Exemption Request Form

Date of submission: January 16, 2015

1. Name and contact details

1) Name and contact details of applicant:

Japan Electronics and Information Technology Industries Association (JEITA) ID number: 519590015267-	JEITA	**Japan Electrical Manufacturers´ Association (JEMA)**	JEMA	**Japan Business Machine and Information System Industries Association (JBMIA)** ID number: 246330915180-10	JBMIA	**Communications and Information network Association of Japan (CIAJ)**	CIAJ

With support from:

Zentralverband Elektrotechnik- und Elektronikindustrie e. V. (ZVEI) ID number: 94770746469-09	ZVEI: Die Elektroindustrie	**Japan Business Council in Europe (JBCE)** ID number: 68368571120-55	Japan Business Council in Europe

2) Name and contact details of responsible person for this application (if different from above):

Company: Murata Manufacturing Co., Ltd.	Tel.: +81 3 5469 6148
Name: Taro Hatano	E-Mail: t_hatano@murata.com
Function: Market Information Department	Address: 3-29-12; Shibuya, Shibuya-ku, Tokyo 150-0002, Japan
Company: Japan Electronics & Information Technology Industries Association	Tel.: +81 3 5218 1054
Name: Minoru Sato	E-Mail: m-sato@jeita.or.jp
Function: Environmental Affairs Department	Address: 1-1-3,Otemachi,Chiyoda-ku, Tokyo,100-0004 Japan

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2. Reason for application:

Please indicate where relevant:

☐ Request for new exemption in:

☐ Request for amendment of existing exemption in

☒ Request for extension of existing exemption in

☐ Request for deletion of existing exemption in:

☐ Provision of information referring to an existing specific exemption in:

☒ Annex III ☐ Annex IV

No. of exemption in Annex III or IV where applicable: 7(c)-I

Proposed or existing wording:

In the existing wording electronic components expressed as “capacitors” are precisely speaking “discrete capacitor components” which are out of the technical scope applicable to exemption 7(c)-I. Capacitors are covered by exemption 7(c)-II as well as by exemption 7(c)-III (which has already expired). We propose the underlined additions

to the current wording for clarification of the technical scope of 7(c)-I/ 7(c)-II /7(c)-III. Our proposal does not have the intention to enlarge the technical scope of 7(c)-I.

Existing wording:

"Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound"

Proposed additions (underlined):

"Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in **discrete** capacitor **components**, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound"

Note: Our proposal does not have the intention to enlarge the technical scope of 7(c)-I, it has the only intention to revise the current wording into a more precise, unambiguous meaning.

Additional Explanation:

Discrete disk-type ceramic capacitors and multilayer ceramic capacitors[1] were split from this exemption 7(c)-I into 7(c)-II and 7(c)-III. However, with RoHS exemption 7(c)-III having expired on 1 January, 2013, misinterpretations have occurred with "capacitors" being mistaken for "electrostatic capacitance" due to the ambiguity of the expression "capacitors". That is, since all ceramic components have electric capacitance, there have been misinterpretations that lead in all ceramic components (including ICs and boards) having electric capacitance for a rated voltage of 125 V AC or less, or 250 V DC or less, was included in the technical scope of 7(c)-III and became restricted with the expiry of that exemption. As already mentioned, what was split from exemption 7(c)-I and has expired as exempted application in 7(c)-III is lead in dielectric ceramic of discrete disk-type ceramic capacitors and multilayer capacitors for a rated voltage of 125 V AC or less, or 250 V DC or less. All other lead in ceramic and/or glass of electrical and electronic components is covered by the scope of exemption 7(c)-I. For this reason, it became necessary to revise the existing wording of 7(c)-I to a more precise content.

As a conclusion, in order that anyone can have the correct understanding of the exemption scope without having to refer to exemption 7(c)-III (already expired) or the final report previously mentioned, the technical scope excluded from the exemption should be clarified and rectified to its original meaning, i.e. discrete capacitor components.

