



CENTRE FOR RENEWABLE &
SUSTAINABLE ENERGY STUDIES



Standards and Labelling

A study on the impact of VC9006 and the lack of compliance
- Summary report for public distribution

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LIST OF ABBREVIATIONS

CRSES	Centre for Renewable and Sustainable Energy Studies
CSR	Customer Specific Requirements
DoE	Department of Energy
dti	Department of Trade and Industry
HP	Heat Pump
LOA	Letter of Authority
MEPS	Minimum Energy Performance Standards
NRCS	National Regulator for Compulsory Specifications
TBT	Technical Barriers to Trade
TC	Technical Committee
SABS	South African Bureau of Standards
S&L	Standards and Labelling
SAIA	South African Insurance Association
SANS	South African National Standards
SWH	Solar Water Heater
UNDP	United Nations Development Programme
VC	<i>Vi Coactus</i> [Latin for: Having been compelled..., referring to Compulsory Standards]
WTO	World Trade Organization



Introduction

The South African government, through the Department of Energy (DoE) in collaboration with the Department of Trade and Industry (dti), is implementing the appliance energy efficiency Standards and Labelling (S&L) programme, which is aimed at removing inefficient household appliances and encouraging the penetration of new energy efficient appliances in the South African market.

The S&L project objectives include the introduction of mandatory Minimum Energy Performance Standards (MEPS) and a product labelling system. The MEPS will set the minimum energy classes and prohibit the sale of appliances that deliver energy performance below the minimum performance level. MEPS for hot water storage units were implemented through an amendment to the compulsory specification for hot water storage tanks for domestic use (VC 9006).

VC 9006 was first published in 2014 with the intention to ensure compliance to SANS 151 (fixed electric storage water heaters) for all hot water storage tanks. Amendments to VC 9006 was published in 2016, which requires all fixed storage water heaters to have a minimum energy efficiency rating of class B when tested in accordance with SANS 151. VC 9006's scope specifies the inclusion of solar water heater (SWH) and heat pump (HP) applications. The inclusion of a class B energy efficiency requirement is perceived to negatively affect the SWH and HP manufacturing and import industry in South Africa.

The United Nations Development Programme (UNDP) contracted Stellenbosch University to conduct a study to investigate the impact of VC 9006 on the hot water storage industry and to establish reasons for the lack of compliance to VC 9006. As such, two stakeholder workshops were held to obtain input from manufacturers, importers, industry bodies, National Regulator for Compulsory Specifications (NRCS), South African Bureau of Standards (SABS) and the short term insurance industry on the concerns they have, and the issues they experienced regarding VC 9006.

Relevant concerns raised during and outside of the workshops were investigated through a combination of desktop research and interviews with key stakeholders to explore the issues and identify and recommend possible solutions. The outcome of the study was presented to the UNDP through a detailed report. The study also makes a number of recommendations in the report and highlights important issues that need to be resolved in the short and long term.

A summary of the outcome of the study is shared in this report to allow for transparency and inclusiveness. The regulator and standardizing body also provides information in this summary report in terms of actions taken to address areas of concerns raised by stakeholders.

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1: Summary of methodology

Statements made during the stakeholder workshops and interviews held outside of the workshops were recorded and assessed by researchers at Stellenbosch University. A large number of these statements were not relevant to the scope of this study, although it was recognized as valid concerns by stakeholders. The relevant statements from stakeholders were identified and summarized into a short list of concerns that need to be investigated.

The statements are sorted into the following topics: standards and specifications related, technical related, and governance related concerns. The statements were simplified to focus on the core issue identified. It is however important to note that statements were not assumed to be accurate or true, it was however investigated to determine the accuracy and the impact of the underlying issue within the statement.

This report only contains the summary of the study results. NRCS, SABS Laboratory Services and SABS Standards Division were provided the opportunity to respond to the summary of results in order to provide collective feedback to the industry and also to provide clarity in terms of the content of the results. Communiques issued by the organizations are included in the appendices.

It is important to note that the findings of the study hold relevance to the time of the research. Several changes have taken place since that time and some of the findings listed in this report may no longer be fully (or only partially) relevant at the time of reading this summary report.



2: Summary of study findings

2.1: Standards and specifications concerns

SANS are voluntary by application and a regulator may reference a SANS which makes it a mandatory requirement. This is the case of SANS 151 which is made voluntary through its reference in VC 9006. This reference drives some of the concerns raised by stakeholders.

2.1.1: Conflict between standards and regulations

There are conflicting energy efficiency requirements between standards and compulsory specifications. Three documents were mentioned during the workshops:

- National Building Regulations and Building Standards Act 103/1977
- VC 9006
- SANS 151

The National Building Regulations and Building Standards Act 103/1977, only addresses the energy source, not the energy storage efficiency. There is no conflict between this document and the requirements in VC 9006 and SANS 151.

