

문서번호	친환경청정소재연구센터-151
보존기간	영구
결재일자	2023.08.05
공개여부	공개

센터원	과제책임자	본부장	원장
김도환	정우영	류중재	서민강
협조			

국외출장결과보고서(안전 보호, 파리)



[별지 제3호 서식] (제1조 관련)

공무국외여행 개요

1. 여행국 : 프랑스, 파리

2. 여행 목적 :

○ 국제 표준회의를 위해 세계 각국에서 총 30명 이상이 참석 예정이며 7월 12일 ISO/DIS 5533 Textiles의 FDIS preparation을 발표할 예정임

3. 여행 기간 : 2023. 07. 10 ~ 2023. 07. 15. (4박6일간)

4. 보고서 작성자 : 친환경·청정소재연구센터, 선임연구원, 김도환

목 차

I. 서론 : 여행의 배경 및 여행 세부내용

II. 본론 : 회의내용 및 결과

III. 결론 : 향후일정

I. 서론 : 여행의 배경 및 여행 세부내용

1. 사업명 : 안전보호 융복합 섬유기술지원센터 구축

2. 출장목적 :

○ 국제표준회의를 위해 세계 각국에서 총 30명이상이 참석 예정이며 7월 12일 ISO/DIS 5533 Textiles의 FDIS preparation을 발표할 예정임

○ 안전보호 융복합 섬유소재의 국제표준을 통한 세계시장에서의 기술적, 경제적 우위를 조기 확보하고 관련 산업계의 산업구조 고도화에 기여하자함

3. 출장배경 :

○ 안전보호 융복합섬유 관련 국제 표준 회의를 참석을 통해 현재 진행 중인 섬유 관련 표준의 동향파악 및 진행 중인 표준에 대한 발표를 위해 국제회의를 참석하고자함

○ 안전보호 섬유산업의 글로벌 시장에서의 경쟁력 확보를 위해 안전보호 융복합섬유소재의 지속적인 국제표준이 절실히 필요함

4. 기대효과 :

○ 안전보호 소재로 적용 가능한 탄소섬유소재 기술은 전기.전자.바이오 등과 같은 다양한 산업에 적용되면서 미래 첨단 기술의 핵심으로 등장하였고, 세계 시장규모는 2010년에 2조 8천억 달러에 달했으며, 2030년엔 17조 달러 규모로 향후 800% 정도 성장할 것으로 예상됨

○ 안전보호 융복합소재의 국제표준은 기본적으로 산업 생태계 형성 및 발전 촉진의 방향으로 나아가는 중요한 역할을하며, 안전보호제품산업 중심의 혁신체제를 구축하는 것이 중요한 요체임

○ 세계 안전보호 융복합 섬유소재의 시장에서 국제표준을 통해 세계시장에서의 기술적, 경제적 우위를 조기 확보하고 관련 산업계의 산업구조 고도화에 기여

○ 안전보호 용복합소재 및 제품 관련 국제표준 관련 전문가 양성을 통해 미래 첨단소재개발에 필요한 전문인력 확보 및 통합연구의 핵심역할을 할 것으로 기대됨

○ 안전보호 용복합소재 국제표준의 경우 대부분 해외 의존형이었던 기존의 국내 안전보호 용복합소재 국제표준에 대한 자신감을 확보하여 안전보호 용복합소재 및 제품 강국으로 도약하기 위한 발판 마련

○ 국제표준 개발을 통해 해외 종속성 극복 및 선진국 수준의 기술 확보를 통해 미래첨단산업 니즈에 부응

○ 따라서, 이러한 안전보호 소재로 적용 가능한 탄소섬유소재 산업의 개발 및 상용화 촉진을 위해 국제표준화기구 (ISO)는 탄소섬유소재 기술 분야의 표준 제정이 절실히 필요하며 국제표준 제정을 통해 향후 후방사업 등에 전방위적으로 적용이 가능함