[1] Technical scope specified on page 188 "Shapes and manufacturing of capacitors"of "Adaptation to scientific and technical progress of Annex II to Directive 2000/53/EC (ELV) and of the Annex to Directive 2002/95/EC (RoHS) final report"

Duration where applicable:

We apply for renewal of this exemption for categories 1 to 7, 10 and 11 of Annex I for an additional validity period of 5 years. For these categories, the validity of this exemption may be required beyond this timeframe. Although applications in this exemption renewal request may be relevant to categories 8 & 9, this renewal request does not address these categories. Further, categories 8 & 9 have separate maximum validity periods and time limits for application for renewals.

☐ Other: _____

3. Summary of the exemption request / revocation request

We apply for extension of the exemption 7(c)-I for electrical and electronic components containing lead in a glass and/or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.

We investigated the substitution of lead in glass and/or ceramic used in electrical and electronic components in the last review and have continued the investigation after 2009 as well, however, substitution technology has not been found up to the present day and extensive research has shown that there are no prospects of finding substitutes for at least seven years. The reason for the exemption presented by the stakeholders in 2009 is still valid. Consequently, it is necessary to extend the exemption 7(c)-I an additional validity period of 5 years for categories 1 – 7 and 10 equipment.

Numerous potential compositions have been investigated for ceramic in the last 10 years and the main task is still the development of reliable technical solutions on an industrial scale. However up to the present moment, substitution technology has not been found and there is no prospect of finding it at least until the maximum validity period.

Alternative technologies for glass have also been evaluated but so far no substitution technology is available which ensures the needed properties such as integrity of the layer, step coverage, delamination resistance, hermetic sealing, charge balance etc. and reliability to ensure public safety and avoid additional waste from premature failure. Therefore we request renewal of the exemption at least until the maximum validity period.

Our society requires the best health care and safety technology, therefore many components containing lead in a glass and/or ceramic matrix compound which provide high security performance in electronic and electrical equipment like, for

example, over-current or over-temperature protection or save lives, and have no substitutes must be used[2].

4. Technical description of the exemption request / revocation request

(A) Description of the concerned application:

1. To which EEE is the exemption request/information relevant?

Name of applications or products:

All types of electrical and electronic equipment (EEE) (Large and small household appliances; IT and telecommunications equipment; consumer equipment; lighting equipment; electrical and electronic tools; toys, leisure and sports equipment; medical devices; monitoring and control instruments (including industrial monitoring and control instruments); automatic dispensers and other EEE categories not covered by any of the categories above.)

a. List of relevant categories: (mark more than one where applicable)

☒ 1	☒ 7
☒ 2	☐ 8
☒ 3	☐ 9
☒ 4	☒ 10
☒ 5	☒ 11
☒ 6	

b. Please specify if application is in use in other categories to which the exemption request does not refer:

To our present knowledge this exemption is used for all categories of electrical and electronic equipment.

Although applications in this exemption renewal request may be relevant to categories 8 & 9, this renewal request does not address these categories. Therefore, we have not completed section 4(A)1.c. Further, categories 8 & 9 have separate maximum validity periods and time limits for application for renewals.

c. Please specify for equipment of category 8 and 9:

The requested exemption will be applied in

[2] However it should be noted that category 8 equipment (medical devices) of Annex I of the RoHS Directive are not subject to current exemption review, we provide examples of such applications for illustrative purposes to demonstrate the wide application of 7c-I scope.

☐ monitoring and control instruments in industry
☐ in-vitro diagnostics
☐ other medical devices or other monitoring and control instruments than those in industry

2. Which of the six substances is in use in the application/product?
   (Indicate more than one where applicable)
   ☒ Pb ☐ Cd ☐ Hg ☐ Cr-VI ☐ PBB ☐ PBDE

3. Function of the substance:
   Lead is used to obtain appropriate physical characteristics in glass and/or ceramic.
   - In ceramics they provide particular dielectric, piezoelectric, pyroelectric, ferroelectric, semiconductor, magnetic properties over a wide use range (temperature, voltage, frequency).
   - In glass using lead the melting and softening points are lowered, workability (machinability) is improved, wettability (affinity) with metal and ceramic is increased the bonding strength with other materials is improved, it becomes possible to control electrical properties (conductivity, resistance values) obtained by the combination with other materials over a wide range, etc., and it is possible to provide excellent functionality. In addition, chemical stability and mechanical strength of glass are improved, and excellent reliability can be obtained.

