zips up the dual zipper system and applies a large strip of adhesive tape to the upper extremity of the second zipper at the top to ensure air tightness. He then, ties the over boot laces around the ankles.
- The wearer can control the air supply by turning the adjustment knob. The correct functioning of the supply flow valve and the over pressure valves can be verified by crouching down rapidly a few times.
- He then is free to enter the work zone.

UNDRESSING

- Undressing may be done in the following manner. While the garment is still being supplied with air, the helper pulls on the orange undressing strip, which runs from one wrist to the other over the hood. Once the undressing strip is removed, the helper can split the suit shell by pulling on the hooded area and separating the suit into two identical pieces. The helper rolls up the front and rear parts in a way that traps the contamination and avoids all contact with the wearer of the garment. (Please consult our video for detailed undressing techniques).

IMPORTANT

- Leave the work zone immediately if the clothing deflates during the work phase evolution. If the helmet fogs, or if the person has a feeling of excessive warmth.
- Remember that the clothing remains pressurised for a few minutes in case of an air supply failure

STORAGE

In the original packaging; out of the light; between + 5°C and + 45°C. (41°F and 113°F)

USAGE

The air supply should be between + 15°C and + 45°C. (59°F and 113°F)

EXPIRY DATE

The clothing should be used by the third year from the date of manufacture.

CLEANING

Not necessary for this type of equipment which is for a single use only.

EMERGENCY FEATURES

- Air outside of the garment can be breathed by removing the safety strip at the front of the helmet/hood.
- The undressing strip, removed by the wearer, enables the wearer to self escape in less than 5 seconds.

* Breathable air : see the EN 132 standard.

Enclosure 1, Attachment 4

EUROPEAN STANDARD EN 1073-1; 1998
Protective clothing against radioactive contamination
(12 pages)

ICS 13.280; 13.340.10

Descriptors: Personal protective equipment, clothing, radioactive contamination.

English version

Protective clothing against radioactive contamination

Part 1: Requirements and test methods for ventilated protective clothing against particulate radioactive contamination

Vêtements de protection contre la contamination radioactive - Partie 1: Exigences et méthodes d'essai des vêtements contre la contamination radioactive sous forme de particules

Schutzkleidung gegen radioaktive Kontamination - Teil 1: Anforderungen und Prüfverfahren für belüftete Schutzkleidung gegen radioaktive Kontamination durch feste Partikel

This European Standard was approved by CEN on 1997-11-23. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

European Committee for Standardization

Comite Europeen de Normalisation

Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Contents

Foreword	2
1 Scope	3
2 Normative references	3
3 Definitions	3
4 Requirements.....	4
5 Test methods	8
6 Marking	10
7 Information supplied by the manufacturer.....	10
Annex A (normative)	
Activity sequence for the testing of the protection factor	11
Annex ZA (informative)	
Clauses of this European Standard addressing essential requirements or other provisions of EU Directives	12

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 162 "Protective clothing including hand and arm protection and lifejackets", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 1998, and conflicting national standards shall be withdrawn at the latest by July 1998.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

The annex A is normative and contains the activity sequence for the testing of the protection factor.

Further parts of this standard will deal with requirements and test methods for unventilated protective clothing and protection against liquids and gases.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the requirements and test methods for ventilated protective clothing protecting the wearer against particulate radioactive contamination.

This European Standard does not apply for the protection against ionizing radiation and the protection of patients against contamination with radioactive substances by diagnostical and/or therapeutical measures.

2 Normative references

This European 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 European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 146

Respiratory protective devices - Powered filtering devices incorporating helmets or hoods - Requirements, testing, marking

EN 270

Respiratory protective devices - Compressed air line breathing apparatus incorporating a hood - Requirements, testing, marking

EN 340

Protective clothing - General requirements

EN 530

Abrasion resistance of protective clothing material - Test methods

EN 863

Protective clothing - Mechanical properties - Test method: Puncture resistance

prEN 943-1

Protective clothing for use against liquid and gaseous chemicals, including liquid aerosols and solid particles - Performance requirements for ventilated and non-ventilated "gas-light" (Type 1) and "non-gas-light" (Type 2) protective clothing

EN 1146

Respiratory protective devices for self-rescue - Self-contained open-circuit compressed air breathing apparatus incorporating a hood (compressed air escape apparatus with hood) - Requirements, testing, marking

EN 25978

Rubber- or plastics- coated fabrics - Determination of blocking resistance (ISO 5978 : 1990)

EN 29073-4

Textiles - Test methods for nonwovens - Part 4: Determination of tear resistance

ISO 5082 : 1982

Textiles - woven fabrics - Determination of breaking strength - Grab method

ISO 7854

Rubber- or plastics-coated fabrics - Determination of resistance to damage by flexing

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 Protective clothing against radioactive contamination

Protective clothing intended to provide protection to the skin and if required to the respiratory tract against radioactive contamination.

3.2 Ventilated protective clothing (against particulate radioactive contamination)

Protective clothing which is supplied with breathable air ensuring internal ventilation and overpressure. This protective clothing provides protection against particulate radioactive contamination for the respiratory tract and the whole body.

3.3 Nominal protection factor (100: inward leakage (IL))

The ratio of the concentration of contaminant in the ambient atmosphere to the concentration of the contaminant in the suit. The concentrations taken into account are the average concentrations recorded during a standardized test.

3.4 Particulate radioactive contamination

Presence of radioactive substances in or on a material or in a place where they are undesirable or could be harmful.

3.5 Seam

A permanent fastening between two or more pieces of protective clothing material.

3.6 Assemblage

A permanent fastening between two or more different garments, or between protective clothing and accessories, obtained, for example by sewing, welding, vulcanising, gluing.

3.7 Join

A non-permanent fastening between two different garments, or between protective clothing and accessories.

3.8 Closure

A device, for example, zipper, "touch and close" fastener, etc., to close openings for donning or removing the protective clothing.

4 Requirements

4.1 Design

4.1.1 Protective clothing against radioactive contamination shall comply with the general requirements specified in EN 340.

4.1.2 The design of the protective clothing shall be such that the protective clothing is straightforward to put on and take off, and to minimize the risk of contamination. Testing according to "practical performance test" (see 5.2).

4.1.3 The clothing can be designed for single or multiple use.

4.1.4 The ventilated protective clothing (see 3.2) may consist of one or several parts. The clothing may be fitted with a respiratory protective device to enable the wearer to breath in case of failure of the primary air supply.

4.2 Materials

The materials used for protective clothing against particulate radioactive contamination shall meet the requirements according to table 1 after the pretreatment in accordance with 5.1.1 and after the conditioning according to 5.1.2.

Table 1: Requirements for the materials

Requirement	Classification	Test according to	Applicable for	
			reusable materials	single use materials
Abrasion resistance	6 > 2000 Cycles 5 > 1 500 Cycles 4 > 1000 Cycles 3 > 500 Cycles 2 > 100 Cycles 1 > 10 Cycles	EN 530, Method 2 00 abrasive paper according to prEN 943-1 and 9 kPa downward pressure	yes	yes
Flex cracking resistance	6 > 100000 Cycles 5 > 40000 Cycles 4 > 1 5000 Cycles 3 > 5000 Cycles 2 > 2500 Cycles 1 > 1000 Cycles	ISO 7854 Method B	yes	no
Puncture resistance	3 > 100 N 2 > 50 N 1 > 10 N	EN 863	yes	yes
Resistance to blocking (see note 1)	2 no blocking 1 blocking	EN 25978	yes	no
Tear resistance	6 > 150 N 5 > 80 N 4 > 40 N 3 > 20 N 2 > 10 N 1 > 2 N	EN 29073-4	yes	yes
Flammability of materials, visor and ancillary parts	Shall not continue to bum	EN 1146 (single burner test)	yes	yes
<p>NOTE 1: Uncoated materials shall not be tested against resistance to blocking. The test report shall be marked "Not tested against....."</p> <p>NOTE 2: If protection against hazardous chemicals is required then testing has to be carried out according to the relevant chemical standards.</p>				

4.3 Nominal protection factor (100:IL)

Ventilated protective clothing shall be classified according to table 2. Testing according to 5.4 with the necessary activity sequence according to annex A, at the minimum design air flow rate.

Table 2: Leakage

Class	Maximum value of mean inward leakage into the hood during exercise of		Nominal protection factor
	One activity %	All activities %	
5	0,004	0,002	50000
4	0,01	0,005	20000
3	0,02	0,01	10000
2	0,04	0,02	5000
1	0,10	0,05	2000

NOTE 1: Maximum value is calculated as the average performance over all test sequences. NOTE 2: Nominal protection factor is the reciprocal of the IL obtained during all activities (100 : IL)

4.4 Seam strength, Joins and Assemblages

4.4.1 Seam strength

A sample of each type of straight seam construction shall be tested in accordance with A.2 of ISO 5082 : 1982 (Constant-rate-of-traverse). Three specimens of each type of seam shall be tested and the mean of each set of three samples calculated. The garment seam performance shall be classified according to the levels of performance given in table 3 using the lowest result, i.e. the weakest seam type.