VC 9006 states that the energy efficiency requirements in SANS 151 apply for devices that do not incorporate means of electrical resistance heating, however, SANS 151 lists a different set of energy efficiency requirements to VC 9006. There is a direct conflict between these two documents. Part of the conflict is a result of SANS 151 not being updated to accommodate VC 9006 and VC 9006 being published prior to the necessary changes being implemented in SANS 151.

In the short term, a clear message must be sent to all stakeholders that VC 9006 takes precedence over SANS 151 and that the energy efficiency requirements of VC 9006 have to be followed. In the long term, the two documents need to be updated to convey a clear and consistent message. Further investigation is also required to identify if conflicting references exist in other standards not mentioned during the workshops.

2.1.2: Alignment with international standards

Various international standards are available but not implemented and it is the understanding of some stakeholders that implementation of international standards is a requirement of membership to the international bodies. There are also standards that are partially implemented with exceptions provided. The international standards that are considered relevant are:



- ISO 9459-1; Solar heating – Domestic water heating systems – Part 1: Performance rating procedure using indoor test methods
- ISO 9459-2; Solar heating – Domestic water heating systems – Part 2: Outdoor test methods for system performance characterization and yearly performance prediction of solar-only systems
- ISO 9459-4; Solar heating – Domestic water heating systems – Part4: System performance characterization by means of components tests and computer simulation
- ISO 9459-5; Solar heating – Domestic water heating systems – Part 5: System performance characterization by means of whole-system tests and computer simulation
- ISO 9806; Solar energy – Solar thermal collectors – Test methods
- IEC 60335-2-21; Household and similar electrical appliances – Safety – Part 2-21: Particular requirements for storage water heaters

The study found that numerous South African National Standards are dissimilar to international standards and in some cases international standards are not adopted. It is important to note that one of the key standards for this study, SANS 151, does not have an international standards equivalent that it can comply to.

Although South Africa is a signatory to the World Trade Organization's Technical Barriers to Trade (WTO/TBT) agreement, the agreement allows for deviations through application processes as well as special cases that apply to third world countries. There are various interpretations of the agreement, including the interpretation that there are no requirements placed on the signatories to adopt the international standards. Researchers attempted to contact the WTO for clarity, without success.

It is one of the aims of the TBT agreement to ensure that standards are non-discriminatory and do not create unnecessary obstacles to trade. It is therefore beneficial to research the relevant international standards, since having SANS that is not aligned with international standards for reasons other than those stated in the TBT agreement could be contrary to the aims of the agreement. International standards also provide a useful source of information and methods that could be applied by South Africa.

Further clarity must be sought into the interpretations and the intentions of being part of the agreement if the standards are not adopted. The relevant authorities (dti and its organizations) must decide upon a position in terms of the interpretation of the TBT agreement and that position clearly communicated to stakeholders. If special climate related circumstances exist, the standards should be drafted using evidence based research as input from a topical expert. Deviations from international standards should be investigated regularly to establish whether it is relevant or discriminatory in any way.



2.1.3: Suitability of standards and specifications for various technologies

The standard, SANS 151, has been identified as unsuitable for non-standard (niche) technology by numerous industry members. There is also confusion when read in parallel to VC 9006. Although there are numerous examples to this, the key issues identified are the inclusion of fixed beverage water boiler units, inconsistent requirements placed on technologies and unsuitable testing methodology.

Fixed beverage water boiler units

Fixed beverage water boiler units (also referred to as “Hydroboil” units) are commonplace in offices and other work environments in South Africa, providing instant boiling water for hot beverages such as coffee or tea.

Conflicting messages have been received from SABS and NRCS on the inclusion of this technology. There also seems to be confusion over the definitions used which results in further miscommunication in terms of the technology. The NRCS refers to the units in question as ‘under counter geysers’, SABS in some cases refers to ‘water boilers’ and the industry has mentioned both as a point of concern. These are distinctly different devices that are referred to and treated differently by the standards. ‘Hydroboil’ units are specific small containers that produce boiling or close to boiling water for beverages, ‘under the counter geysers’ are small water heaters used for domestic heating (supplies tap water).

VC 9006 expressly states that it covers hot water storage for domestic use. Domestic use, refers to drinking, ablution and culinary purposes. Fixed beverage water boiler units (“hydroboil units”) are not used for ablution and do not fall under the scope of VC 9006. Under counter water heaters are used for domestic purposes, albeit at a smaller scale, and are therefore included in VC 9006.