   As there are extremely numerous applications of utilizing lead-containing ceramic and/or glass, it is impossible to list all of them. Please refer to examples provided in Annex 1 (Ceramic) and Annex 2 (Glass). These examples are “illustrative” examples and they do NOT constitute a comprehensive list of examples.

4. Content of substance in homogeneous material (%weight):
   Up to 93 wt%

5. Amount of substance entering the EU market annually through application for which the exemption is requested: ~ 78 tons
   Please supply information and calculations to support stated figure.

We show a rough estimate of the total amount of lead included in glass and/or ceramic of the main electrical and electronic components.
These figures were estimated from the production and sales results of electrical and electronic component manufacturing companies from Japan and Europe.
Electronic equipment industry is engaged in the reduction of lead and environmental burdens within its powers, although it is impossible to completely cease the use of lead under the scope of 7(c)-I.
For details please refer to Annex 3.

[Disclaimer]

Electrical and electronic components are used in a wide range of final products and markets, it is impossible to provide a precise figure of the amount of lead included in glass and ceramic components in the EU for Electrical and Electronic Equipment [EEE].

Here we present the results of an estimate concerning glass and/or ceramic in electrical and electronic components for which production figures are comparatively easy to obtain by JEITA.

It should be noticed that there may be components with lead-containing ceramic and companies which are not included.

For this reason, although the estimates were done in good faith with the data resources available, the values shown here are provided strictly for reference purposes.

6. Name of material/component:

Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in discrete capacitor components, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound

7. Environmental Assessment:
   LCA: ☐ Yes
   ☒ No

(B) In which material and/or component is the RoHS-regulated substance used, for which you request the exemption or its revocation? What is the function of this material or component?

Lead is used in Electric and Electronic Components incorporated in EEE.
The number of applications and the corresponding materials using Pb in glass and/or ceramic are so numerous it is impossible to list them all. Please refer to examples provided in Annex 1 (Ceramic) and Annex 2 (Glass). These examples are “illustrative” examples and they do not constitute a comprehensive list.

(C) What are the particular characteristics and functions of the RoHS-regulated substance that require its use in this material or component?

Although some progress has been reported in the extremely limited applications, the incorporation of lead into the crystal structure of ceramic is absolutely indispensable to obtain the required effects and functionality, for example a high performance at the application temperatures etc. Without the necessary minimum performance requirements in the respective applications, the ceramic cannot perform according to the standards such as commodity products specification/Minimum performance requirements, etc.. Glass containing lead as a constituent element is able to provide the high functionality required for electrical and electronic components. Such glass can fulfil the appropriate characteristics and manage to meet the high reliability requirements over a wide range of applications.

For details please refer to Product Examples in Annex 1 (Ceramic) and Annex 2 (Glass).

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5. Information on Possible preparation for reuse or recycling of waste from EEE and on provisions for appropriate treatment of waste

1) Please indicate if a closed loop system exist for EEE waste of application exists and provide information of its characteristics (method of collection to ensure closed loop, method of treatment, etc.)

Currently one third of WEEE in the EU is being reported by compliance schemes as separately collected and appropriately managed (note some of this might be via destinations outside the Member State of origin).

The remaining WEEE is either

1) Collected by unregistered enterprises and properly treated

2) Collected by unregistered enterprises and improperly treated or even illegally exported abroad or

3) Disposed of as part of residual (e.g. municipal) waste (e.g. to landfills or incinerators).

References:

[1] Eurostat
http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key_waste_streams/waste_electrical_electronic_equipment_weee

The component manufacturers are not directly involved in EEE Waste - In general there is no closed loop system, just on customer basis related to specific sectors. There are some companies that reprocess recycled PZTs to reuse it, such as re-poling.

Some companies recycle metallic Pb from PZT.

