

Instructions

Research Outline Instructions

Need

- Describe why the research described in this application is necessary. This should describe the need for the work in this EMRP Researcher Grant and not the overall need for the JRP.
- Describe what the EMRP Grant Researcher will do (in relation to this broad need)

Scientific and Technical Objectives

- Explain exactly what the EMRP Grant Researcher will do.
- Break down the work into a number of scientific and technical objectives (usually these objectives will form the objectives of your technical tasks).
- Identify which activities (e.g. activity 4) relate to which objective

How this research goes beyond the State of the Art

- Describe what the current state of the art is (related to the work described in the EMRP Researcher Grant).
- Explain what your research will do to progress the state of the art in this field.

How this research relates to the JRP

- Explain how the proposed research is related to the parent JRP.
- Be clear regarding what the JRP-Participants will do, and what the EMRP Grant Researcher will do.

Projected Impact of the Research

- Explain the direct impact of the EMRP Grant Researcher's work.
- Include impact on the JRP, on the wider European community and so on.
- Be sure to only discuss the impact of this research (not of the wider technology).

Technical Work Instructions

Please use the term "REG(Shortname)", "RMG(shortname)" or "ESRMG(shortname)", and the JRP-Partner short names from the parent JRP.

Summary

In no more than 500 words please summarise all technical activities. Show how you will collaborate with the JRP-Partners in order to achieve your technical objectives. Do not summarise the Impact and Management sections. The number of activities should reflect the duration and scale of the grant.

Activity description: Describe the activities within the activity table, this is to help the EMRP Grant Researcher plan how they will approach the activity, and to ensure that the JRP-Consortium get the outputs (and decision points) that they require. You should identify the JRP-Participants who are active in the activities. Please keep a numerical order of your activities and deliverables.

- Deliverables Table
 - Describe each deliverable: note that it must be a tangible item (that could be handed over) not an activity
 - Make sure that deliverables are 'SMART' (S-specific, M-measurable, A-attainable, R-realistic, T-timely)
 - Usual "types" of deliverables are: artefact, sample, dataset, device, mathematical model, presentation, list, procedure, protocol, reference material, report, scientific paper, software, technical drawing, training course, good practice guide. However, it can be another type.
 - Please note that EURAMET do not require deliverable reports. You should only produce a report where you have a target audience that requires a report. Otherwise another deliverable type e.g. dataset may be more appropriate

- Dependencies/Collaborative work: State dependencies between this task with others in the parent JRP; describe any collaborative work between the JRP-Consortium and the REG; please note that if your EMRP Researcher Grant has no dependencies with the JRP, you should write “none”.

NOTE (for integral REGs only): If your JRP includes integral REGs, you must ensure that the information related to activities, deliverables and scheduling provided in the JRP-Protocol and the REG Research Schedule is consistent.

- If a REG deliverable is identical to a JRP deliverable, then it is recommended to use the same activity description in both the JRP-Protocol and the REG Research Schedule. If a JRP and a REG deliverable are the same then the wording and the participants should be identical.
- If a REG is not leading in the JRP activity/deliverable then you have two options:
 - Keep activity/deliverable/date the same in both Research Schedule and JRP-Protocol – but have the JRP deliverable in brackets in the Research Schedule (explaining what REG is doing in activity)
 - Say what the REG is exactly doing in this activity (e.g. providing data to JRP-Coordinator so they write a report). If they deliver before the JRP deliverable (e.g. REG providing data M3 so JRP-Partner writes the report on M4) they should have different dates in the Research Schedule and JRP-Protocol respectively. You should write “contribute to JRP D0XX” in the Research Schedule.

Impact Instructions

- Every EMRP Researcher Grant must include the following activities:
 - Knowledge Transfer
 - Training: All EMRP Researcher Grants must support the development of the researcher (such as staff at the Home Organisation of Organisation REGs and/or other staff in the JRP-Consortium). This section can include activities to demonstrate this: e.g. Training received from the JRP-Consortium, mentoring at the Home/Guestworking Organisation, conferences to be attended, relationship building with key researchers, attending committees/working groups, building collaborations, participation in industry groups / working groups
 - Exploitation: Describe planned activities to exploit the results of the work. This may include: Writing patents, agreeing licences, creating an IP exploitation plan etc.
- The number of activities should reflect the duration and scale of the grant. As a guide, generally around 10% of the grant duration is allocated to Creating Impact.