NOTE: The test method described in ISO 5082 : 1982 is only applicable to straight seams joining two pieces of material.

Table 3: Classification of seam strength

Class	Seam strength N
5	>300
4	>125
3	> 75
2	> 50
1	> 30

4.4.2 Joins and assemblages

The joins and assemblages between the suit and detachable parts e.g. between gloves and sleeves, boots and trouser legs, shall be tested in accordance with 5.5 and withstand a pull of 100 N.

4.5 Visor

The visor shall comply with table 4. Where antifogging compounds are used or specified by the manufacturer they shall not have an adverse affect on the health of the wearer, or on the clothing.

Table 4: Requirements for the visor

Properties of the visor	Requirement	Testing
Distortion of vision	the loss of sight shall not exceed two scales on the optometrical chart	to read letters on a chart at a distance of 5 m during the practical performance test according to 5.2
Mechanical strength	shall not be visibly damaged in such a way as to be likely to affect the performance of the suit system	according to EN 146

4.6 Air supply system

Couplings and connections shall comply with EN 270.

The connection between the compressed air supply tube and the suit, including attachments, threaded parts, belt or other parts, or means of stabilising the suit to the body shall withstand a 250 N pull when tested according to 5.5 .

NOTE: The test should be performed before the inward leakage test.

4.7 Breathing hose

The breathing hose shall comply with the requirements of EN 270.

4.8 Air flow rate

Two suit systems shall be tested, one of which has to be preconditioned as specified in 5.1.4. When tested the air flow rate into the suit system shall not be less than the manufacturers' minimum design flow rate. The maximum flow rate shall not exceed the maximum as stated by the manufacturer. Test in accordance with 5.3

The flow rate and the distribution of the air into the suit system shall not cause distress to the wearer by local cooling. The heat stress has to be considered. Test in accordance with 5.2.

4.9 Air flow rate warning device

If an audible warning device is incorporated in the suit system it shall comply to EN 270, except for the sound pressure level which may be in the range 85dB(A) to 90 dB(A) when measured at the ears of the wearer. The frequency range of the warning device shall be between 2 000 Hz to 4 000 Hz.

Five warning devices shall be tested, one of which has to be preconditioned as specified in 5.1.4. Testing according to EN 270.

4.10 Supply valve

If a variable continuous flow valve is fitted, it shall comply to EN 270. The valve shall permit to adjust the air flow rate in the range from the minimum to the maximum as specified in 4.8. It shall not be possible to close the valve to restrict the air flow below the minimum design air flow rate.

4.11 Exhaust devices

The suit shall be provided with exhaust devices which shall continue to work correctly after the testing of the pressure in the suit (see 4.1 2), during the practical performance test (see 5.2) and during the determination of the protection factor (see 5.4). Testing in accordance with 5.6.

4.12 Pressure in the suit

The overpressure shall not exceed 1 000 Pa mean and 2 000 Pa peak. A positive pressure shall be maintained. Testing with the maximum air flow rate during the activity sequence as specified in Annex A.

4.13 Carbon dioxide content of the inhalation air

The carbon dioxide content of the inhalation air, determined at the minimum air flow rate, shall not exceed an average of 1,0 % (by volume), tested according to EN 270. Two suits shall be tested, one of which has to be pretreated as specified in 5.1.1.

4.14 Noise associated with the air supply to the suit

The noise measured in the suit at the ears shall not exceed 80 dB(A) at the maximum manufacturers' design flow rate. Testing in accordance with EN 270. Two suits shall be tested, one of which has to be pretreated as specified in 5.1.1.

5 Test methods

5.1 Test preparations

5.1.1 Pretreatment

When the clothing is intended to be reusable the requirements for the materials or the complete clothing shall be proved after five cycles of cleaning and disinfection according to the manufacturer's instructions for use before testing.

5.1.2 Conditioning

All material samples shall be conditioned by storage at (20 ± 2) °C and (65 ± 5) % relative humidity for at least 24 h. Start each of the tests as specified in 5.1.3 and 5.1.4, within 5 min after removal from the conditioning atmosphere.

5.1.3 Visual Inspection

A visual inspection shall be carried out by the test house prior to the laboratory or the practical performance test. This may entail a certain amount of dismantling of the components of the protective clothing in accordance with the manufacturer's information for maintenance.

5.1.4 Preconditioning for the practical performance test

If the manufacturer does not state the preconditioning atmosphere for the practical performance test, the complete clothing shall be exposed:

- a) for 4 h to a temperature of (-30 ± 3) °C and allowed to return to ambient conditions, followed by
- b) for 4 h to an atmosphere of (60 ± 3) °C at 95 % relative humidity. It shall then be allowed to return to ambient temperature.

5.2 Practical performance test

5.2.1 General

The tests shall be carried out by two test persons at (20 ± 5) °C and a relative humidity of less than 60 %. The test temperature and humidity shall be recorded. The background noise shall not be greater than 75 dB(A).

The test persons shall be selected who are familiar with using such or similar protective clothing. The persons will be drawn from those people certified as fit to do so by the medical officer. The necessity of a medical examination before or supervision during the tests shall be at the testing officers discretion.

Prior to the test there shall be an examination that the suit is in working-condition and that it can be used without danger. If more than one size of clothing is manufactured the subjects are asked to select the appropriate size. Ensure that the air supply is within the specified parameters. Two suits shall be tested, each being tested on one test person.

After fitting the suit each test person is asked "Does the suit fit?". If the answer is "Yes", continue the test. If the answer is "No", replace the test person or the suit.

5.2.2 Procedure

During the test the following activities shall be done in simulation of the practical use of the suit:

- a) the test shall be completed within a total working time of 20 min
- b) walking on the level with regular rate of 5 km/h for 5 min

c) filling a small basket (see figure 1, approximate volume 8 l) with 12 mm chippings (e.g. limestone chippings) or other suitable material from a hopper which stands 1,5 m high and has an opening at the bottom to allow the contents to be shovelled out and a further opening at the top where the chippings may be returned. The person stoops or kneels as he wishes and fills the basket with chippings. He then lifts the basket and empties the contents back into the hopper. This shall be repeated 15 to 20 times in 10 min .

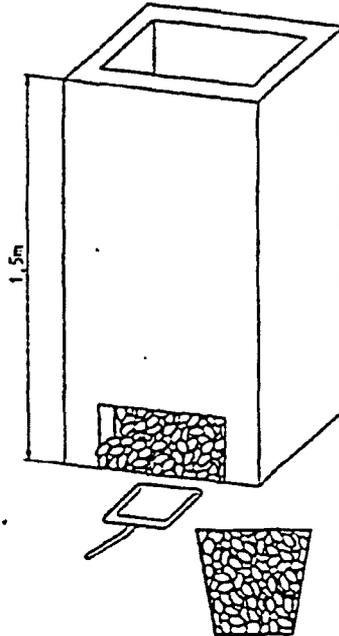


Figure 1: Hopper and basket

5.2.3 Information to be recorded

During the practical performance test the clothing shall be subjectively assessed by the wearer and the following shall be recorded:

- a) harness comfort (see 5.6);
- b) security of fastening and couplings;
- c) accessibility of controls and pressure gauge (if fitted);
- d) clarity and field of vision from the facepiece and/or visor;
- e) clothing comfort;
- f) ease of speech transmission;
- g) any other comments volunteered by the wearer.

5.3 Measurement of minimum and maximum air flow rate

Connect the ends of the distribution system collectively to a suitable measuring device. Record the maximum air flow delivered at the manufacturers' specified air supply, if a control valve is fitted, record the maximum delivered air flow and the minimum delivered air flow.

The value of minimum and maximum air flow rate shall be determined under the condition of exercise 6 of Annex A (person standing still).

5.4 Determination of the protection factor

The protection factor shall be determined in accordance with prEN 943-1. Sodium chloride test method shall be used. Activity sequences for testing are given in Annex A of this standard.

The determination has to be done at the minimum design air flow rate (see 4.8).

On two test subjects four new suits shall be tested. Two suits per test subject.

For each individual test calculate the arithmetic mean over the time period. Calculate the percentage inward leakage (IL) as follows: -

$$IL = \frac{C_2 \times 100\%}{C_1}$$

where:

- C_1 is the challenge concentration in the test chamber,
 C_2 is the mean concentration in the breathing zone for each exercise. For classification according to table 2, the average value for the four suits shall be taken.

5.5 Join and assemblage pull test

Assemble the means of attachment according to the manufacturers' information. If the assembled item (e.g. glove or boot) is itself not strong enough to apply the required pull substitute an item that is. Securely attach one part to a fixed clamp. Apply the required force longitudinally. Record at which force it parts or state that at the required force it was still complete.

5.6 Exhaust device pull test

Mount the suit on to a dummy torso which can be adjusted so that the load can be applied axially to the exhaust device. A system of retaining straps or bands is fitted over the suit around the exhaust device so that the load is applied as directly as possible to the fitting of the exhaust device in the suit.

Exert a force of $(50 \pm 2,5)$ N to the exhaust device and hold for 10 s. Repeat 10 times.

Examine the exhaust device for signs of damage or failure.