2) Please indicate where relevant:

☒ Article is collected and sent without dismantling for recycling
☒ Article is collected and completely refurbished for reuse
☒ Article is collected and dismantled:
- ☐ The following parts are refurbished for use as spare parts: _____
- ☐ The following parts are subsequently recycled: _____

☒ Article cannot be recycled and is therefore:
- ☒ Sent for energy return
- ☒ Landfilled

Note: Some EE Equipment is recycled and refurbished. Some Equipment is disposed as part of residual waste (e.g. to landfills or incinerators)

3) Please provide information concerning the amount (weight) of RoHS substance present in EEE waste accumulates per annum:

☐ In articles which are refurbished _____
☐ In articles which are recycled _____
☐ In articles which are sent for energy return _____
☐ In articles which are landfilled _____

Electrical equipments containing electronic parts are not collected or recycled separately from other types (if any) of electrical equipments and there are no data on the volume of the lead in the parts refurbished, recycled or landfilled.

However, we provide an estimation as follows:

Total Waste (t)	2005	2006	2007	2008	2009	2010
Products put on the market	1.394.785	6.636.645	9.719.550	10.398.205	9.205.514	9.574.734
Reuse	3.147	20.725	26.404	44.001	59.316	69.368
Recovery	334.462	1.391.705	2.297.955	2.874.517	3.071.115	2.785.286
Total recycling and reuse	305.816	1.236.613	2.030.483	2.564.782	2.833.061	2.564.384
Treated in the Member State	251.034	1.280.288	2.119.001	2.554.495	2.790.144	2.775.050
Treated in another Member State of the EU	9.222	82.917	125.786	150.912	141.180	165.717
Treated outside the EU	7	25.932	96.891	95.759	110.988	106.465

Pb content (t) max	2005	2006	2007	2008	2009	2010
Products put on the market	1.395	6.637	9.720	10.398	9.206	9.575
Reuse	3	21	26	44	59	69
Recovery	334	1.392	2.298	2.875	3.071	2.785
Total recycling and reuse	306	1.237	2.030	2.565	2.833	2.564
Treated in the Member State	251	1.280	2.119	2.554	2.790	2.775
Treated in another Member State of the EU	9	83	126	151	141	166
Treated outside the EU	0	26	97	96	111	106

Based on the trend of waste amount during the period 2007 to 2010 an estimated mean value can be calculated for 2013 waste under the assumption that threshold level of the waste is not exceeding the RoHS limit.

Estimate 2013:

Maximum lead content for Products on the market: ~ 9.000 t
Reuse: ~ 100 t
Recovery: ~ 3500 t
Total Recycling and reuse: ~3300 t

See file reference: [File:EEE Waste Pb Amount.pdf]

References: [1] Eurostat
http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key_waste_streams/waste_electrical_electronic_equipment_weee

6. Analysis of possible alternative substances

(A) Please provide information if possible alternative applications or alternatives for use of RoHS substances in application exist. Please elaborate analysis on a life-cycle basis, including where available information about independent research, peer-review studies development activities undertaken

As described in the annexes, there is no suitable substance for substituting lead. The results of industry's efforts to analyze possible alternative substances are shown in the annexes.

For details please refer to Annex 1 (Ceramic) and Annex 2 (Glass).

(B) Please provide information and data to establish reliability of possible substitutes of application and of RoHS materials in application

As described in the annexes, there is no suitable substance for substituting lead. Therefore such information and analysis are not applicable in this case.

The results of industry's efforts to analyze possible alternative substances are shown in the annexes.

No data available, for details please refer to Annex 1 (Ceramic), and Annex 2 (Glass).

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7. Proposed actions to develop possible substitutes

(A) Please provide information if actions have been taken to develop further possible alternatives for the application or alternatives for RoHS substances in the application.

