Environmental Technology Verification Projects Related to Air and Energy

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Outline

I. Ethylene Oxide Treatment Technologies

II. Technologies for Mitigation of the Urban Heat-island Effect (for suppressing the heat emitted from outdoor heat exchangers of air conditioners)

III. VOC Treatment Technologies (for organochlorine degreasing agents such as dichloromethane)

I. Ethylene Oxide Treatment Technologies

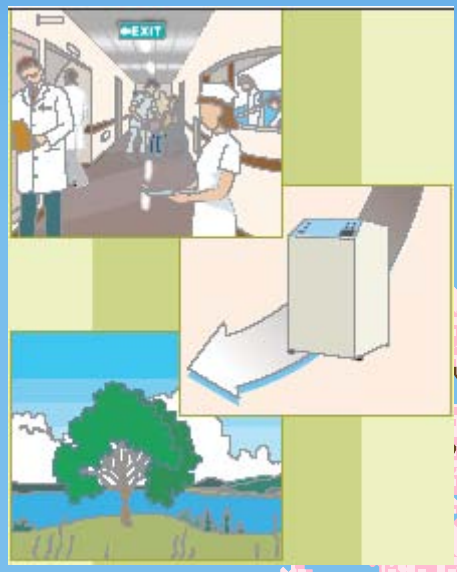
~ Why are they needed? ~

(1) No regulation, lack of information about emissions:

- According to data collected under Japan's Pollutant Release and Transfer Registers (PRTR) law for FY2003, ethylene oxide, a carcinogenic substance, is emitted in large quantities into the environment, making it a high priority for countermeasures.
- Ethylene oxide is often used in sterilization equipment in hospitals. According to the PRTR data for FY2003, its emissions from hospitals is estimated at about 210t, while national emission at about 510t. However, there are currently no emissions regulations in Japan that cover ethylene oxide from sterilization equipment in hospitals. At present, any actions are thus left up to the voluntary efforts of businesses.

(2) Emissions from sterilization equipment may be huge:

- According to research by the Tokyo metropolitan government, only a small number of hospitals have equipment installed to treat emissions from sterilization equipment using ethylene oxide.



Ethylene oxide treatment
(cover of FY2003 report)

I. Ethylene Oxide Treatment

~ Overview ~

Technologies for cleaning ethylene oxide gases being used for sterilization in manufacturing, medical institutions, etc.

Examples: Technology (equipment) that properly treats emission gases from ethylene oxide sterilization equipment, through incineration, catalytic oxidation, hydrolysis, etc.

- Verification projects began in FY2003.
- FY2003: 1 Verification Organization (Tokyo Metro. Gov't.), total of 6 technologies verified.
- FY2004: 1 Verification Organization (Tokyo Metro. Gov't.), total of 2 technologies verified.
- FY2005: Two-year pilot period ends, now shifting to user-pays structure (Phase 2).

FY2003 & 2004 verifications and reports have been completed.