6 Marking

The marking shall comply with the specifications of EN 340 with the pictogram as given in figure 2.

The level of performance of the inward leakage (IL) shall be marked as:

IL : class x (x = class number according to table 2).

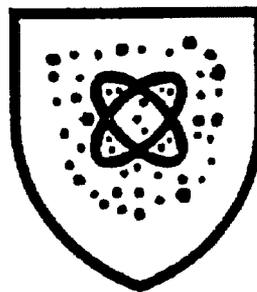


Figure 2: Pictogram

7 Information supplied by the manufacturer

The information supplied shall be at least in the official language(s) of the country or region of application. The manufacturers' information shall comply with the specifications of EN 340. The following information shall be supplied additionally:

- instructions for donning, using, fitting, removing and storing;
- application, limitations of use (classification, temperature range etc.);
- tests to be carried out by the wearer before use (if required);
- maintenance and cleaning and decontamination by e.g. showering (if required).

The manufacturers shall specify the required supply pressure and flow range necessary to maintain protection.

Warnings (if appropriate) shall be given against problems likely to be encountered, as e.g. heat stress, depending on the air flow rate, work load, environmental atmosphere etc.

Annex A (normative)

Activity sequence for the testing of the protection factor

Table A.1: Activity sequence for the testing of the protection factor

No	Activity sequence for the testing	Time of activities min
1	dress person in the suit	
2	don boots, gloves etc. as required according to the manufacturers instructions	-
3	person to enter test chamber, connect tubing to the sample point - no test agent	3
4	establish background reading at sample point with person standing still - no test agent	3
5	start test agent and allow to stabilize	3
6	record leakage and pressure at sample point with the person standing still	3
7	start treadmill	-
8	walk	3
9	record leakage and pressure at sample point with the person walking at about 5 km/h	-
10	stop treadmill	-
11	record leakage and pressure at sample point, person moving arms up and down above head height and looking upward, e.g. lifting object (half brick) from desk to shelf level	3
12	record leakage and pressure at sample point, person doing continuous squats	3
13	stop test agent and allow to disperse with person in chamber	3
14	disconnect sample tubes and remove person from test chamber and undress subject	-
<p>NOTE: The total trial may vary, all times are approximate and are to stable conditions. When doing squats, a slow deliberate action is required, say continuously during about 3 s. Analyse results over final 2 min of each exercise period to avoid carry over of result from one exercise to the other. Record challenge chemical continuously using a separate detector (if possible). Record the pressure inside the suit over the whole time.</p>		

Annex ZA (informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive 89/686/EEC.

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

The following clauses of this standard are likely to support requirements of Directive 89/686/EEC, Annex II:

EU-Directive 89/686/EEC, Annex II	clauses of this standard
1.1 Design principles	4.1, 4.2, 4.3, 5.5.1 to 5.6
1.2 Innocuousness of PPE	4.1, 4.5, 4.14, 5.2
1.3 Comfort and efficiency	4.1, 4.3, 5.2, 5.4, annex A
1.4 Information supplied by the manufacturer	clause 7
2.2 PPE 'enclosing' the parts of the body to be protected	4.1.4, 4.5, 4.8, 5.2
2.3. PPE for the face, eyes and respiratory tracts	4.5, 5.2
2.1 2 PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	clause 6
3.9.2.1 Protection against external radioactive contamination	clause 4, 5, 6, 7

Compliance with the clauses of this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

Enclosure 1, Attachment 5

Test Results carried out on full encapsulated suits MTH2 and V4F1
(5 pages)

Test Results carried out on the full encapsulated suit
MTH2 ref. 841442T
For the EC Type Examination Certificate
N°0073/197/162/01/96/0001

You will find below the detailed results taken in account for being able to state on the conformity of this equipment in accordance with the Essential Requirements of the European Standard pr EN 1073-1 (revision Nov 1995). Other results those are not pointed out in this report are already written in the EC TYPE Examination certificate (dated December 10th 1997)

1 – Air Flow entering the suit when connected to a 6 bar feeding pressure (paragraph 5.2.8. of the EC Type Examination Certificate)

Suit number	Entrance valve position	Air flow feeding pressure Bar / psig	air flow (m ³ /h / l/mn/ cfm)
1	Fully open	5,5 / 77	66/1100 / 38
1	Closed	6,0 / 87	30 / 500 / 17
2	Fully open	5,5 / 77	65 / 1080 / 37,8
2	closed	6,0 / 87	31 / 516 / 18

2 – Carbon dioxide content of the Inhalation air when measured at the minimum air flow (paragraph 5.2.13. of the EC Examination Type)

Suit number	Feeding pressure Bar / psig	Air flow M ³ /h / cfm	CO ₂ contents(%)
1	6 / 87	30 / 17	0,85
2	6 / 87	31 / 18	0,80

3 - Noise level associated with the air supply to the suit when tested at the maximum air flow rate (paragraph 5.2.14 of the EC Examination Type)

Suit number	Feeding pressure Bar / psig	Air flow M ³ /h; cfm	Noise level (dB)
1	5,5 / 77	66 / 38	76,8
2	5,5 / 77	65 / 37,8	78,5

**4 – Inward leakage average- Fit Factor measured at the minimal air flow of 450l/mn
(paragraph 2.3.3. of the CE Examination Type)**

Sult n°	1	2
Exercise		
Air flow m ³ /h/ l/mn / cfm	30 / 500 / 17	31 / 516 / 18
Standing still	130 000	130 000
Walking (5 km/h)	59 500	50 000
Moving arms up and down above head	125 000	125 000
Continuous squats	65 000	81 250
Bending forward	100 000	92 850
Person twisting at walst	115 000	130 000
Standing still	130 000	130 000
Average	103 500	103 440

5 - Pressure In the sult when measured at the maximum air flow when sult connected under 5,5 bar (77psig) feeding pressure (paragraph 4.12.of the EC Examination Type)

Sult n°	1			2		
Exercise	P ave/ P mln/ Pmax daPa.			P ave; P mln, P Max. daPa		
Standing still	40	-	-	38	-	-
Walking (5 km/h)	40	23	74	100	61	128
Moving arms up and down above head	40	17	62	46	18	72
Continuous squats	42	4	86	56	3	110
Bending forward	52	3	104	74	0	162
Person twisting at walst	38	18	58	46	20	110
Person crawling	37	-	-	40	-	-

For Information: Both overboots are broken at the end of the test

6 Over pressure and fit factor when person crawling on the floor as indicated in paragraph 4.12 and 5.2.2 of the pr EN 1073-1 dated 1995

Suit number	Crawling exercise			Fit Factor
	Average DP daPa	Minimum DP daPa	Maximum DP daPa	
1	52	12	90	110 000
2	65	3	102	105 000

7 Screen:(paragraph 5.2.5)

- Distortion of the vision: none
- Mechanical resistance : no incidence on the screen.

Test Results carried out on the full encapsulated suit
MURUROA V4F1 ref. 8481X1T
For the EC Type Examination Certificate
N°0073/197/162/12/97/0028

You will find below the detailed results taken in account for being able to statue on the conformity of this equipment in accordance with the Essential Requirements of the European Standard pr EN 1073-1 . Other results those are non pointed out in this report are already written in the EC TYPE Examination certificate (dated December 10th 1997)

1 – Air Flow entering the suit when connected to a 6 bar feeding pressure (paragraph 2.3.2. of the EC Type Examination Certificate)

Suit number	Minimum air flow(l/mn)	Maximum air flow (l/mn)
1	508	1050
2	516	1070
3	508	1050

2 – Carbon dioxide content of the Inhalation air when measured at the minimum air flow of 450 l/mn (paragraph 2.3.12. of the EC Examination Type)

Suit number	Test N°1 CO2 contents(%)	Test N°2 CO2 contents(%)
1	0,86	0,93
2	0,68	0,68
3	0,75	0,82

3 - Noise level associated with the air supply to the suit when tested at the maximum air flow rate at 6 bar (paragraph 2.3.13 of the EC Examination Type)

Suit number	Maximum air flow(l/mn)	Noise level (dB)
1	1050	77,2
2	1070	75,1
3	1050	77,6

**4 – Inward leakage average- Fit Factor measured at the minimal air flow of 450l/mn
(paragraph 2.3.3. of the CE Examination Type)**

Suit n°	1	2	3
Exercise			
Standing still	> 120 000	> 120 000	> 120 000
Walking (5 km/h)	76 700	90 900	66 000
Moving arms up and down above head	113 800	> 120 000	113 800
Continuous squats	30 000	41 700	50 000
Bending forward	110 000	103 400	91 700
Person twisting at waist	> 120 000	> 120 000	> 120 000
Person crawling	55 000	> 120 000	31 400

**5 - Pressure in the suit when measured at the maximum air flow when suit connected
under 6 bar feeding pressure (paragraph 2.3.11.of the EC Examination Type)**

Suit n°	1		2		3	
Exercise	P min(Pa)	P Max.	P min(Pa)	P Max.	P min(Pa)	P Max.
Standing still	275	280	295	305	275	280
Walking (5 km/h)	200	800	300	900	600	900
Moving arms up and down above head	150	400	160	420	250	800
Continuous squats	30	900	30	1050	70	1700
Bending forward	80	1550	60	1900	100	1900
Person twisting at waist	140	500	160	420	160	650
Person crawling	160	900	150	850	250	1050

6 Air supply system (paragraph 4- 6 of the pr EN 1073-1)

In accordance with the paragraph 4.6; the connexion between the compressed air supply system and the suit has been tested for a steady pull of 250 N. The three suits have been tested successfully. However, it appears a deformation of the fabric, near the regulation air flow device. A reinforced area could certainly avoid this deformation.