○ 안전보호 용복합소재의 국제표준을 개발하고 신뢰성 확보를 통해 점차 고도화 되고 있는 인류의 니즈를 만족할 수 있는 산업기술의 역량이 확충되고 인류의 삶을 편리하고 풍요롭게 하며, 행복지수를 향상시키는데 기여

5. 출장지역 : 프랑스, 파리

6. 출장기간 : 2023. 07. 10 ~ 2023. 07. 15. (4박6일간)

7. 출장자(1명)

1) 김도환

○ 소속 : 친환경·청정소재연구센터

○ 직급 : 선임연구원

8. 출장일정

월 일(요일)	일 정	비 고
07월 10일(월)	-인천국제공항출발	대한항공KE901
07월 11일(화)	- FDIS preparation 대응발표준비	전주대학교 이해성 교수 (WG22Expert)
07월 12일(수)	- TC38 WG22 참석 (FDIS preparation 발표)	전주대학교 이해성 교수 (WG22Expert)
07월 13일(목)	- TC38 WG22 참석	전주대학교 이해성 교수 (WG22Expert)
07월 14일(금)	-프랑스 샤를드골 공항 출발	대한항공KE902
07월 15일(토)	-인천국제공항 도착 후 해산	21:00 - 익일 15:45

II. 본론 : 회의내용 및 결과

1. ISO 국제회의 개요

○ 일시 : 2020년 1월 13일 - 18일

○ 장소 : 파리(Institut Francais Textile Habillement)

2. TC38 WG22 회의 내용

○ 7월 12일

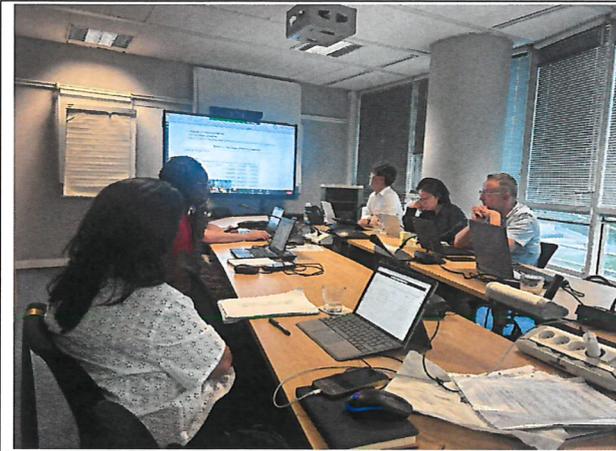
(ISO/DIS 5533 : Quantification of carbon fibre constituent element — Elemental analyser method 발표 내용)