I. Ethylene Oxide Treatment

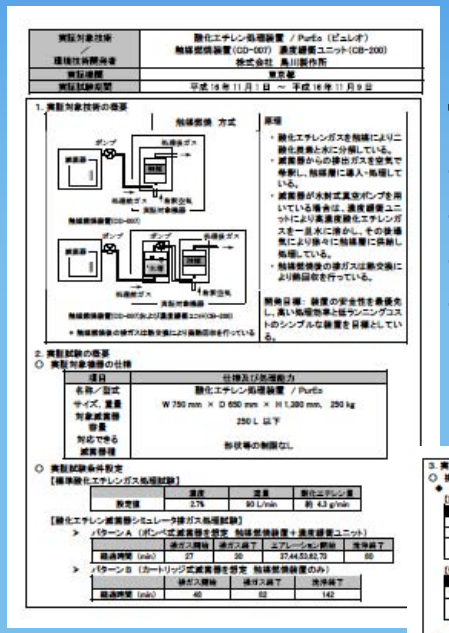
~ Outline of Verified Technologies ~

FY	Technology developer	Name of technology	Treatment method
2003, Tokyo Metro. Gov't.	MURAKI Co., Ltd.	Ethylene oxide emission gas treatment equipment MEJ-101A	Catalytic incineration
	NIPPON SHOKUBAI Co., Ltd.	NS emission gas treatment equipment Model NS-EO-01	Catalytic incineration
	AIR WATER INC.	Countertop ethylene oxide cleaning treatment equipment AW-EOA25	Catalytic incineration
	MIURA PROTECH Co., Ltd.	Ethylene oxide gas removal equipment AJ-100	Catalytic incineration
	3M™ Health Care Limited	3M™ Steri-Vac™ EO gas emissions treatment equipment 3M EO Abator 50	Catalytic incineration
	Pax Co., Ltd.	Ethylene oxide gas removal equipment CNES-150	Chemical cleaning
2004, Tokyo Metro. Gov't.	EKIKA CARBON DIOXIDE Co., Ltd.	Ethylene oxide gas removal equipment EJ-250L type	Catalytic incineration
	SHIMAKAWA SEISAKUSHO Co., Ltd.	Ethylene oxide treatment equipment PurEo	Catalytic incineration

※ *Note1: For almost all equipment, 99.9% of the gas was removed (lowest rate was 99.4%).*
Note2: Names of Developers and Technologies may not be accurate.

I. Ethylene Oxide Treatment

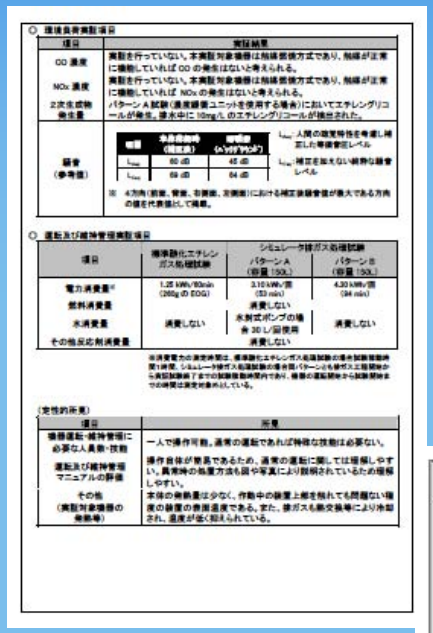
~ Sample Verification Report (Summary Version) ~



1st page

Technology Outline

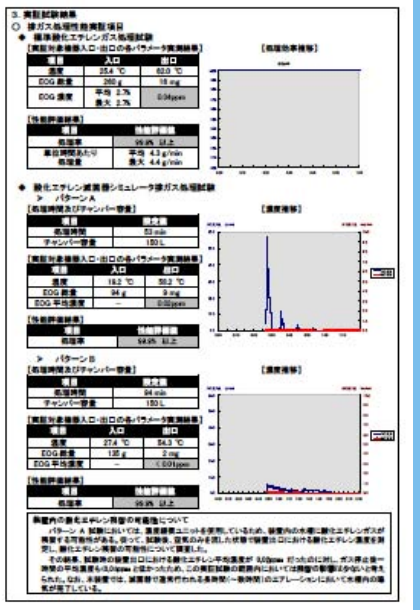
- Technology name
- Technology flowchart
- Test conditions
- Technical specs., etc.



3rd page

Verification result 2

- Byproducts
- Resources used (electricity, water, etc.)
- Operating features, etc.



2nd page

Verification results 1

- Gas treatment performance

4th page

Applicant info.

- Product data
- Contact info., etc.