Enclosure 1, Attachment 6

MURUROA MTH2 and V4F1
Certificate No. 0073/197/162/01/96/0001
Certificate No. 0073/197/162/12/97/0028
(21 pages)

INSTITUTE FOR NUCLEAR PROTECTION AND SECURITY

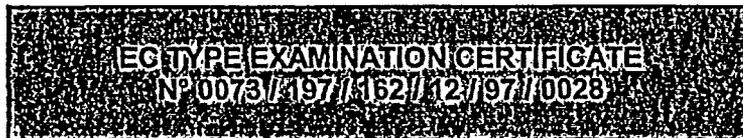
Technical Center for Nuclear Equipment Certification

In accordance with the directive 89/686/EEC dated December 21th 1989 comparing the laws of the States Members Legislations relative to the Personal Protective Equipments, and the decrees n° 92-765, 766 and 768 dated July 29th 1992 transposing the directive into French Laws.

The organisation herebelow mentioned (IPSN / CTHEN) whose references are as follows:

- Address : B.P. n° 6 – 92265 Fontenay-aux-Roses Cedex (France).
- Empowered by Order of the Ministries of Employment and Agriculture dated December 24th 1996.
- Identified under the n° 0073 (published in the EEC Official Publication dated July 23th 1994).

Assigns the :



To the following Personal Protective Equipment model:

- Designation: Ventilated Protective Suit against Radioactive Contamination pressurised for a single use only.
- Commercial reference : *MURUROA V4 F1 – ref. 848 1X1T.*
- Manufacturer : DELTA PROTECTION / RED I – 69 210 Saint-Germain-Sur-L'Abresle.
- Certificate applicant : DELTA PROTECTION – Z.A. De Berret-30200 Bagnols-Sur-Ceze.
- Essential Requirements Reference : EN 143, pr EN 1073-1 (July 1997), pr EN 943-1 (October 1997), EN 270, EN 1146 (April 1997).

Date : December 10th 1997
J. CORBIERE/ Chief of CTHEN

Nota : According to article R 223-62 of the "Working Law", the empowered organisation should be informed of any modification made to the material subject of this EEC type examination certificate, as well as of any modification made to the contents of this technical file on which the delivered type certificate was based on (address, manufacturer name, quality insurance certificate extract, ...)

This certificate contains 12 pages n° 1/12 to 12/12

1. DESCRIPTION

It is a Ventilated Protective Suit against Radioactive Contamination ventilated type – pressurised for a single use only, its name is:

MURUROA V4 F1 – ref. DELTA: 8481X1T

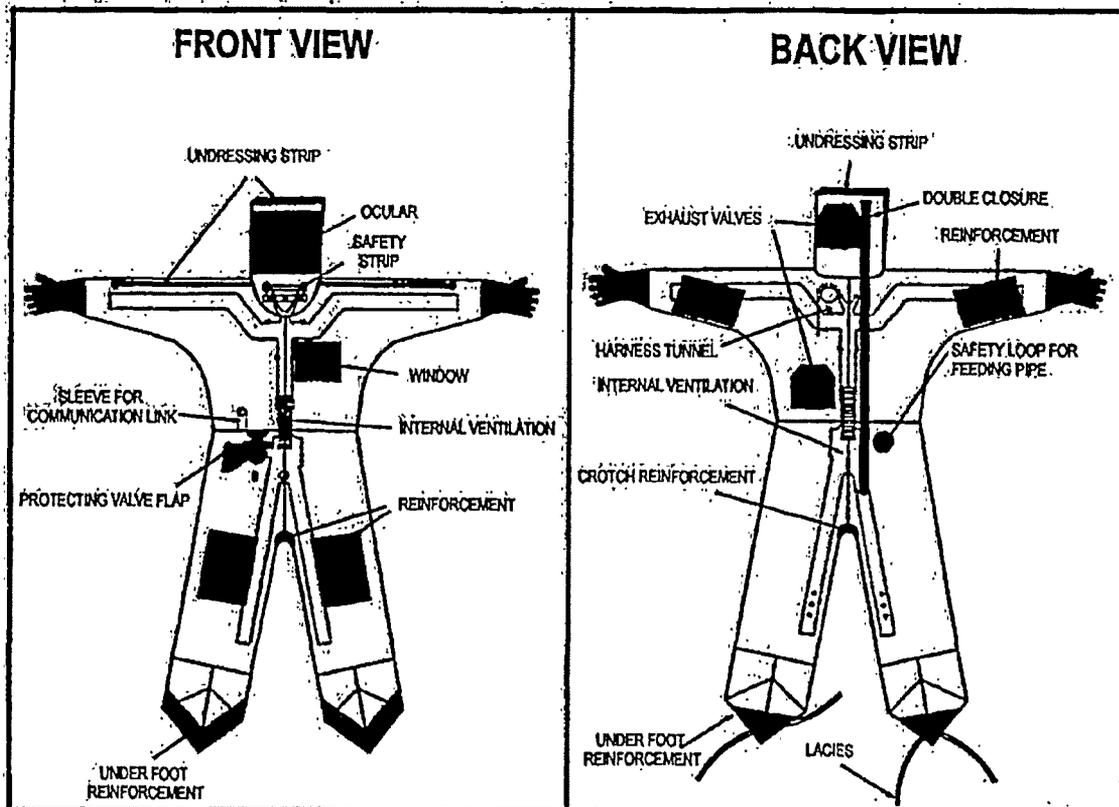
The T values are defined according to the size of the suit.

The X values are defined according to the pipe butt (Staubli or CEJN) allowing to connect the suit to the breathable compressed air supply system.

The attached list – annex 2 – gives all the references defined by this ECEC.

The suit includes:

- A air tight suit with an incorporated hood
- A suit fastening system located on the back of the suit.
- A breathable air flow supply system.
- A air exhaust device.
- A safety strip for emergency opening located on the hood.



1.1. MAIN MATERIALS

- **Skin of the suit :**
PVC 9013 – Formule 1010, 20/100 mm thickness.
- **Hood:**
PVC Cristal – 30/100 mm thickness.
- **Visor:**
PVC (astraglass) 50/100 mm thickness.
- **Gloves:**
PVC Sempersoft type – Size 9-9 1/2 for all the sizes of the suits.
- **Boots :**
PVC 9013 – formulation 1010 – 20/100 mm thickness , reinforced PMI.

1.2. COMPONENTS

- **Internal Ventilation System :**
It includes a total ventilation V4 fitted with a valve with butt.
- **Exhaust:**
It includes two exhaust valves located on the head and on the back of the suit.
- **Fastening device:**
It includes a double zip fastener situated vertically on the back of the suit.
- **Other components:**
The suit includes:
 - A safety strip for an emergency opening located on the hood.
 - A acoustic link tunnel.
 - A loop for breathable air supply pipe.
 - Several internal strengthening pieces for elbows, knees and Imegs.
 - A transparent window to visualise the dosimeter.

2. CONFORMITY TO REQUIREMENTS

2.1. REQUIREMENTS FOR THE MATERIALS (except accessories: Gloves, slippers...) (See paragraph 4.2. of the Norm EN 1073-1)

2.1.1. Abrasion Resistance

Test according to the Norm EN 530 – method 2 (abrasive paper 00). The classification is carried out according to the following diagram:

Class	Number of cycles
6	> 2 000 cycles
5	> 1500 cycles
4	> 1 000 cycles
3	> 500 cycles
2	> 100 cycles
1	> 10 cycles

Results: Class 6 for PVC 9013 – formule 1010 – 20/100 mm thickness.
Class 6 for Cristal PVC 30/100 mm thickness.

2.1.2. Flexcracking Resistance

Test according to the Norm ISO 7854 – method B. The classification is carried out according to the following diagram :

Class	Number of cycles
6	> 100 000 cycles
5	> 40 000 cycles
4	> 15 000 cycles
3	> 5 000 cycles
2	> 2 500 cycles
1	> 1 000 cycles

This test is not applicable to suits for one single use only.

2.1.3. Puncture Resistance

Test according to the Norm EN 863. The classification is carried out according to the following diagram :

Class	Puncture resistance
3	> 100 N
2	> 50 N
1	> 10 N

Results: Class 2 for PVC Cristal – 30/100 mm thickness.
Class 1 for PVC 9013 – Formule 1010 -20/100 mm thickness.

2.1.4. Resistance in blocking

Test according to the Norm EN 25978. The classification is carried out according to the following diagram:

Class	Comments
2	non stick
1	sticky

This test is not applicable to non-coated materials.