Boron, phosphorus, zinc, tin, bismuth, etc. have been investigated as elements for substituting lead as a constituent element of glass.
However, when compared with lead-containing glasses, chemical stability and mechanical strength of the glasses are insufficient (to meet the required functionality).
As a result, there are concerns of accidents originating from crucial failures in EEE incorporating electrical and electronic components composed of glass with lead substituted by these elements due to their insufficient reliability and quick deterioration.
Niobium, Tantalum, Antimony, Lithium, Rare Earth, etc. have been investigated as elements for substituting lead as a constituent element of ceramic.
However, those electrical (piezoelectric) properties are inferior when compared with lead-containing ceramic and cannot be stably achieved throughout a wide

temperature range. Moreover, the properties obtained in the laboratory cannot generally be achieved stably at a mass production scale. There are still many remaining technical issues needing to be solved in order to achieve mass production of practical products. Adding to that, even in the case that mass production technology is achieved, the required properties for substituting almost all of the applications cannot be obtained.

For details please refer to Annex 1 (Ceramic) and Annex 2 (Glass).

(B) Please elaborate what stages are necessary for establishment of possible substitute and respective timeframe needed for completion of such stages.

There are no prospects concerning the technical scope of exemption 7(c)-I for a comprehensive substitution to “lead-free” glass and/or ceramic at least until the next revision (21 July, 2021)

For further details please refer to Product Examples in Annex 1 (Ceramic) and Annex 2 (Glass).

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8. Justification according to Article 5(1)(a):

(A) Links to REACH: (substance + substitute)

1) Do any of the following provisions apply to the application described under (A) and (C)?

☐ Authorisation

☒ SVHC
☒ Candidate list
☐ Proposal inclusion Annex XIV
☐ Annex XIV

[1]: Lead Titanium Zirconium Oxide / EC 235-727-4 / CAS 12626-81-2 and Lead Titanium Trioxide / EC 235-038-9 / CAS 12060-00-3

☐ Restriction

☐ Annex XVII
☐ Registry of intentions

☐ Registration

2) Provide REACH-relevant information received through the supply chain.
Name of document: None

(B) Elimination/substitution:

1. Can the substance named under 4.(A)1 be eliminated?
   - ☐ Yes. Consequences? _____
   - ☒ No. Justification: No substitutes with required properties exist.
2. Can the substance named under 4.(A)1 be substituted?
   - ☐ Yes.
     - ☐ Design changes:
     - ☐ Other materials:
     - ☐ Other substance:
   - ☒ No.

     Justification: No substitutes with required properties exist.
3. Give details on the reliability of substitutes (technical data + information):Not
4. Describe environmental assessment of substance from 4.(A)1 and possible substitutes with regard to
   1) Environmental impacts: N/A
   2) Health impacts: N/A
   3) Consumer safety impacts: N/A

⇨ Do impacts of substitution outweigh benefits thereof?
Please provide third-party verified assessment on this: N/A

(C) Availability of substitutes:

a) Describe supply sources for substitutes: None
b) Have you encountered problems with the availability? Describe: N/A
c) Do you consider the price of the substitute to be a problem for the availability?
   ☐ Yes ☐ No
d) What conditions need to be fulfilled to ensure the availability? N/A

(D) Socio-economic impact of substitution:

⇨ What kind of economic effects do you consider related to substitution?

- ☐ Increase in direct production costs
- ☐ Increase in fixed costs
- ☐ Increase in overhead
- ☐ Possible social impacts within the EU
- ☐ Possible social impacts external to the EU
- ☐ Other: _____

⇨ Provide sufficient evidence (third-party verified) to support your statement: _____

9. Other relevant information

Please provide additional relevant information to further establish the necessity of your request:

Up to the present moment substitution technology has not been found, but many potential compositions have been investigated in order to develop reliable technical solutions on industrial scale however below are further examples of environmental and health and production impacts of major candidates:
Potential future candidates under investigation are expected to have more difficult raw materials and process, even under mass production considerations.
Niobium, bismuth-based substitutes: have a higher impact on environment during extraction and purification than lead, as lead is already recycled with high recovery and is relatively abundant in nature (10 to 70 times more than Bi and 3 times more than Nb).