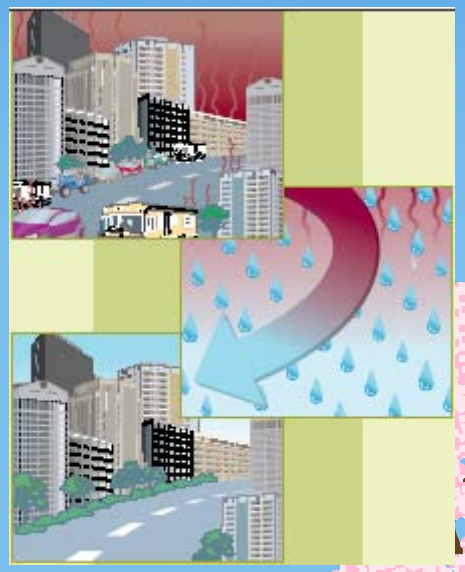
II. Technologies for Mitigation of the Urban Heat-island Effect ~ Why are they needed? ~

(1) Countermeasures are important in the long term:

- Steps must be taken in the long term to counter the heat island effect. It is important to start by promoting feasible measures to address the problem.
- According to estimates by Japan's Ministry of the Environment, about 50% of the heat (sensible heat) that is raising air temperatures in the Tokyo core comes from waste heat from artificial sources, and about half of this is waste heat from buildings, including their air conditioning systems.

(2) Outdoor heat exchangers of air conditioners matter:

- Local governments put much effort into promoting energy efficiency in buildings, but very little effort is being made to suppress waste heat from existing air conditioners.
- In particular, because a very large number of outdoor heat exchangers of air conditioners are already installed, efforts to suppress waste heat from these sources can be expected to be very effective.



Heat island effect countermeasures (cover of FY2004 report)

II. Heat-island Mitigation

~ Overview ~

Technologies to counter the urban heat island effect by suppressing the heat emitted from outdoor heat exchangers of air conditioners

Examples: Technologies (or equipment) for suppressing the sensible heat emitted from outdoor heat exchangers of air conditioners by improving their cooling efficiency (for example, by using the latent heat of evaporation of water sprayed onto the heat exchanger).

- Verification projects began in FY2004.
- FY2004: 1 Verification Organization (Osaka Pref.), total of 4 technologies verified.
- FY2005: 1 Verification Organization (Osaka Pref.), now inviting/selecting target technologies.

FY2004 verifications and reports have been completed.

II. Heat-island Mitigation

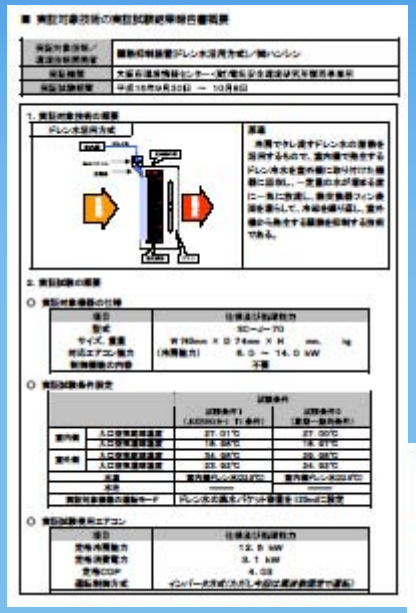
~ Summary of FY2004 Verification Results ~

Developer	Hanshin, Co., Ltd.	Hanshin, Co., Ltd.	O.K. KIZAI Co., Ltd.	Fujikoki Corporation
Name of technology	Sensible heat suppression equipment (drainwater utilization method)	Sensible heat suppression equipment (water spray cooling method)	Sensible heat suppression equipment using water spray	Cooling equipment using indirect water aspersion
Sensible heat suppression rate	15.2% (Pattern 1) 13.1% (Pattern 2)	80.1% (Pattern 1) 37.7% (Pattern 2)	47.3% (Pattern 1) 34.5% (Pattern 2)	14.6% (Pattern 1) 8.1% (Pattern 2)
Reduction in electrical consumption	3.6% (Pattern 1) 3.4% (Pattern 2)	15.8% (Pattern 1) 10.0% (Pattern 2)	9.5% (Pattern 1) 6.9% (Pattern 2)	3.0% (Pattern 1) 2.2% (Pattern 2)
Operating costs (See note)	¥0/h	¥9.72/h	¥3.93/h	¥3.53/h
Cost reduction (due to lower electrical consumption) (See note)	¥2.55/h	¥9.15/h	¥6.71/h	¥2.73/h