2.1.5. Tear Resistance

Test according to the Norm EN 29073-4. The classification is according to the following diagram:

Class	Applied strength
6	> 150 N
5	> 80 N
4	> 40 N
3	> 20 N
2	> 10 N
1	> 2 N

Results :. Class 3 for PVC 9013 – Formule 1010 – 20/100 mm thickness.
Class 4 for Cristal PVC – 30/100 mm thickness.

2.1.6. Flammability of materials, visors, and ancillary parts

Tests are carried out according to the Norms EN 1146 – single burner test (paragraph 7.5.3).

Results: Test requirements entirely fulfilled.

2.2. REQUIREMENTS FOR THE ACCESSORIES

2.2.1. Gloves

The gloves set on the MURUROA V4 F1 ref. 8481X1T comply with the specific requirements for this type of Individual Protection Equipment, mainly to the Norm EN 421 "Protective Gloves against ionizer radiation and radioactive contamination".

They have Special EC Examination Certificates (ECEC) based on contracted tests.

2.2.2. Boots

The boots are part and parcel of the suit and are made of the same constituted material.

Consequently they comply with the requirements.

2.3. REQUIREMENTS FOR THE PROTECTIVE SUIT

2.3.1. Suit Design: Practical Performance Test

The Practical Performance Test is carried out according to the Norm 1073-1 (paragraph 5.2.). The conditioning is according to the manufacturer directions for use.

Parameters	Valuations
a) Hood comfort	Aimless
b) Security of fastenings & couplings	Good
c) Accessibility of adjusting devices	Good
d) Clarity of vision through visor	Good
e) Suit comfort	Good
f) Speaking transmission facility	Aimless
g) Other parameters	No particular notice

2.3.3. Air flow supply system (project Norm pr EN 1073-1 – paragraph 4.8.)

The manufacturer estimated air flow rates, for a relative air flow supply pressure of 6 bar, with a tolerance of +/- 10%, are:

- Minimal flow rate : 30,0 m³.h⁻¹ (500 l.min⁻¹)
- Maximum flow rate : 58,4 m³ h⁻¹ (973 l.min⁻¹)

Notice: In order to take into account the manufacturer indicated tolerances, this ECEC tests have been carried out under the following conditions:

$$D_{\min} = 27,0 \text{ m}^3 \cdot \text{h}^{-1} \text{ (450 l} \cdot \text{min}^{-1}\text{)}$$

$$D_{\max} = 64,2 \text{ m}^3 \cdot \text{h}^{-1} \text{ (1070 l} \cdot \text{min}^{-1}\text{)}$$

The test concerning the air flow rates of the suit has been realised according to the Norm EN 1073-1 (paragraph 5.3); For an air supply pressure of 6 bar, the air flow rate inside the suit must not be : :

- Below the minimum value estimated by the manufacturer (D_{\min}), when the valve is on the "stop" closed position.
- Superior to the maximum value estimated by the manufacturer (D_{\max}), when the valve is on the "on" opened position.

Results : Requirements entirely fulfilled.

2.3.3. Inward leakage average – Fit Factor (paragraph 4.3. of the project Norm pr EN 1073-1)

The ratio of the average inward leakage (or its contrary : Fit Factor) has been measured according to the draft Norm pr EN 943-1 (annex A). According to the Sodium Chloride Method.

Measurements have been performed under the following conditions:

- Quantity of tested suits : 3
- Air flow rate: Adjusted and maintained on minimum flow rate (D_{\min}) as indicated in paragraph 2.3.2.
- Trainings sequence: According to the Norm EN 1073-1 Annex A list.
- Suit preliminary conditioning: According to the advice of the user manual

The ratio of the average inward leakage (or Fit Factor) gives the following classification :

Ventilated pressurised Suit classification	Maximum accepted values, in %, of the ratio of the average Inward Leakage inside the hood, calculated on the whole lot of suits		FIT FACTOR
	For One activity	For all activities	
5	0.004	0.002	50 000
4	0.010	0.005	20 000
3	0.020	0.010	10 000
2	0.040	0.020	5 000
1	0.100	0.050	2 000

Results : The suit is classified 5.

2.3.4.1. Seams / Welds (paragraph 4.4.1 of the project Norm pr EN 1073-1)

A sample of each type of seam/weld is tested according to the Norm ISO 5082 (annex 2). The seam performance level is according to the following classification:

Class	Seam resistance (N)
5	> 300
4	> 125
3	> 75
2	> 50
1	> 30

The tests have been applied to the following welds:

- Assemblage hood/suit
- Assemblage hood/visor
- Assemblage hood level
- Assemblage belt level
- Assemblage of the strengthening pieces (elbow and knees)
- Assemblage at the level of the arms, back and sides

Results : All the welds are classified 4.

2.3.4.2. Joins and Assemblages (paragraph 4.4.2. – project Norm pr EN 1073-1)

This suit has no removable parts. This paragraph is aimless.

2.3.4.3. Visors (paragraph 4.5. – project Norm pr EN 1073-1)

The distortion of vision is measured, during the Practical Performance Test, by reading letters on an optometrical chart placed at a distance of 5 m; The loss of vision must not exceed 2 degrees.

The mechanical resistance test of the visor is according to the Norm EN 146 (paragraph 6.7.).

Results : Distortion of vision : Up to requirement.
Mechanical resistance : up to requirement.

2.3.6. Air supply system (paragraph 4.6. of the project Norm pr EN 1073-1)

The couplings and connections must comply with the requirements of the paragraphs 6.7.1., 6.7.2., and 6.11.7. of the Norm EN 270. The connection between the compressed air supply system and the suit must resist to a 250 N pull.

Result: requirement entirely fulfilled.

2.3.7. Breathing Hose (paragraph 4.7. of the project Norm pr EN 1073-1)

Tests are performed according to the Norm 270 (paragraph 7.2. and 7.6). The pipes must not block the movements nor cause a rupture of the air supply during the Practical Performance Test.

Result: No constraint.

2.3.8. Air flow rate warning device (paragraph 4.9. of the project Norm pr EN 1073-1)

If a warning is fitted, it must comply to the Norm EN 270 (paragraph 6.13.3). The test must be carried out according to the Norm EN 270 (paragraph 7.12). The sound level must be between 85 dB(A) and 90 dB(A).

Result: Aimless (there is no warning device).

2.3.9. Air supply valve (paragraph 4.10 of the project Norm pr EN 1073-1)

For the air supply pressure specified by the manufacturer, the air supply valve must be able to adjust the air flow between the minimum and maximum values as indicated in the technical manual. It must be impossible to close the valve in order to reduce the air flow supply below the minimum flow rate as specified by the manufacturer.

Result: Requirements entirely fulfilled.

Notice: The MURUROA does not include low air flow indicator.

2.3.10. Exhaust devices (paragraph 4.11. of the project Norm pr EN 1073-1)

The exhaust devices must work correctly after the testing of the pressure in the suit, during the Practical Performance Test and during the determination of the Fit Factor. Test in accordance with the Norm 1073-1 (paragraph 5.6.).

Results : Good valves working.
Pull resistance superior to the fixed limit.

2.3.11. Pressure in the suit (Paragraph 4.12. of the project Norm pr EN 1073-1)

During the activity sequence as specified, the overpressure shall not exceed 1000 Pa mean and 2000 Pa peak. A positive pressure shall be maintained.
Test is performed with maximum air flow rate D max, as stipulated in paragraph 2.3.2. on three different suits.

Result : Requirements entirely fulfilled.

2.3.12. Carbon dioxide content of the Inhalation air (paragraph 4.13.-project Norm pr EN 1073-1)

The CO₂ content of the inhalation air, determined at the minimum air flow rate, shall not exceed an average of 1 % (by volume), tested according to the Norm 270 (paragraph 7.15) with the minimum air flow rate D min indicated in paragraph 2.3.2, on three different suits.

Result: Requirement entirely fulfilled.

2.3.13. Noise associated with the air supply to the suit (paragraph 4.14 - project Norm pr EN 1073-1)

Test according to the Norm 270 (paragraph 7.16). The noise measured in the suit at the ears shall not exceed 80 dB(A) at the maximum air flow rate as indicated by the manufacturer. Tested at the maximum air flow rate D max as stipulated in paragraph 2.3.2, on three different suits.

Result: Requirement entirely fulfilled.

3. CHECKINGS

3.1. MARKING (paragraph 6 of the Norm project pr EN 1073-1)

The marking complies with the requirements of the Norms EN 340 and EN 1073-1. According to the Decree dated February 7TH 1997 "relative to EEC marking of the working equipment and of the Personal Protective Equipment", it includes the distinctive number of the entitled organisation for the procedure of controls of the manufactured PPE (article 11 of the EEC Directive 89/686/EEC).

The symbol "i" is included in the pictogram, in order to show that the manufacturer instructions should be read by the user..

3.2. MANUFACTURER INFORMATION (Paragraph 7 of the project Norm pr 1073-1)

Information comply with the specifications of the project of Norm pr 1073-1. They include the Directions for use, the conditions of use, the specific limits and restraints.
These documents will be corrected in order to take into account the tests results as mentioned in this ECEC.

3.3. MAINTENANCE MARKING

This is aimless, the suit being for one single use only.