Management Instructions

- Ensure adequate management resources are allocated to attend JRP meetings and fulfil reporting requirements.
- Usually around 5% - 10 % of the grant duration is allocated to Management and Coordination

Breakdown of Research, Training & Development Allowances

Instructions for Organisation REGs

This section is not applicable for Organisation REGs and should be left blank.

Instructions for Individual REGs

- You can claim up to €800 / month for the **Research & Training Allowance**. Such as:
 - Consumables
 - Attendance at JRP project meetings
 - Attendance at conferences
 - Travel to JRP-Partners
 - Other research costs
- NOTE 1: The allowance should only include research and training costs that are **not** already covered by the Home Organisation’s overhead rate.
- NOTE 2: Where transnational Guestworking is included an additional budget for travel and subsistence will automatically be applied to the REG by the EMRP, therefore such costs should not be included.

Instructions for RMGs and ESRMGs

- You can claim up to €1500 € every 6 months (FTE) or part of 6 months (i.e. twice in 7 months FTE) for **Training and Development Allowance**. Such as:
 - Participation in training
 - Attendance at conferences
 - Other
- The development activities must be in a technical area closely related to the work being funded by the EMRP Researcher Grant.

EMRP Researcher Grant Contract

ORGANISATION REG – INDIVIDUAL REG – RMG – ESRMG (delete as appropriate)

Annex 1 – Research Schedule

Version Date:

Reference	Start date	End date	Duration	Full or Part time (% FTE ¹)
EMRP Researcher Grant:	01 January 2000	31 December 2000	12 months	100 %
ENG01-REG4				
Parent² JRP:	01 June 1999	31 May 2002	36 months	
ENG01 GAT				

Transnational Guestworking Period (applicable ONLY to Individual REGs wishing to spend up to 30% of their REG duration in a transnational institution according to Eligibility criteria) – DELETE table if not applicable

	Start date*	End date*	Duration**
NPL Management Ltd (NPL)	01 April 2000	31 May 2000	1 month

* **Note 1:** Start and end date are nominal and only require an amendment when changed significantly.

** **Note 2:** Duration of transnational periods should only be declared as whole months

Contact Details:

	Name of contact	Organisation	Country
RG-Researcher	Adam Smith		
Home Organisation³	Jo Stan	University of Star (UniStar)	UK
Guestworking Organisation 1	Liz Fam	Braun A.T. (BAT)	Germany
JRP-Coordinator	Paola Lantor	Istituto Nazionale di Ricerca Metrologica (INRIM)	Italy

¹ Full time equivalent (for an Individual REG this is the percentage of a working week that will be dedicated to this research – must not include time teaching, lecturing etc. For an Organisation REG it is the number of months of researcher effort divided by the duration, expressed as a percentage.)

² Every EMRP Researcher Grant must be associated with a JRP, we refer to this JRP as the "Parent"

³ For Organisation REGs the Contact Person can also be the same as the named REG Researcher

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Research Outline

(No more than 1 A4 page in total)

The Need for This Research

There is currently a limited amount of biofuels data available and much of this is not traceable. The work of REG(UniStar) is to undertake traceable physical measurements of biofuels samples and constituents, and supplement this with a number of validated theoretical models which will enable theoretical data of other samples to be simulated.