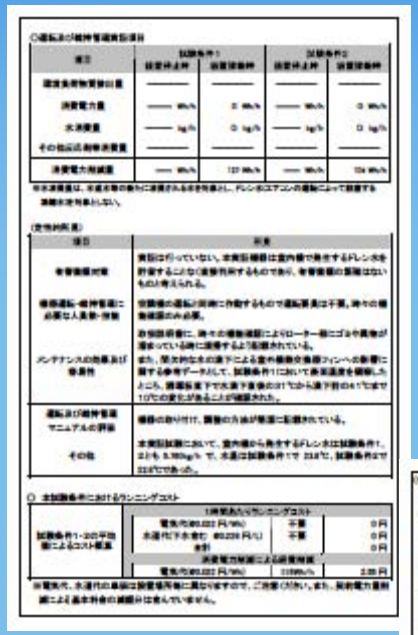
- Pattern 1 test conditions: Outdoor temps. dry bulb 35ºC, wet bulb 24ºC
- Pattern 2 test conditions: Outdoor temps. dry bulb 30ºC, wet bulb 25ºC
  - *Indoor temps. are common in both patterns (dry 27ºC, wet 19ºC)*
- *Note1: Operating costs and cost reductions are estimated based on the average values of both test conditions, based on assumed 0.022 yen/Wh for electricity and 0.228 yen/L for water.*
- *Note2: Names of Developers and Technologies may not be accurate.*

II. Heat-island Mitigation

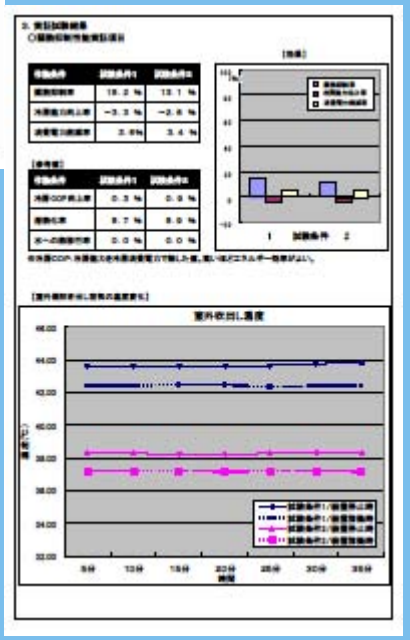
~ Sample Verification Report (Summary Version) ~



1st page
Technology Outline
- Technology name
- Technology flowchart
- Test conditions
- Technical specs.,
  etc.



3rd page
Verification result 2
- Resources used
(electricity, water, etc.)
- Operating features
- Operating costs



2nd page
Verification results 1
- Sensible heat suppression
  performance

4th page
Applicant info.
- Product data
- Contact info.,
etc.

III. VOC Treatment Technologies

~ Why are they needed? ~

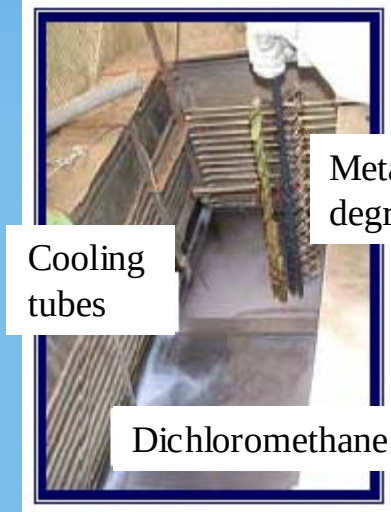
(1) Urgent need for suppressing VOC emissions:

- Photochemical oxidants and SPM (suspended particulate matter) are the main air pollutants in urban areas. VOC (volatile organic compounds) become sources of them through atmospheric chemical reactions. According to PRTR data, emissions of organochlorine hydrocarbons such as dichloromethane are particularly high.
- VOC emissions from Large establishments will be regulated under the Japan's Air Pollution Control Law (amended 2004, entry into force in 2006), but small- and medium-sized establishments will not be regulated for the time being. It is therefore important to encourage voluntary initiatives.