<p>Textiles — Quantification of carbon fibre constituent element — Elemental analyser method</p> <p>1 Scope This document specifies a quantitative measurement of chemical constituent element on carbon fibre and its textile by an elemental analyser. <i>This test document is applicable to textiles of all kinds and in all forms.</i></p> <p>2 Normative references There are no normative references in this document.</p> <p>3 Terms and definitions For the purposes of this document, the following terms and definitions apply. ISO and IEC maintain terminological databases for use in standardization at the following addresses: — ISO Online browsing platform: available at https://www.iso.org/obp. — IEC Electropedia: available at https://www.electropedia.org/.</p> <p>3.1 polyacrylonitrile. PAN. synthetic, semicrystalline organic polymer resin for carbon fibre production.</p> <p>4 Principle The carbon fibre constituent elements are determined with the quantification method by using an elemental analyser (EA). All types of textiles and textile product or samples including PAN-based carbon fibre are oxidised each element in a carbon fibre by dynamic flash combination method in a high purity oxygen environment, separated on gas chromatography column, and analysed using a thermal conductive detector (TCD). When the tin boat with sample is dropped in to the reactor, the oxygen environment triggers a strong exothermic reaction. Temperature rises approximately to 1 200 °C causing the sample to be combusted. The combustion products are conveyed across the reactor, where oxidation is completed. Nitrogen oxides and sulfur trioxide are reduced to elemental nitrogen and sulfur dioxide and oxygen excess is retained. The gas mixture containing N₂, CO₂, H₂O and SO₂ flows into the chromatographic column, where separation takes place. Eluted gases are sent to the TCD where electrical signals processed by the EA software provide percentages of nitrogen, carbon, hydrogen, and sulfur contained in the sample.</p> <p>5 Reagents and materials Unless otherwise specified, analytical grade chemicals shall be used.</p> <p>5.1 Toluene, CAS No. 108-88-3.</p>	<p>6.7.4 Tin boat, with a disc-type holder in which a pretreated sample of carbon fibre is located for the EA measurement. NOTE — any unavoidable deposit of dust should be regularly removed.</p> <p>7 Preparation of test specimen</p> <p>7.1 If the test specimen is yarns, unravel the fibres and cut them to about 50 mm ± 5 mm in length.</p> <p>7.2 If the test specimen is all kinds of fabrics, cut the specimen pieces with 50 mm × (50 mm ± 5 mm). In case of woven fabric, unravel warp and weft yarns in order to get couple(s) of representative yarns from two different places of each direction. <i>In case of knitted and non-woven fabric, unravel yarns in order to get couple(s) of representative yarns from vertical and horizontal direction.</i> Fabrics or yarns may contain of different components, so take this into account when collecting them.</p> <p>7.3 Desizing <i>Put test specimen obtained by (7.1) and (7.2) in a vial (6.1). Add 20 ml of toluene (5.1). If the test specimen is not sufficiently immersed in the solvent, add more solvent. Close the vial tightly and extract the test specimen at (60 ± 5) °C for (60 ± 5) min in an ultrasonic bath. Cool down to room temperature to less than 27 °C.</i> After desizing, test specimens shall be dried at 80 °C for 5 h in a vacuum oven (6.5) and kept in the desiccator (6.2). Do not touch the specimen with bare hands during drying and mass measurements.</p> <p>7.4 Drying The vial (6.1) and tin boat (6.7.4) dry at 105 °C to 110 °C for 4 h to 16 h in oven (6.7.3) to a constant mass. After Drying, cool them in the desiccator (6.2). Do not touch the specimen with bare hands during drying and mass measurements.</p> <p>7.5 Cutting Unravel the test specimen and cut them to about 10 mm. Cut this specimen to 1 mm or less and take 1 mg to 2 mg of specimen.</p> <p>8. Test procedure</p> <p>8.1 Preparation of dosing test specimen</p>
<p>8.1.1 Break clumpy test specimen into pieces and drying completely.</p> <p>8.1.2 Balance zero adjustment before weighing the tin boat (6.7.4).</p> <p>8.1.3 The dosing test specimen is placed in a tin boat and weight using analytical balances (6.6). Do not touch the dosing test specimen with bare hands during drying and mass measurements.</p> <p>8.2 Procedure</p> <p>8.2.1 Prepare the instrument for running dosing test specimens.</p> <p>8.2.2 The weighed dosing test specimen with tin boat (8.1.3) is located on a tin boat to be inserted into an elemental analyser. The above measurement should be repeated at least five times from five different doses obtained from the test specimen. The experimental parameters such as the amount of a sample, flow rates of carrier gases, etc. are described in Annex A in details.</p> <p>8.2.3 Summarize, edit, and analyse results.</p> <p>9. Calculations and display results Electrical signal data converted by the software in the TCD give information on the amount (%) of carbon, hydrogen and nitrogen in the sample. The quantification of the element that has been analysed is determined by comparing the values obtained from the analysis of test specimen with the analysis of the use of a reference factor according to Formula (1): $K = (AS - AB)/(T \times W) \times 100 \quad (1)$ where: — K = Average K-Factor. — AS = peak area or integral of standard material. — AB = peak area or integral of blank. — T = theoretical percentage of standard material, in %. — W = mass of standard material, in g. The calculation of the percentage of element (%) is given by Formula (2): $Ca = ((AU - AB)/K)/W \times 100 \quad (2)$ Where: — Ca = Calculated % of element. — K = Average K-Factor. — AU = peak area or integral of the unknown.</p>	<p>— AB = peak area or integral of the blank. — W = mass of the unknown, in g. Test results shall be calculated up to two decimal places and end at one decimal place.</p> <p>10 Test report The test results shall include the following information: a) a reference to this document, i.e. ISO 5533:2023; b) details of test specimen to be tested; c) details of the testing conditions such as atmosphere, temperature, combustion condition if necessary, etc.; d) details of the testing results (each measure from 5 times measurements and their average with standard deviation); e) details of any deviation from the specified procedure; f) details of any unusual features observed; g) the date of the test.</p>