Scientific and Technical Objectives of this Research

The scientific and technical objectives of REG(UniStar) are:

- To develop and validate highly precise measurements of the calorific values, and enthalpies of formation, of a variety of fatty esters and triglycerides (parent compounds of biofuels). – Activities 1 and 2
- To develop and validate fast innovative methods for measurements of very low vapour pressures, to enable calculation of enthalpies of vaporisation. These measurements will be undertaken for a variety of pure model compounds of biofuels (saturated and non-saturated fatty esters), and their model and natural mixtures. The validated measurement data will enable theoretical material data (calorific values to support Equations of State) to be calculated for biofuel blends. – Activity 2
- The conventional Reid Vapour Pressure testing method (ASTM D-323-90 for environmental regulations), will be adapted and modernised to make high quality traceable measurements of biofuel compounds. – Activities 3 and 4

How This Research Goes Beyond the State Of The Art

Currently, validated measurement data for vapour pressure, enthalpy of vaporisation, liquid heat capacity, and enthalpy of formation are available for a limited number of compounds, which excludes all saturated and non-saturated fatty esters and triglycerides (which are the main types of Biofuels).

REG(UniStar) will collect and publish validated measurement data for vapour pressure, enthalpy of vaporisation, liquid heat capacity, and enthalpy of formation for around 20 different types of saturated and non-saturated fatty esters and triglycerides.

How This Research Relates to the JRP

Workpackage 2 of JRP ENG09 Biofuels aims to develop high quality metrology reference methods suitable for biofuels. The deliverables of JRP WP2 (the related workpackage) are traceable physical material data combined to equations of state (EOS). These EOS will enable material data to be calculated, for blends, which have not been directly measured.

Projected Impact of the Research

The research results will provide a standardised combustion procedure for the measurement of calorific values of biofuels by applying thermochemical corrections for acid formation based on the titration of acidity, and by analysing the anion content (nitrates, sulphates and chloride). REG(UniStar) will work on the standardisation procedure in close cooperation with JRP-Consortium (mostly NPL). Suggestions for the input into standards bodies about measurement of vapour pressure of biofuels (e.g. ASTM X-YYY-00) will be provided by REG(UniStar).

Technical Work

Activities Summary (No more than 500 words)

REG(UniStar) will develop a suitable method based on ML tracking to efficiently identify the detection threshold, or the point of subjective equality. The range of the function around this point should be obtained to estimate the acuity of this judgement. The method should be suitable for reliably obtaining thresholds and equal loudness contours in the frequency range of 2 Hz – 100 Hz. It must be validated against conventional methods (existing XS, AFP, or MLS methods). **REG(UniStar)** will also develop a non-invasive technique to quantify objectively the transfer of low-frequency sounds (2 Hz – 250 Hz).

Activities

Keep the activities numerical starting from **Activity 1**. You should say in brackets what this activity is (Technical, Training etc.). Same applies for deliverable number: start from **REG D1**

Activity 1 (Technical)

REG(UniStar) will select a set of at least 10 biofuel constituents (parent compounds) to be measured. The selected samples will be jointly agreed with NPL and CEA, and will include a group of selected fatty acids and mono-, di-, triacylglycerides, plus pure and mixed biofuels.

Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
Jan 00	REG D1	List of at least 10 biofuel parent compounds selected for testing	REG(UniStar) , CEA, NPL	List	Mar 00

Each Technical Activity should lead to **ONE** deliverable.

Dependencies/Collaborative work This activity requires input from the following deliverables/activities within the JRP:

JRP D1.1 due to be delivered May 2000.

JRP D1.2 due to be delivered Aug 2000.

This activity will provide an output that is required by JRP D3.1 due to be delivered Oct 2001

Make sure you have enough Technical activities and deliverables to report every 6 months.

Activity 2 (Technical)

REG(UniStar) will purify the samples and attestation of purities, with a target purity of 0.1 %.

Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
Feb 00	REG D2	Purified samples with validated purity <0.1 %	REG(UniStar) , NPL	Material, Data set	May 00

Dependencies/Collaborative work.

During this activity REG(UniStar) will work closely with NPL. Several visits will be undertaken in order to achieve the required purification for the samples. NPL will provide access to their state of the art facilities.