(2) Current state of the technology and issues:

- There has been progress in recent years with the development and application of technologies to treat organochlorine degreasing agents such as dichloromethane, and compact equipment has been coming onto the market that can be retrofitted at small- and medium-sized establishments. But many businesses are not yet aware of this equipment, so its use is spreading only slowly.

→ It is necessary to promote emissions reductions by conducting technology verification.



Example of a dichloromethane cleaning tank

III. VOC Treatment

~ Overview ~

Technologies for removing the emission gases from dichloromethane (a type of VOC) and other organochlorine degreasing agents that are used for metal degreasing and cleaning in metal plating and processing factories

Examples: Technologies (or equipment) for the proper treatment (for example, by the coagulation method) of dichloromethane and other organochlorine degreasing agents that are used for the degreasing and cleaning of metal.

- Verification projects began in FY2004.
- FY2004: 1 Verification Organization (Tokyo Metro. Gov't.), total of 2 technologies verified.
- FY2005: Invitation/selection of Verification Organizations
- For FY2004 verifications testing and reports have been completed.

III. VOC Treatment

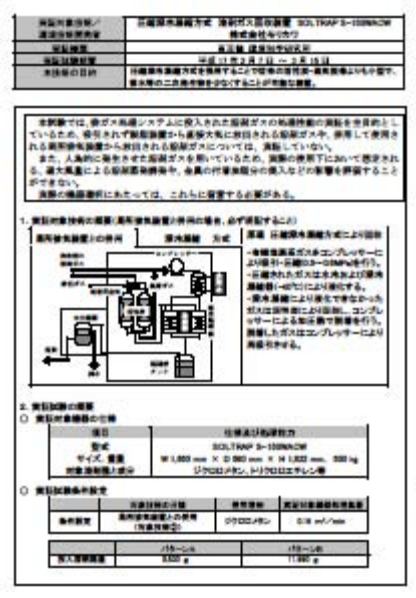
~ Summary of Verification Results ~

Verification Organization	Tokyo Metro. Gov't.	
Technology developer	Morikawa Co., Ltd.	System Eng Service Co., Ltd.
Product name	Solvent gas recovery equipment using pressurized cryogenic separation method, SOLTRAP S-150WACW	Organochlorine gas recovery equipment
Substance targeted for testing	Dichloromethane	Trichloroethylene
Removal rate (see note)	Pattern A: >99.9% Pattern B: >99.9%	Pattern A: >99.9% Pattern B: >99.9%

- *Note1: Verification was conducted with a focus on the performance of the equipment in removing solvent gas injected into the treatment system. These verification tests do not cover the solvent gas directly emitted from the degreasing equipment without being aspirated.*
- *Note2: Patterns A and B were selected as typical usage scenarios.*
- *Note3: Names of Developers and Technologies may not be accurate.*

III. VOC Treatment

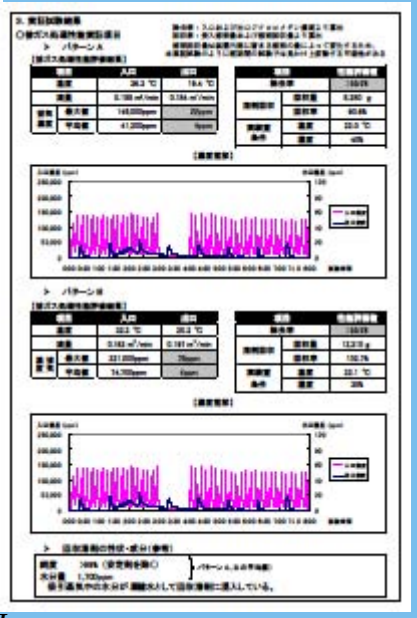
~ Verification Report (Summary Version) ~



1st page
Technology Outline
- Technology name
- Technology flowchart
- Technical specs.,
- Test conditions

etc.