MB/NC	Line number	Clause/Subclause	Paragraph/Figure/Table	Type of comment	Comments	Proposed change	Observations of the secretariat
IR3-001				1a	It is better to write the clauses (clause 7 to 8) like this (see ISO/IEC Directives, Part 2: 2021, 18.4), and remove the title of 8.3 to 8.6, and write them as a subclause of "procedure" without title (except 8.5, which shall be written as a subclause of "desizing the test specimens")	7 Preparation of test specimens- 8 Desizing the test specimens- 9 Procedure- 10 Calculations and expression of test results	Agreed 7.1.1 changed 7.1. 7.1.2 changed 7.2. 8.3 moved 7.3. 8.4 moved 7.3. 8.5 moved 7.4. 8.6 moved 7.4. 8.7 moved 7.5. Deleted 8.8 by IR22-027. 8.9 moved 8.1. 8.9.1 moved 8.1.1. 8.9.2 moved 8.1.2. 8.9.3 moved 8.1.3. 8.10 moved 8.2. 8.10.1 moved 8.2.1. 8.10.2 moved 8.2.2. 8.10.3 moved 8.2.3.
IR3-002			Formula (2)	1a		W _u - mass of the unknown, in g	Agreed W = weight of the unknown, in g
IR1-003		1		1a		This document specifies a quantitative measurement of chemical constituent elements on carbon fibre by an elemental analyzer. This document is applicable to textiles of all kinds and in all forms.	Agreed This document specifies a quantitative measurement of chemical constituent elements on carbon fibre by an elemental analyzer. This test document is applicable to textiles of all kinds and in all forms.
IR-004		3.1		Ed	The definition must be able to replace the term in its context. Do not use articles at the beginning and punctuations in the end	See Word file with trackchanges	Agreed Polysaccharide PAN

MB/NC	Line number	Clause/Subclause	Paragraph/Figure/Table	Type of comment	Comments	Proposed change	Observations of the secretariat
IR2-005	1	4		9b		The carbon fibre constituent elements are determined with the quantification method by using an elemental analyzer (EA)	synthetic, semicrystalline organic polymer resin for carbon fibre production. Agreed
IR3-006		5.1		9b	See ISO/IEC Directives, Part 2: 2021, 18.4, EXAMPLE 2	Warning: The safety precautions for the harmful effects of this reagent shall be borne in mind, and shall be taken during use.	Agreed SAFETY PRECAUTIONS — The safety precautions for the harmful effects of this reagent shall be borne in mind, and shall be taken during use.
IR4-007		5.2		9b	Write like 5.1.	5.2 Helium, with a minimum purity of 99,999 % used as carrier gas.	Agreed Helium, with a minimum purity of 99,999 % used as carrier gas.
IR5-008		5.3		9b	Write like 5.1.	5.3 Oxygen, with a minimum purity of 99,999 %, used as an oxidation gas.	Agreed Oxygen, with a minimum purity of 99,999 %, used as an oxidation gas.
IR6-009		6		1b	See ISO/IEC Directives, Part 2: 2021, 18.5.4, EXAMPLE Also the analytical balance is not only used for standard materials	6.1 Vial, with a capacity of approximately 25 ml. 6.2 Desiccator, containing desiccant (silica gel, calcium chloride anhydride, calcium sulfate anhydride) to dry solvent and cool down to test specimens. 6.3 Volumetric graduated pipette, with the capacity of approximately 5 ml and 10 ml. 6.4 Thermostatic ultrasonic bath, capable of operating by a frequency of 40 kHz.	Agreed 6.6 Analytical balance, with a resolution of at least 0,01 mg. 6.7.1 Oxidation reactor, GC column and adsorption trap, the equipment shall be installed and used according to the manual provided by their manufacturer. All the parts coming in contact with a test specimen shall be