Conflicting information is provided from various stakeholders, even though the regulation is clear on technology inclusion. The SABS and NRCS should seek clarity internally and communicate a clear message to other stakeholders that are consistent and accurate to prevent future misinterpretations. Additionally, clear definitions and terms should be used and any confusing wording should also be modified within the VC 9006 and SANS 151.

Inconsistent requirements

Various aspects of the standards have been expressed by stakeholders as prohibitive and specifically targeted to exclude certain (niche and imported) technologies. The assertion is that inconsistent requirements make compliance exceptionally hard for those technologies.



There are sections within SANS 151 that has the effect of placing additional requirements on technologies that are not considered to be 'standard water heaters' or that are imported. These requirements include tank sizes, higher energy efficiency requirements and testing methodology. These additional requirements especially affect solar water heaters, imported products and products manufactured from material other than steel.

SANS 151 should be reviewed to identify and address inconsistencies and unfair requirements placed on niche and non-'standard water heater' technologies. The standards should be drafted to be fair and inclusive of other technologies. It is also worth considering the approach recommended by the WTO/TBT to regulate based on performance rather than design or descriptive characteristics. Any justification for differentiation and technology specific requirements should be evidence based to prevent unnecessary discrimination.

Testing methodology

An overview of the testing standards in SANS 151 revealed that ambiguities exist in the procedure, language and methodology for testing of hot water storage units. This could potentially result in deviations between independent testing results and SABS laboratory testing results.

For well-insulated products, the majority of heat loss occurs at the connection points. Additionally, stratification and heat flows result in uneven distribution of heat inside the water heater. As such, orientation of testing, position of element, cladding of pipes, distances of test piping, position of thermocouples/thermometers, the position of inlets and outlets will all have a significant impact on the testing results. The details required to incorporate these variables are not clearly specified in the standards. This oversight does not only affect the testing result but can also influence the quality of the product and the health of consumers.

Clear testing methodology should be specified in the standards that will not benefit one technology above another. The standards need to be reviewed by a suitable specialist to provide recommendations in terms of consumer rights, health and safety and technical considerations. There are guidelines available from standards in other countries (such as EN standards) that can be implemented in SANS.

2.1.4: Systems and partial testing

All hot water storage units are tested with a system-based approach to achieve compliance, whereby the entire system consisting of multiple components is tested as a single entity. This approach leads to the failure of tests due to a single part within the system and if they do pass the tests, they are still not able to obtain a Letter of Authority (LOA) if an individual component was not previously tested with the collection of components.



System based approach is considered to affect SWHs most severely. Another aspect, which was raised outside the workshops, is the restriction of innovation and the limitation that a system-based approach creates, which largely relates to the demand for custom products.

The logic of system based testing is questionable as utilized for SWHs. In most (if not all) cases, different components are manufactured by different companies. In the case of SWHs, the collector manufacturer is different to the tank manufacturer and both have different products types and models. System based testing forces specific models to be paired, even though different combinations may be applicable for different applications. Proper design practices cannot be implemented due to the forced partnering of components, which negatively affects the industry and the perception of the technology.

Similarly, there is a small consumer demand for customized products. Customized products refer to hot water storage tanks that are adapted for specific functions or sizes utilized by a client. Any changes in a model or component of a system will require a complete system test, even though the rest of the components are the same. It is unaffordable to implement such a testing requirement on a small batch product. Implementation of VC 9006 as is, will negatively affect this industry and the ability of companies (especially small and local companies) to supply this consumer demand.

Considering the goals stated by government in terms of reducing carbon emissions through renewable energy and energy efficient technology, as well as supporting Small and Medium Enterprises (SMEs), the system based testing method and related costs counteract those goals. System based testing should be re-evaluated for its applicability and usefulness, especially in terms of renewable energy technology. The demand for custom systems should be considered and a decision must be made on how to accommodate it.



NRCS response:

The SANS 151 working group made a decision that SWH/HP without an electrical element must comply with a class D energy efficiency requirement. When NRCS revises the compulsory specification VC 9006, the exclusion will be included in the compulsory specification.

The alignment of the South African National Standards with the International Standards have to be done via the SABS technical committee and working group, once completed the NRCS will include the requirements into the compulsory specification. SABS will take the WTO/TBT agreements into consideration when developing or amending standards.

Exclusion of the under-counter units must be indicated in the compulsory specification so that it can be clear to the applicant, that it to be done by the NRCS during the revision of the compulsory specifications, some the exclusion will be covered under VC 8055 requirements as per SANS/IEC 60335-2-75 standards.

The products in question are under basin/sink water heaters, these are used to heat (below boiling temperature) and store water and have a temperature control unit. This make them to fall under the scope of VC 9006, and hence are required to comply with both SANS 151 and SANS 60335-2-21. The exclusion must be discussed and agreed by the SABS technical committee and SANS workgroup.