3rd page
Verification results 2
- Environmental impacts (wastewater, noise)
- Resources used (electricity, water, etc.)



2nd page
Verification results 1
- Emission gas treatment performance

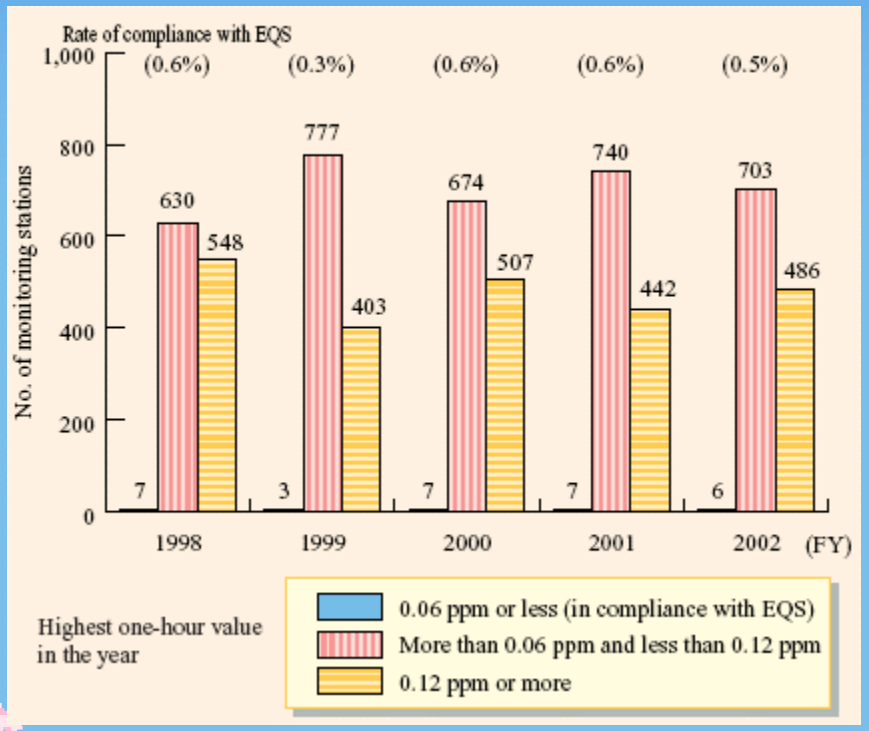
4th page
Applicant info.
- Product data
- Contact info., etc.

Thank you!

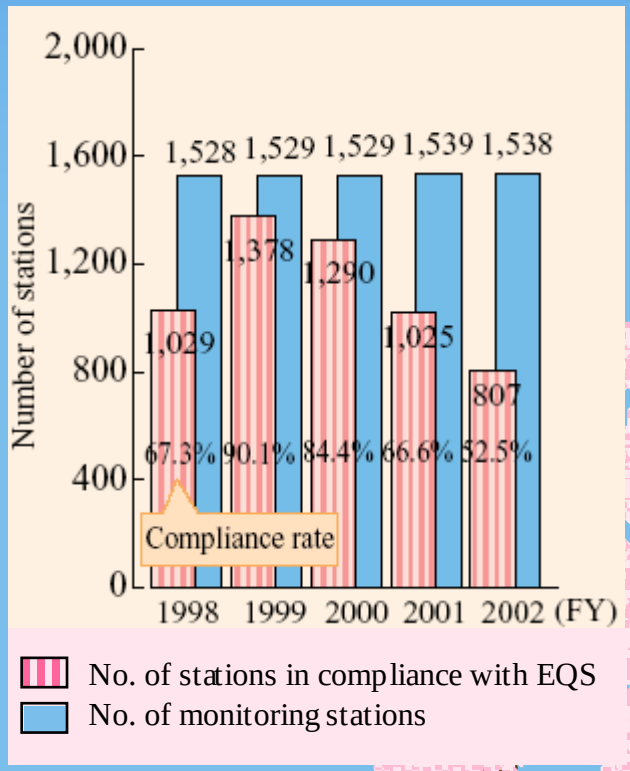
J-ETV Website (English)
http://etv-j.eic.or.jp/en/index.html