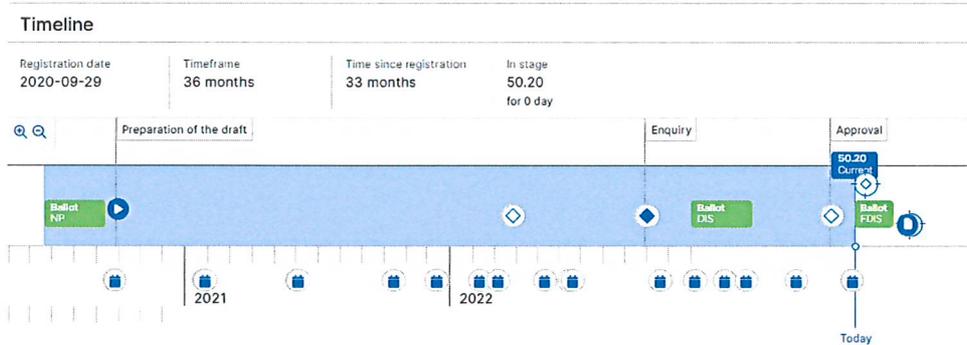
MB/NC	Line number	Clause/Subclause	Paragraph/Figure/Table	Type of comment	Comments	Proposed change	Observations of the secretariat
						6.5 Vacuum oven, capable to dry test specimens at least at 80 °C. 6.6 Analytical balance, with a resolution of at least 0,01 mg. 6.7 Elemental analyzer equipment- 6.7.1 Oxidation reactor, GC column, and adsorption trap, shall be installed and used according to the manual provided by their manufacturer. All the parts coming in contact with a test specimen shall be made of materials which are resistant to the sample and do not generate any chemical change. 6.7.2 TCD detector, with gas supply for the detector, injected sample volume, separation ratio and sensitivity adjustment shall be optimized so that the signal (peak area) utilized in the calculation is proportional to the material amount. 6.7.3 Oven, capable to dry at (105 ± 5) °C. 6.7.4 Tin boat, with a disc-type holder in which a pretreated sample of carbon fibre is located for the EA measurement.	made of materials which are resistant to the sample and do not generate any chemical change. 6.7.3 TCD detector, with gas supply for the detector, injected sample volume, separation ratio and sensitivity adjustment shall be optimized so that the signal (peak area) utilized in the calculation is proportional to the material amount. 6.7.4 Tin boat, with a disc-type holder in which a pretreated sample of carbon fibre is located for the EA measurement. NOTE — Any unavoidable deposit of dust must be regularly removed. NOTE — any unavoidable deposit of dust should be regularly removed.
IR7-010		6.7.4		9b			Agreed NOTE — any unavoidable deposit of dust should be regularly removed.
IR9-011		7		1b	The number of test specimens shall be determined		Agreed 8.2.2 The above measurement should be repeated at least five times from five different



* 회의내용 첨부 파일 참조(7월 13일 회의내용)

3. TC38 WG22 회의 결과

○ 7월 12일 ISO/DIS 5533 Textiles의 FDIS preparation을 발표 후 FDIS Voting을 진행함(2023-07-19 ~ 09-13)