Activity 3 – Guestworking (Technical)					
REG(UniStar) will work at CEA for 2 months to develop and document a standardised combustion procedure for the measurement of calorific values of biofuels. The draft procedure will be reviewed by CEA.					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
Apr 00	REG D3	Standardised combustion procedure (for the measurement of calorific values of biofuels)	REG(UniStar) , CEA	Procedure	May 00
<p><u>Dependencies/Collaborative work.</u> This activity requires input from the following deliverables/activities within the JRP: JRP D1.1 due to be delivered May 2000. This activity will provide an output that is required by JRP D3.1 due to be delivered Oct 2001</p>					
<p>Guestworking activity only for Individual REG RMG/ESRMG: all work is done in Guestworking Organisation anyway so no need to name it in activity</p>					

Activity 4 (Technical)					
REG(UniStar) will establish the thermochemical corrections for acid formation based on the titration of acidity, and by analysing the anion content (nitrates, sulphates and chloride).					
REG(UniStar) will traceably measure calorific values of the samples using a bomb calorimeter at NPL, which is calibrated using a calibrated standard sample of benzoic acid. The results will be analysed by NPL and REG(UniStar).					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
Jul 00	REG D4	Traceably measured calorific values of the samples listed in REG D1	NPL , REG(UniStar)	Report	Sep 00
<p><u>Dependencies/Collaborative work.</u> This activity requires input from the following activities within the JRP: JRP D1.1 due to be delivered May 2000. JRP D1.2 due to be delivered Aug 2000. This activity will provide an output that is required by JRP D3.1 due to be delivered Oct 2001</p>					

Activity 5 (Technical)					
REG(UniStar) will analyse the combustion products and the water content in the sample, and analyse the results.					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
Sep 00	REG D5	Analysed combustion products of the samples listed in REG D1	REG(UniStar)	Data set	Oct 00
<p><u>Dependencies/Collaborative work.</u> This activity requires input from the following deliverables/activities within the JRP: JRP D1.1 due to be delivered May 2000. JRP D1.2 due to be delivered Aug 2000.</p>					

Impact work

Activity 6 (Knowledge Transfer)					
Publications: REG(UniStar) will submit at least X scientific papers to peer reviewed journals, including: <ul style="list-style-type: none"> ○ 1 paper probably on “xxxx”, paper jointly authored by NPL and CEA. ○ 1 paper probably on “xxx” 					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
Sep 00	REG D6	At least 2 scientific papers submitted to peer reviewed journals	REG(UniStar) , CEA, NPL	Paper	Nov 00
We expect from a 12 month RG to submit at least one paper to a peer review journal					

Activity 7 (Knowledge Transfer)					
Presentations: REG(UniStar) will submit and present at least 2 conference papers at the following conferences: <ul style="list-style-type: none"> ○ European Symposium on Applied Thermodynamics (ESAT) 2000 ○ Russian Conference on Chemical Thermodynamics (RCCT) 2000, paper jointly authored by NPL and CEA. 					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
n/a	REG D7	At least 2 conference papers submitted and presented	REG(UniStar)	Paper, Presentation	Sep 00
We expect from a 12 month RG to submit at least one conference paper to a relevant conference					

Activity 8 (Knowledge Transfer)					
Input to standards <ul style="list-style-type: none"> ○ REG(UniStar) will provide input into standard ASTM X-YYY-00 (relating to REG Activity 3 from May 2000). ○ Input into biodiesel standards about calorific values will be provided by JRP-Partner CEA, but REG(UniStar) to provide input to CEA (from May 2000). ○ Results of the standardisation work of the REG(UniStar) will be presented at JRP meetings. 					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
Mar 00	REG D8	Input into standards bodies - Vapour pressure (from May 2000)	REG(UniStar) , CEA	Meeting, report	Jun 00

Activity 9 (Knowledge Transfer)					
REG(UniStar) will provide at least 3 contributions to JRP webpages / trade journals.					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
Jul 00	REG D9	At least 3 contributions to JRP webpages /	REG(UniStar)	Article	Dec 00

		trade journals		
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Activity 10 (Training)					
<p style="text-align: right;">We expect a REG to provide/receive training.</p> <ul style="list-style-type: none"> REG(UniStar) will train researchers from JRP-Partner NPL and CEA in: <ul style="list-style-type: none"> Experimental methods for determining parameter X Correlations between the chemical structure and energy of samples Techniques for comparing experimental data and theoretical data. 					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
Aug 00	REG D10	Researchers from NPL and CEA trained in experimental methods by REG(UniStar)	REG(UniStar) , NPL, CEA	Training	Nov 00