The environmental impact of lead in ceramic and glass is low, because of the low water solubility of lead contained in ceramic and glass, therefore, leakages into the environment are very low. Current PZT production is based on water; potential substitutes would require alternative technology based on organic solvents (e.g. isopropyl alcohol, ethanol, acetone). Such solvent-based technologies and the requirement to meet ATEX regulations would result in higher efforts and risks in health and environment protection, e.g. to avoid emission of solvents (Isopropyl alcohol, Ethanol, Acetone) that are VOCs (volatile organic carbon) which also need to be minimized in the EU due to the Industrial Emissions Directive 2010/75/EU.

PZT is used in industry for processing of ceramic for many years under controlled worker conditions. Health impact has been well investigated. Please refer to references below.

References:

[1] Worker Exposure to Lead Titanate Zirconate in an Ontario Company M.L. Roy, MD, PhD; S.Siu, Md; W.Waddell, MD; P.Kennedy, BSc

[File:Worker Exposure to lead.pdf]

[2] COMMENTS ON AN ANNEX XV DOSSIER FOR IDENTIFICATION OF A SUBSTANCE AS SVHC AND RESPONSES TO THESE COMMENTS

[File:rcom_lead_titanium_zirconium_oxide_en.rtf.pdf]

Below are examples of availability of the major candidate materials.

Twenty critical raw materials were identified as critical from the list of fifty-four candidate materials in 2013:

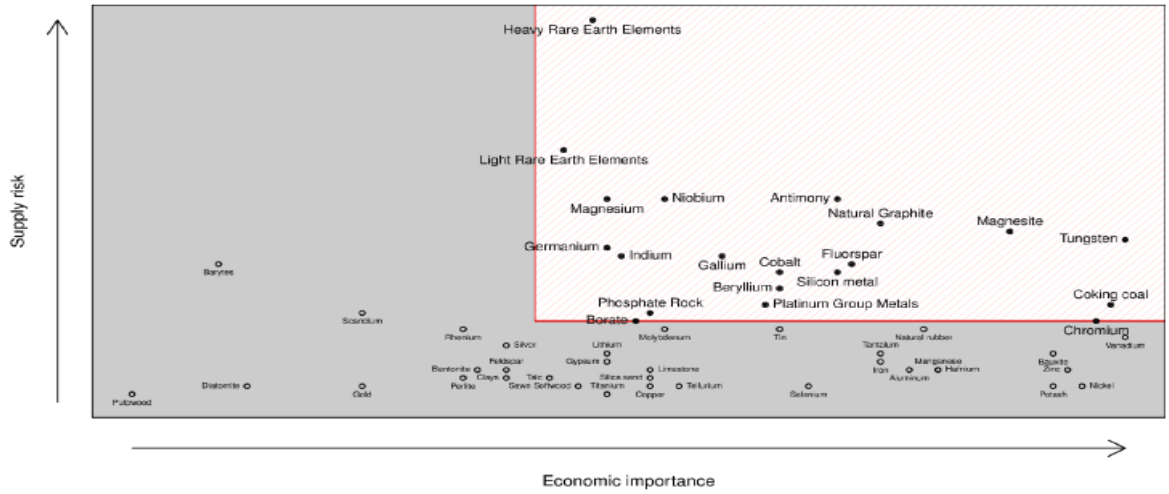
Antimony	Beryllium	Borates	Chromium	Cobalt	Coking coal	Fluorspar
Gallium	Germanium	Indium	Magnesite	Magnesium	Natural Graphite	Niobium
PGMs	Phosphate Rock	REEs (Heavy)	REEs (Light)	Silicon Metal	Tungsten	

Rem: Tantalum was on the previous critical raw materials list

References:

[1] http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm

The overall results of the 2013 criticality assessment are shown below; the critical raw materials are highlighted in the red shaded criticality zone of the graph.



Supply risk: in order to measure the supply risk of raw materials, the World Governance Indicator (WGI) was used. This indicator takes a variety of influences into account such as voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law or control of corruption.

References:

[1] http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm

[2]

[File:EU-Rohstoffinitiative.pdf]

[3]

[File:COM_2011_0025_FIN_DE_TXT.pdf]

10. Information that should be regarded as proprietary

Please state clearly whether any of the above information should be regarded to as proprietary information. If so, please provide verifiable justification:

There is no information which should be regarded as proprietary information.