4. CONCLUSIONS

Upon presentation of the tests results, the Ventilated – pressurised for a single use only, **MURUROA V4 F1 – ref. 8481X1T** is certified to ensure a protection against radioactive contamination according the following specified limits :

- Minimum air flow rate: 27,0 m³.h⁻¹.
- Maximum air flow rate: 64,2 m³.h⁻¹.

The **MURUROA V4 F1** is delivered without low air flow rate indicator.

Before using it, the user will have at his disposal the necessary devices to check that the minimum air flow rate, as specified by the manufacturer is reached or over reached before and during the use of the suit.

ANNEX 1

Description and references of the equipment certified in the EC Type Examination Certificate

The different models of equipment, whose generic appellation is MURUROA V4 F1 ref. 8481X1T, and which are the subject of this EEC type examination certificate (ECEC), are only different on the following points:

- The type of pipe butt connecting the equipment to the breathable compressed air supply system.
- The size.

X indicates the type of pipe butt according to the following values:

References	Type of butt for connection to the compressed air supply system	References of MURUROA V4 F1 associated
X=2	Staubli RBE 06 6150	848121 T
X=3	Staubli RBE 06 "détrompeur"	848131 T
X=4	CEJN 342	848141 T
X=8	Staubli RBE 06 QR	848181 T

T indicates the size of the suit according to the following values:

REFERENCE	Height (cm)	Waist measurement (cm)
T=0	152-164	56-64
T=1	164-170	64-68
T=2	170-176	68-72
T=3	176-182	72-76
T=4	182-188	76-80
T=5	188-200	80-88



INSTITUTE FOR NUCLEAR PROTECTION AND SECURITY

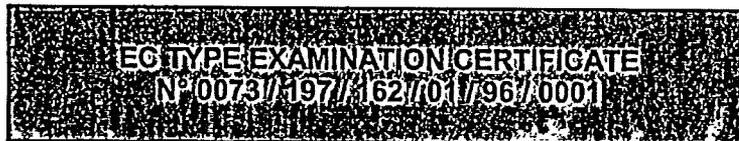
Technical Center for Nuclear Equipment Certification

In accordance with the directive 89/686/EEC dated December 21th 1989 comparing the laws of the States Members Legislations relative to the Personal Protective Equipments, and the decrees n° 92-765, 766 and 768 dated July 29th 1992 transposing the directive into French Laws.

The organisation here below mentioned (IPSN / CTHEN) whose references are as follows:

- Address : B.P. n° 6 – 92265 Fontenay-aux-Roses Cedex (France).
- Empowered by Order of the Ministries of Employment and Agriculture dated December 24th 1996.
- Identified under the n° 0073 (published in the EEC Official Publication dated July 23th 1994).

Assigns the :



To the following Personal Protective Equipment model:

- Designation: Ventilated Protective Suit against Radioactive Contamination pressurised for a single use only.
- Commercial reference : *MTH 2 – ref. 841 442 T.*
- Manufacturer : DELTA PROTECTION / REDI – 69 210 Saint-Germain-Sur-L'Abresle.
- Certificate applicant : DELTA PROTECTION – Z.A. De Berret-30200 Bagnols-Sur-Ceze.
- Essential Requirements Reference : EN 143, pr EN 1073 (nov. 1995), pr EN 943 (august 1995), EN 270, EN 146.

Date : January 10th 1996
G.BRUHL / Chief of CTHEN

Nota : According to article R 223-62 of the "Working Law", the empowered organisation should be informed of any modification made to the material subject of this EEC type examination certificate, as well as of any modification made to the contents of this technical file on which the delivered type certificate was based on (address, manufacturer name, quality insurance certificate extract, ...)

This certificate contains 12 pages n° 1/9 to 9/9

1. DESCRIPTION

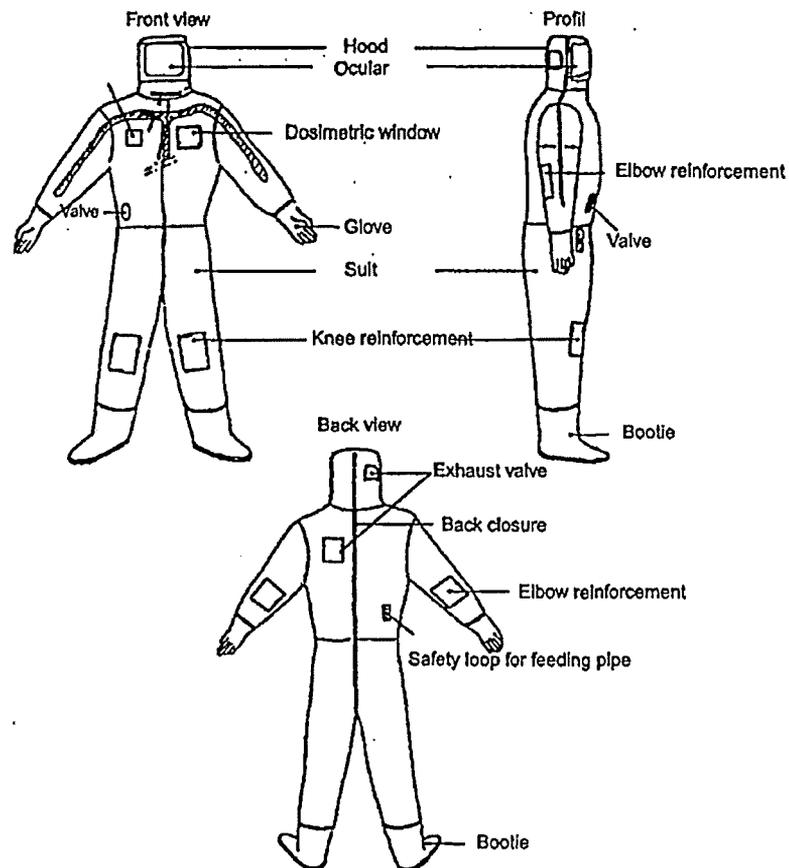
It is a Ventilated Protective Suit against Radioactive Contamination ventilated type – pressurised for a single use only, its name is:

MTH2 – ref. DELTA: 841 442 T

The T values are defined according to the size of the suit.

The suit includes:

- A air tight suit with an incorporated hood
- A suit fastening system located on the back of the suit.
- A breathable air flow supply system.
- A air exhaust device.
- A safety strip for emergency opening located on the hood.



1.1. MAIN MATERIALS

- **Skin of the suit :**

White polyethylene: Ethyfuge 2000 Thickness: 24/100 mm

- **Hood:**

PE Cristal – 30/100 mm thickness.

- **Visor:**

PVC (astraglass) 50/100 mm thickness.

- **Gloves:**

PVC Sempersoft type – Size 9-9 1/2, and Semperstar type – size 10-10 1/2..

- **Boots :**

Polyethylene – 24/100 mm thickness , reinforced with PE cristal.

1.2. COMPONENTS

- **Internal Ventilation System :**

It includes a total ventilation V4 fitted with a valve with CEJN (réf:342) butt.

- **Exhaust:**

It includes two exhaust valves located on the head and on the back of the suit.

- **Fastening device:**

It includes a double zip fastener located vertically on the back of the suit.

- **Other components:**

The suit includes:

- A safety strip for an emergency opening located on the hood.
- A acoustic link tunnel.
- A loop for breathable air supply pipe.
- Several internal strengthening pieces for elbows, knees and legs.
- A transparent window to visualise the dosimeter.

2. CONFORMITY TO REQUIREMENTS

2.1. REQUIREMENTS FOR THE MATERIALS (except accessories: Gloves, slippers...) (See paragraph 5.1. of the prEN 1073)

2.1.1. Abrasion Resistance

Test according to the Norm EN 530 – method 2 (abrasive paper 00). The classification is carried out according to the following diagram:

Class	Number of cycles
6	> 2 000 cycles
5	> 1500 cycles
4	> 1 000 cycles
3	> 500 cycles
2	> 100 cycles
1	> 10 cycles

Results: Class 6 for Ethyfuge 2000 – 24/100 mm thickness.
Class 6 for PVC.

2.1.2. Flex cracking Resistance

Test according to the Norm ISO 7854 – method B. The classification is carried out according to the following diagram :

Class	Number of cycles
6	> 100 000 cycles
5	> 40 000 cycles
4	> 15 000 cycles
3	> 5 000 cycles
2	> 2 500 cycles
1	> 1 000 cycles

This test is not applicable to suits for one single use only.

2.1.3. Puncture Resistance

Test according to the Norm EN 863. The classification is carried out according to the following diagram :

Class	Puncture resistance
3	> 100 N
2	> 50 N
1	> 10 N

Results: Class 1 for Ethyfuge 2000 – 24/100 mm thickness.
Class 2 for PE cristal.

2.1.4. Resistance in blocking

Test according to the Norm ISO 5978. The classification is carried out according to the following diagram:

Class	Comments
2	non stick
1	sticky

This test is not applicable to non-coated materials.