http://etv-j.eic.or.jp/index.html
(Japanese)

Appendix: Air Quality Status in Japan
Photochemical oxidants and SPM



Photochemical oxidants, FY1998-2002



SPM, FY1998-2002

EQS: Environmental Quality Standard

Appendix: Outline of Testing Criteria (Verification Items) (1)

I. Ethylene Oxide Treatment Technologies

Category	Aspect Being Verified	Main Items Being Verified	
Verification items for emission gas treatment performance	・Emission gas treatment performance of equipment	Ethylene oxide concentration, changes in treatment efficiency rate, treatment rate (balance of transfer)	
Environmental impact items	・Environmental impacts of equipment operation	CO concentration, NOx concentration, amount of byproducts generated, noise	
Verification of operations and maintenance	・Performance in terms of operations and maintenance (qualitative, quantitative) ・Costs associated with operations and maintenance	Resources used	Consumption of electricity, fuel, water, as well as any reagents, etc.
		Operations and maintenance performance	Personnel numbers and skills required for equipment operation and maintenance; equipment safety; emergency response; consistency of performance over time; recovery methods after occurrence of operational trouble; assessment of operating/maintenance manuals

Appendix: Outline of Testing Criteria (Verification Items) (2)

II. Technologies for Mitigation of the Urban Heat-island Effect

Category	Aspect Being Verified	Main Items Being Verified	
Verification items for sensible heat suppression performance	・Sensible heat suppression performance by equipment installation	Sensible heat suppression rate, increase rate of cooling efficiency, energy consumption reduction rate Reference measurement data: Latent heat conversion ratio, heat transfer rate to drain water	
Verification of operations and maintenance	・Performance in terms of operations and maintenance (qualitative, quantitative) ・Costs associated with operations and maintenance	Environmental impacts	Emissions of environmental impact substances (e.g., rust inhibitors, descaling agents, etc.) Measures against pathogenic microbe proliferation (Legionella, etc.)
		Resources used	Consumption of electricity, water, reagents, etc.
		Operations and maintenance performance	Personnel numbers and skills required for equipment operation and maintenance; possible impacts on air conditioner's cooling performance and functional life; benefits and ease of maintenance; equipment reliability; recovery methods after occurrence of operational trouble; assessment of operating/maintenance manuals

Appendix: Outline of Testing Criteria (Verification Items) (3)

III. VOC Treatment Technologies

Category	Aspect Being Verified	Main Items Being Verified	
Verification items for emission gas treatment performance	・Emission gas treatment performance of equipment	Concentrations of dichloromethane, etc., recovery rate (balance of transfer) Reference measurement data: Properties and composition of recovered solvent	
Environmental impact items	・Environmental impacts of equipment operation	Conditions of wastewater (solvent concentrations, COD, BOD, discharge volume), Status of byproducts generated, waste generated Reference item: Noise	
Verification of operations and maintenance	・Performance in terms of operations and maintenance (qualitative, quantitative) ・Costs associated with operations and maintenance	Resources used	Consumption of electricity, fuel, water, as well as any reagents, etc.
		Operations and maintenance performance	Personnel numbers and skills required for equipment operation and maintenance; assessment of operating/ maintenance manuals Reference items: Constraints relating to installation location; response to shut-downs and operational trouble Responses to fire and other hazards, consistency of performance over time