Activity 11 (Training)					
<ul style="list-style-type: none"> REG(UniStar) will attend the following: <ul style="list-style-type: none"> 25th European Symposium on XXXXXX, Munich, Germany, June 2000 Russian Conference on YYYYYY, St Petersburg, Russia May 2000 International Conference on ZZZZZZ, Manchester, UK, August 2000 REG(UniStar) will visit at least 3 industrial stakeholder premises to discuss measurement issues. 					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
n/a	None required				

Activity 12 (Exploitation)					
<p>REG(UniStar) will consider whether any of the measurement systems and techniques developed are suitable for patenting or licensing, particularly:</p> <ul style="list-style-type: none"> Measurement techniques for testing developed in Activities 1 and 2 Chemical purification techniques 					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
n/a	None required				
All IP will be handled in accordance with the accession of the REG to the JRP Consortium Agreement for ENGXX, which will be agreed within one month of the start date of ENGXX-REG1.					

Having or not Exploitation plans this phrase should be featured here, always.

Management work

Activity 13 (Management)					
<ul style="list-style-type: none"> ○ Input to JRP reports every six months ○ Attendance at JRP meetings ○ Liaison with relevant parties regarding accession to the JRP-Consortium Agreement. ○ Writing the final REG report 					
Start Date	Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date
n/a	REG D11	JRP project meetings attended	REG(UniStar), all JRP-Partners	Meeting	Feb 00, Jul 00
Jan 00	REG D12	Input for JRP project reports provided	REG(UniStar)	Contract Report	Feb 00, Jul 00
Oct 00	REG D13	Final REG report	REG(UniStar)	Contract Report	Dec 00

Risk and Mitigation

Scientific/Technical Risks

Risk (description)	Likelihood and impact of occurrence	Mitigation	Contingency
<u>Activity 1 and 2</u> Samples cannot be adequately purified impacting on the uncertainties of measurement	<u>Likelihood without mitigation:</u> Low <u>Impact:</u> Uncertainties too high, model fails <u>Likelihood after mitigation:</u> Low	Use expertise of Home Organisation in this field. Access expertise from NMI community if sufficient purity cannot be achieved.	Buy purified samples from another source (~€ 2000).
<u>Activity 3</u> Water content of biofuel samples cannot be adequately controlled over the duration of the tests	<u>Likelihood without mitigation:</u> Medium <u>Impact:</u> Data is inadequate / delay to results <u>Likelihood after mitigation:</u> Low	Humidity controlled lab used, awaiting non-humid weather conditions.	Use an alternative equipment for the tests with improved moisture control (around 3 months delay).
<u>Activity 4 and 5</u> Results of this work are not incorporated into future European standards that support the EC Directive	<u>Likelihood without mitigation:</u> Medium/ <u>Impact:</u> Reduced impact of project <u>Likelihood after mitigation:</u> Low	Working with standards committees to publish standards. Aiming to ensure that EC are aware of published and verified data and methods.	Make data publicly available and open source (no delay or cost implications).

We expect Technical Risks to reflect most of the Technical activities

Management Risks

Risk (description)	Likelihood and impact of occurrence	Mitigation	Contingency
Blocking of open data publications	<u>Likelihood without mitigation:</u> Low <u>Impact:</u> reduced impact of project results <u>Likelihood after mitigation:</u> Low	Address data sharing in JRP Consortium Agreement.	None required
REG(UniStar) leaves before end of REG	<u>Likelihood without mitigation:</u> Medium <u>Impact:</u> delay results <u>Likelihood after mitigation:</u> Low	Deliverables spread throughout project lifetime.	Home Organisation to discuss replacement with JRP-Coordinator and EURAMET (~ 3 month delay during recruitment).
REG(UniStar) fails to continue	<u>Likelihood without mitigation:</u> Low <u>Impact:</u> reduced impact of project results <u>Likelihood after mitigation:</u> low	Regular communication between REG(UniStar) and JRP-Coordinator will minimise the risk.	JRP to find another Home Organisation if possible. JRP will undertake research according to the T&C of their contract.