2.1.5. Tear Resistance

Test according to the Norm ISO 9073-4. The classification is according to the following diagram:

Class	Applied strength
6	> 150 N
5	> 80 N
4	> 40 N
3	> 20 N
2	> 10 N
1	> 2 N

Results :. Class 4 for Ethyfuge 2000 – 24/100 mm thickness.

Class 3 for PE Cristal.

2.1.6. Flammability of materials, visors, and ancillary parts

Tests are carried out according to the Norms EN 1146 – single burner test (paragraph 7.5.3).

Results: Test requirements entirely fulfilled.

2.2. REQUIREMENTS FOR THE ACCESSORIES

2.2.1. Gloves

The gloves set on the MTH2 ref. 841 442 T comply with the specific requirements for this type of Individual Protection Equipment, mainly to the Norm EN 421 "Protective Gloves against ionizer radiation and radioactive contamination".

They have Special EC Examination Certificates (ECEC) based on contracted tests.

2.2.2. Boots

The boots are part and parcel of the suit and are made of the same constituted material.
Consequently they comply with the requirements.

2.3. REQUIREMENTS FOR THE PROTECTIVE SUIT

2.3.1. Suit Design: Practical Performance Test

The Practical Performance Test is carried out according to the prEN 1073 (paragraph 6.2.).
The conditioning is according to the manufacturer directions for use.

Parameters	Valuations
a) Harness comfort	Aimless
b) Security of fastenings & couplings	Good
c) Accessibility of adjusting devices	Good
d) Clarity of vision through visor	Good
e) Suit comfort	Good
g) Other parameters	No particular notice

2.3.2. Fit Factor (paragraph 5.2.2. of the pr EN 1073)

The protection factor is determined according to the PrEN 944 standard (paragraph 8.9) by respecting the sequences indicated in Annex A of the PrEN 1073.

The mean leakage value (or inversely, the protection factor) enables a clothing classification according to the following table. The preconditioning according to the instructions for use recommendations.

Ventilated pressurised Suit classification	Maximum accepted values, in %, of the ratio of the average Inward Leakage inside the hood, calculated on the whole lot of suits		FIT FACTOR
	For One activity	For all activities	
5	0.004	0.002	50 000
4	0.010	0.005	20 000
3	0.020	0.010	10 000
2	0.040	0.020	5 000
1	0.100	0.050	2 000

Results : The suit is classified 5.

2.3.3.1. Seams, Joins and Assemblages pull test resistance**2.3.3.1. Seams / Welds (paragraph 5.2.3.1 of the pr EN 1073)**

A sample of each type of seam/weld is tested according to the Norm ISO 5082 (annex 2).
The seam performance level is according to the following classification:

Class	Seam resistance (N)
5	> 300
4	> 125
3	> 75
2	> 50
1	> 30

The tests have been applied to the following welds:

- Elbow and knee reinforcement
- Crotch assembly
- Belt assembly
- Booties assembly
-

Results : All the welds are classified 3.

2.3.3.2. Joins and Assemblages (paragraph 5.2.3.2. – prEN 1073)

This suit has no removable parts. This paragraph is aimless.

2.3.4 Gas tight (paragraph 5.2.4. of prEN 1073).

The test was carried out according to the EN 464 standard . The loss of pressure shall not be greater than 4 mbar in 6 minutes.

Results : Test not undertaken as the clothing is not considered as an gastight suit.

2.3.5. Visors (paragraph 5.2.5. of prEN 1073)

The distortion of vision is measured, during the Practical Performance. The mechanical resistance test of the visor is according to the Norm EN 146 (paragraph 6.6 and 6.7.).

Results : Distortion of vision : Up to requirement.
Mechanical resistance : up to requirement.

2.3.6. Air supply system (paragraph 5.2.6. of the pr EN 1073)

The couplings and connections must comply with the requirements of the paragraphs 6.7.1., 6.7.2., and 6.11.7. of the EN 270. The connection between the compressed air supply system and the suit must resist to a 250 N pull.

Result: requirement entirely fulfilled.

2.3.6. Breathing Hose (paragraph 5.2.7. of the pr EN 1073)

Tests are performed according to the EN 270 (paragraph 7.2. and 7.6). The pipes must not block the movements nor cause a rupture of the air supply during the Practical Performance Test.

Result: No constraint.

2.3.7. Air supply flow rate (paragraph 5.2.8. of the PrEN 1073)

The test is carried out according to the PrEN 1073 standard (paragraph 6.3).

Result:

Minimal flow rate: $30 \text{ m}^3 \cdot \text{h}^{-1}$ ($500 \text{ l} \cdot \text{min}^{-1}$) for a 6 Bar supply pressure
Maximal flow rate: $66 \text{ m}^3 \cdot \text{h}^{-1}$ ($1100 \text{ l} \cdot \text{min}^{-1}$) for a 5.5 Bar supply pressure

2.3.8. Air flow rate warning device (paragraph 5.2.9. of the pr EN 1073)

If a warning is fitted, it must comply to the EN 270 (paragraph 6.13.3). The test must be carried out according to the EN 270 (paragraph 7.12). The sound level must be higher than 85 dB(A).

Result: Aimless (there is no sonic warning device).

2.3.9. Air supply valve (paragraph 5.2.10 of the pr EN 1073)

Where present, the control valve should enable a variation of flow rate between the minimum and maximum specified values without the possibility of closure.

Result: Requirements entirely fulfilled.

2.3.11. Exhaust devices (paragraph 5.2.11. of the pr EN 1073)

The exhaust devices must work correctly after the testing of the pressure in the suit, during the Practical Performance Test and during the determination of the Fit Factor. Test in accordance with the EN 1073 (paragraph 6.6.).

Results : Good valves working.
Pull resistance superior to the fixed limit.

2.3.12. Pressure in the suit

During the activity sequence as specified, the overpressure shall not exceed 1000 Pa mean and 2000 Pa peak. A positive pressure shall be maintained.

Result: Requirements entirely fulfilled.

2.3.13. Carbon dioxide content of the inhalation air

The CO₂ content of the inhalation air, determined at the minimum air flow rate, shall not exceed an average of 1 % (by volume), tested according to the EN 270 (paragraph 7.15).

Result: Requirement entirely fulfilled.

2.3.14. Noise associated with the air supply to the suit (paragraph 5.2.14 - pr EN 1073)

Test according to the EN 270 (paragraph 7.16). The noise measured in the suit at the ears shall not exceed 80 dB(A) at the maximum air flow rate as indicated by the manufacturer.

Result: Requirement entirely fulfilled.

3. CHECKINGS**3.1. MARKING (paragraph 7 of the pr EN 1073)**

The marking satisfies the requirements of article 7 in the EN 340.

3.2. MANUFACTURER INFORMATION (Paragraph 8 of the pr 1073)

The manufacturer's information complies with the specifications in paragraph 8 of the EN 340. They contain the instructions for use, the usage conditions and the specific limits and restraints.

3.3. MAINTENANCE MARKING

This is aimless, the suit being for one single use only.

4. CONCLUSIONS

Upon presentation of the tests results, the Ventilated suit – pressurised for a single use only, MTH 2 – ref. 841 442 T is certified to ensure a protection against radioactive contamination according the following specified limits :

- Minimum air flow rate: 30 m³.h⁻¹ (500 l.min⁻¹)
- Maximum air flow rate: 66 m³.h⁻¹.(1100 l.min⁻¹)

Enclosure 1, Attachment 7

INSTRUCTIONS FOR DONNING AND REMOVAL THE MURUROA V4 FULLY
ENCLOSED SUIT
(5 pages)

N°: Do / USA / 2	MURUROA INSTRUCTIONS FOR DONNING AND REMOVAL THE MURUROA V4 FULLY ENCLOSED SUIT	 <u>DELTA PROTECTION</u> ☎ 04 66 89 18 36
INDICE : a		
DATE D'APPLICATION :06/09/01		
PAGE :1/5		

**INSTRUCTIONS FOR DONNING AND
REMOVAL THE MURUROA V4 FULLY
ENCLOSED SUIT**

N°: Do / USA / 2	MURUROA INSTRUCTIONS FOR DONNING AND REMOVAL THE MURUROA V4 FULLY ENCLOSED SUIT	 DELTA PROTECTION ☎ 04 66 89 18 36
INDICE : a		
DATE D'APPLICATION :06/09/01		
PAGE :2/5		

FOREWORD

The Mururoa suit is a fully enclosed supplied-air suit; designed for protecting the wearer against radioactive contamination brought about by contact with liquid or solid substances or by atmospheric pollutants such as solid particles, mist gases or vapors.

Made of non-flammable PVC sheet its mechanical and chemical resistance is good enough for working in most of the nuclear environments, acids, bases or low concentration solvents.

Caution should always be used around sharp edges and tools to avoid tearing of the Mururoa. Contact with open flames or grinding spark ray for instance must be avoided to prevent perforation by melting of the PVC skin.