Stage 1

Stage	Version	Description	Edit draft	Target date	Limit date	Started	Status
10.00	1	Proposal for new project registered				2020-06-22	Closed
10.20	1	New project ballot initiated		2020-06-23		2020-06-23	Closed
10.60	1	Close of voting		2020-09-16		2020-09-16	Closed
10.99	1	New project approved				2020-09-29	Closed
20.00	1	New project registered in TC/SC work programme				2021-11-24	Closed
30.00	1	Committee draft (CD) registered		2021-10-01		2022-03-30	Closed
30.99	1	CD approved for registration as DIS				2022-10-03	Closed
40.00	1	DIS registered		2022-08-01	2022-09-29	2022-10-03	Closed
40.20	1	DIS ballot initiated		2022-12-05		2022-12-05	Closed
40.60	1	Close of voting		2023-02-27		2023-02-28	Closed
40.99	1	Full report circulated: DIS approved for registration as FDIS				2023-06-13	Closed
50.00	1	Final text received or FDIS registered for formal approval		2023-06-19		2023-06-15	Closed
50.20	1	Proof sent to Secretariat or FDIS ballot initiated: 2 months		2023-07-19		2023-07-19	Current
50.60	1	Close of voting -- Proof returned by Secretariat		2023-09-13			Awaiting
60.00	1	International Standard under publication					Awaiting
60.60	1	International Standard published		2023-10-03	2023-09-29		Awaiting



Dear Mr Hisashi Tazawa,
 You are informed of the following ballot-related events
 See [here](#) for more detailed information on what to do

Opened ballot(s)

Project reference	Committee	External relation	Type	Due date
ISO/EDIS 5533	ISO/TC 38		FDIS	2023-09-13

English title: Textiles — Quantification of carbon fibre constituent element — Elemental analyser method
 French title: Textiles — Quantification des éléments constituants des fibres de carbone — Méthode de l'analyseur élémentaire

* 추가사항(Meeting Report 첨부 파일 참조)

III. 결론 : 향후 일정

1. TC38 WG22 향후 일정

○ 10월 30일 ISO/FDIS 5533 Textiles의 Voting Results and collated comments을 진행할 예정임

1. Meeting Location

The venue for the meetings are:

1. Hotel Peyto Samseong (Only for CAG meeting on Oct. 29)

- [9 Teheran-ro 87-gil, Gangnam-gu, Seoul](#)

2. Textile Center Conference Hall (Meetings from Oct.30 to Nov.3)

- [944-31 Daechi-dong, Gangnam-gu, Seoul](#)
- 섬유센터 (纖維center) 서울시 강남구 대치동 994-31 (테헤란로 518)

5-minute walk from “Hotel Peyto Samseong” to “Textile Center”

Date	Time	Meeting	Room
Oct. 29	PM 15:00 ~ PM17:00	TC38/CAG	Hotel Peyto Samseong, Peyto Hall (B1F)
Oct. 30	AM 09:00 ~ PM 12:00	TC38/WG33	Textile Center Conference Hall, Room C1 (2F)
	PM 13:00 ~ PM 16:30	TC38/WG22	
Oct. 31	AM 09:00 ~ PM 12:00	SC24/SG2	Textile Center Conference Hall, Room C1 (2F)
	PM 13:00 ~ PM 15:00	TC38/WG23	
	PM 15:30 ~ PM 18:00	TC38/WG30	
Nov. 01	AM 09:00 ~ PM 12:00	SC1	Textile Center Conference Hall, Room C1+C2 (2F)
	PM 13:00 ~ PM 17:00	SC2	
Nov. 02	AM 09:00 ~ PM 12:00	SC23	Textile Center Conference Hall, Room C1+C2 (2F)
	PM 13:00 ~ PM 17:00	SC24	
Nov. 03	AM 09:00 ~ PM 12:00	TC38	Textile Center Conference Hall, Room C1+C2 (2F)
	PM 13:00 ~ PM 17:00	TC38	

*This schedule may be changed by request from Committee manager