You can use the Management Risks featured here changing only the short name of the Home Organisation .

Breakdown of Research, Training & Development Allowances

Example for Individual REGs

Activity Description	Related to Activity	Approximate cost (€)	Approximate date
Oxygen for combustion calorimetry (400 €/year)	Activity 1	400	Feb 00-Sep 01
Nitrogen and hydrogen gas for the gas-chromatographs (400€/ year)	Activity 3	400	Feb 00-Sep 01
Liquid nitrogen (400 € / per year)	Activity 2	400	Feb 00-Sep 01
Chemicals and samples (800 € / per year)	Activity 4 and 5	800	Feb 00-Sep 01
Other laboratory consumables and small devices (300 € /per year)	Activity 1 and 2	300	Feb 00-Sep 01
Attendance at the following international conferences at 1400 € / per conference - ESAT - RCCT - Intl conf on Chemical Thermodynamics	Activity 7	4200	Jun 00 May 00 Aug 00
Travel and subsistence for 2 JRP project meetings at 400 € per meeting	Activity 13	800	Feb 00, Jul 00
Travel to JRP-Partner in Germany for 1 week to visit laboratory and undertake experiments	Activity 3	500	May 00
Travel to attend standards meetings	Activity 13	1000	Aug 00
Travel to world-known laboratories in Portugal in order to improve the techniques used for combustion calorimetry and vapour pressure determination methods (Lisbon and Porto)	Activity 11	800	Feb 00
Total Max =800 € * 12 = 9600 €		9600	

Example for RMG/ESRMGs

Activity Description	Related to task	Approximate cost (€)	Approximate date
Travel and subsistence for the RMG (UniStar) for attendance at a Conference (e.g. APS or SPIE) to present the results of the RMG	Task 3	1500	March 2000
Total Max for ES/RMG = 1500 € every 6 months FTE		1500	

Description of EMRP Grant Researcher

Dr Smith's background in audio signal processing started in 1989 with a vocational training as studio technician at the Belgium state's broadcast company. Subsequently, he decided to become an audio engineer and studied Electrical Engineering and Computer Science. His curiosity about spatial hearing goes back to these times, and his interest changed progressively from music production to the perception and physiological processing of sound. He specialised therefore in signal processing, technical and psycho-acoustics, as well as, in the modelling of neural networks. In January 1997, he started his first job in hearing research as a technician in the SAT Research department. This was a part-time employment because he was still studying at the time. In what became later his diploma thesis, he set up an experimental system to bias the cochlear partition by low-frequency tones and measure its effect on the generation of otoacoustic emissions (OAE).

Description of Home Organisation (Employing Organisation for RMG/ESRMG)


UniStar forms part of the largest biomedical science faculty in Europe achieving a highly-successful UoA4 return in the 2008 Research Assessment Exercise. UniStar benefits from close links with the Departments of Speech Hearing and Phonetic Sciences, Anatomy and the Deafness Cognition and Language Research Centre and hosts regular cross-disciplinary and work-in-progress talks, as well as, virtual and on-site seminars for clinicians. UniStar now constitutes the largest single grouping of basic and clinical scientists interested in hearing and deafness in Europe and has received over £7,000,000 of research funding from EU FP7 program.

Description of Guestworking Organisation (applicable for Individual REGs, RMGs and ESRMGs)

BAT performs fundamental research and development work in the field of metrology as a basis for all the tasks entrusted to it in the areas concerning the determination of fundamental and natural constants, the realization, maintenance and dissemination of the legal units of the SI, safety engineering, services and metrology for the area regulated by law and for industry.

BAT has long term experience with audiological measurements. The department (Sound In Air) is specialised in the determination of hearing thresholds and maintenance of audiological standards. There is also an expertise in assessment of sound and safety aspects.

Document Control Page

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