At any time: avoid direct contact with objects less than 5°C (41°F) or more than 60°C (140°F) temperature. It is the responsibility of the supervisor to qualify, by preliminary test, the ability of the suit to protect the wearer against the harmful atmosphere in each specific environment

CAUTIONS

- 1) Care must always be taken due to the asphyxiation hazard.
- 2) The buddy system must be in effect with the use of this suit fed with a sufficient breathable air source with either both persons in it or the second person nearby in view with a particulate respirator ready.
- 3) Suit removal under ordinary circumstances requires an assistant.
- 4) Thorough knowledge of the safety features of the Mururoa are essential for safety!
 - a) a safety strip for breathing can be pulled open should air supply be restricted.
 - b) a safety strip for suit egress in an emergency is available by using pull tab on each elbow.
 - c) do not over tighten any tape applied to the suit as it will prevent rapid suit removal.
- 5) An air supply of 1 to 3 minutes exists inside the suit should the air supply fail.

During that time, due to the magnetic exhaust valves, the garment will remain overpressurised, avoiding penetration of harmful atmospheres as long as portions of the remaining air have not been forced out of the suit such as if the wearer bends over and forces air out the discharge valves.

N°: Do / USA / 2	<p align="center">MURUROA INSTRUCTIONS FOR DONNING AND REMOVAL THE MURUROA V4 FULLY ENCLOSED SUIT</p>	
INDICE : a		
DATE D'APPLICATION :06/09/01		
PAGE :3/5		

DONNING

- 1) Review the safety features of the Mururoa with the accompanying assistant and compare with the job scope.
 - 2) The package containing the Mururoa must have been kept 2 hours or more at a temperature around 20°C before being opened and the devices manipulated.
 - 3) Near the job site remove garment from the bag, shake open and inspect for obvious defects.
 - 4) Inspect the emergency egress strip to ensure that the strip can be removed easily if desired.
 - 5) Remove the cardboard and the clear plastic faceplate protector. Remove the paper sheet placed in the head position. Discard these.
 - 6) In the donning and removal area, verify that the local breathable air supply is working properly.
 - 7) Connect the garment to the local air supply with a flexible hose. Take care that the hose goes through the throttle valve by using the loop at the back right side of the suit.
 - 8) Don the suit from the back with the help of the assistant. Connect the MURUPHONE phonic system if used and check.
 - 9) Bind the shoe joints with the shoe strips and apply tape, if necessary, to the suit gloves.
 - 10) Zip up the mechanical zip.
 - 11) Zip up the external plastic gas sealing zipper when the suit is inflated.
- Apply an adhesive tape of sufficient width on the second zip-fastener to be shure no leak occurs.
- 12) Check the air supply valve and adjust to the desired flow for comfort.
 - 13) Perform several crouching exercises to ensure the exhaust valves work; the air source is sufficient to recharge the suit to its full volume quickly and to check for leaks.
 - 14) Proceed to the job site and begin to work. You can disconnect the hose from the air line, and travel from the donning area to the working area to reconnect your suit at the step off pad; after having insured the air source in the working area is well fed and if the time, disconnected is not more than a few dozen of seconds.
 - 15) Comfort in breathing and in temperature can be maintained by adjusting the air inlet regulating valve during work.

CAUTION

Should the Mururoa feel hot, deflate, or if fog appears on the faceplate, leave immediately and quietly the working area and contact your assistant for suit removal.

Remember:

- 1) The air supply of 1 to 3 minutes exists inside the suit after breaking of air supply feeding.
- 2) The suit emergency strips are there for your use if needed.

N°: Do / USA / 2	MURUROA INSTRUCTIONS FOR DONNING AND REMOVAL THE MURUROA V4 FULLY ENCLOSED SUIT	
INDICE : a		
DATE D'APPLICATION :06/09/01		
PAGE :4/5		

SUIT REMOVAL (with assistance)

When he has to leave the working area, the wearer comes back to the dressing area where an assistant will remove the garment.

- 1) Remove the clothing while still connected with the air source, remove any restrictive tape (on gloves joint for instance).
- 2) Pull slowly on the tab of the quick release strip from forearm, overhead to forearm.
- 3) Carefully remove by rolling up the two half parts of the suit (front and back, without touching any exterior contaminated surfaces)
- 4) Continue shedding the suit down.
- 5) Disconnect the air feeding to the suit.
- 6) Step out of the suit.
- 7) Discard suit into appropriate container.

N°: Do / USA / 2

INDICE : a

DATE D'APPLICATION :06/09/01

PAGE :5/5

MURUROA
INSTRUCTIONS FOR DONNING AND
REMOVAL THE MURUROA V4 FULLY
ENCLOSED SUIT


Ⓣ 04 66 89 18 36

EMERGENCY FEATURES

EMERGENCY EGRESS

- 1) Grasp emergency pull-off strip on either elbow with hand.
- 2) Pull strip firmly upward until the suit separates over the head and to the other elbow.
- 3) Step out of suit when appropriate.
- 4) Move to a safe area.

EMERGENCY BREATHING

- 1) Pull mouth strip off with either hand
- 2) Separate plastic of mouth and breath
- 3) Move to a safe area and get assistance

Enclosure 2 to NRC-15-0019

**Regulatory Commitments to be Completed Prior to Use of
MURUROA MTH2, V4F1, and BLU Suits**

Regulatory Commitments to be Completed Prior to Use of MURUROA
 MTH2, V4F1, and BLU Suit Systems

The following list identifies regulatory commitments to be completed prior to use of MURUROA MTH2, V4F1, and BLU suits for respiratory protection. The nine actions are in accordance with NRC's guidance for approval of licensee requests for use of the MURUROA BLU suits (ML062340554) and consistent with previously approved requests for VC Summer (ML081210403), Columbia (ML061660196), and Diablo Canyon (ML053340498) for the MURUROA MTH2 and V4F1 suits.

	Required Action	Due Date
1	MURUROA BLU one-piece encapsulating suit (of either PVC or Ethyfuse construction), will be fitted with 1) a Micronel C500X-012EK-AB60 blower with a C501A-012Ak-A battery (consistent with the parts list in Section 7 of Attachment 6.6.6 to Topical Report MURUBLU05NP, see ADAMS ML061910495 (proprietary) and ML061910495 (public)) and 2) four Scott FP 10 P3, or four Delta Protection P3, high efficiency particulate filter cartridges. All four filter cartridges must be matching and replaced as a set.	Upon implementation of NRC approved use for respiratory protection.
2	Procedures for use of the MURUROA MTH2, V4F1, and BLU suit systems will be integrated into the Fermi 2 respiratory programs required by Subpart H of 10 CFR Part 20 using the information provided by the manufacturer with the minor clarification that the suits will be inspected and removed from their protective packaging outside of the plant's radiological controlled area in a way that maintains the integrity of the suit, but does not lead to the unnecessary generation of solid radioactive waste. Fit testing of user is not applicable to fully encapsulating suits. Prior to use, wearers will be trained on these conditions of use as well as the emergency escape features of the suits.	Upon implementation of NRC approved use for respiratory protection.
3	MURUROA BLU suits will be used in accordance with recommendations in Attachments 6.6.4, 6.6.5, and 6.6.6 of Topical Report MURUBLU05NP (ADAMS ML061910495 (proprietary) and ML061910495 (public)).	Upon implementation of NRC approved use for respiratory protection.
4	MURUROA MTH2, V4F1, and BLU suit enclosures will be single use only, and will be discarded after use. Unused suit enclosures will be stored in their original manufacturer's packing (in an environment not colder than 32 deg. F, nor hotter than 140 deg. F), with a maximum storage shelf-life of 3 years. Suits will not come in contact with anything colder than 41 deg. F, nor hotter than 140 deg. F, during use.	Upon implementation of NRC approved use for respiratory protection.

	Required Action	Due Date
5	MURUROA BLU suits will be donned with a fully charged battery pack installed on the blower. The maximum period of use (timed from a fully charged battery), will be 4 hours with the blower set at 600 l/min, and 7 hours with the blower at the 400 l/min setting.	Upon implementation of NRC approved use for respiratory protection.
6	MURUROA MTH2, V4F1, and BLU suits will be used only in atmospheres containing specific contaminants in concentrations that are not immediately dangerous to life or health (IDLH), as given in NIOSH "Concept for Industrial Power, Air-purifying Respiratory Standard," Draft for Comment, May 30, 2005, and have an oxygen content of at least 19.5 percent by volume.	Upon implementation of NRC approved use for respiratory protection.
7	Any defects discovered with the MURUROA MTH2, V4F1, or BLU suits will be entered into the Corrective Action Program and reported to the manufacturer, as necessary. Communication channels will be established with the supplier to report any defects, if experienced, with the device, and to ensure that any manufacturer's notifications concerning the suit systems will be received in a timely manner. Industry notifications, when required, will be made through the Operating Experience Program.	Upon implementation of NRC approved use for respiratory protection.
8	Lesson plans will be developed and used to train workers and radiation protection technicians on the MURUROA V4F1, MTH2, and BLU suit features, donning, use and removal, and use of mouth strip and tear off strips for routine and emergency egress.	Upon implementation of NRC approved use for respiratory protection.
9	Prior to use, radiation protection personnel will be provided additional training for selection, approval, issue, equipment set-up, operation and maintenance instructions for the MURUROA V4F1, MTH2, and BLU suits.	Upon implementation of NRC approved use for respiratory protection.