SABS Laboratory Services response:

The SABS Laboratory Services Division concluded an in-depth review on the subject of “partial testing”, following various engagements with industry during 2018. In October 2018, the SABS sanctioned and it was communicated to industry that SABS have adopted a risk based approach in the implementation of Customer Specific Requirements (CSR) testing. In this context, the laboratories can conduct part of SANS or even customer specifications, subject to our capabilities and infrastructure. In the instance of CSR testing, SABS provides a results report, in comparison with full SANS testing where full compliance statement can be reported. The industry communications in this regarding are attached and available on our website.

It is observed that industry often address comments regarding the standards and methods for testing with the laboratory management. The SABS LSD strictly applies the requirements of the SANS and do not deviate from the testing methods and conditions prescribed by the SANS. Should a customer require alternative testing, it will be considered under CSR, but strictly only a results report can be issued as it would not be compliant with SANS. Moreover, should a customer require a change to the standard, the documented process for standards review as coordinated by the Technical Committee (TC), is and will remain the only process for change management.

Although SABS LSD has moved to accommodate industry calls for partial and other customer specific testing, in particular in support of product development objectives and containing testing expense during development, it stands firm in maintaining its compliance in terms of the requirements from the SABS Certification (Mark Scheme) and regulatory requirements as published by NRCS in the VCs governing this and other industries. The SABS LSD do not engage on any calls for deviation to the requirements of the Certification body and regulator and all such enquiries will be routed for the appropriate attention.

SABS welcome customer enquiries for testing through our website, info@sabs.co.za and call centre 0861 27 7227. The laboratory management if engaged, will utilise the same customer query routing protocol.



SABS Standards division response:

The implementation of international standards is not a requirement of membership to International Bodies. National standards bodies develop national standards that meet the conditions (Geographical, Technological, Climatic) of their respective countries and home grown standards are outcomes of these national conditions. SABS governs the process of developing national standards however the technical requirements of national standards are defined by the stakeholders participating in the SABS Technical committees which includes amongst others, manufacturers, users, regulators, consumers etc.

The SABS is responsible for developing national standards for voluntary applications and does not develop compulsory specifications or VCs. The process of developing national standards involve various stakeholders that participate in SABS committees that are responsible for developing the technical content through a consensus process and published as a SANS. Regulators do form part of the stakeholder categories in SABS committees. A regulator can achieve its regulatory objective by referencing a SANS or parts thereof or by any other means outside of a national standard. The regulator can clearly define other requirements not within national standards as part of administering regulations. SABS does not have a regulatory function.

Conflicting statements of technical requirements as purported in the report can be addressed by providing clarity in the VC over and above referencing the SANS.

The SABS is a member of ISO and IEC and can put forward international standards for adoption to the committee and the decision to adopt internationally relevant standards will reside with the committee members and their justification thereof.

The review of SANS 151 has been registered with one of the key issues to be addressed is the test method on standing heat loss for storage water heaters.

2.2: Technical concerns

2.2.1: Energy efficiency requirements

The requirement for class B energy efficiency is largely driven by a study published in 2015. The experiments conducted in that study and the outcomes are based on standard electric 150 litre hot water storage tanks, made from mild steel for high-pressure systems. This standard hot water storage unit represents the majority of all hot water storage units and was identified as the target of the S&L programme. No testing was done on SWH, integrated HP, cistern type or similar tanks of various sizes, nor on tanks manufactured from alternative materials such as plastic or copper. The general applicability of VC 9006's energy efficiency clause to all hot water systems results in contention with the producers and suppliers of other product types, and the requirements are considered unsuitable for many existing products.

The class B energy efficiency rating is potentially unachievable for technologies such as open vented cistern-type water heaters, since these units vent heat directly into the atmosphere. Similarly, technology using more conductive material or alternative insulation may also experience difficulty in achieving class B energy efficiency.

The decision taken to incorporate class B energy efficiency on all products was not based on sufficient research that considers the diversity of products available on the market. Implementing a class B energy efficiency rating on distinctly different technology prior to doing any type of research or testing creates a compliance risk, since there is no proof that compliance is achievable.

In the short term, technology which does not have the same material type or operating methods as the ones tested in the source study, should be accommodated until their ability to achieve class B energy efficiency can be confirmed. In the longer term, such technologies should be tested to determine a suitable energy efficiency class that are achievable, yet provides significant energy savings. However, this should not compromise safety.

2.2.2: Impact of insulation on test results

Performance tests are highly dependent on the insulation used, any change in the insulation properties will affect the outcome of that test. Most manufacturers utilise polyurethane foam injected into a cavity between the inner and outer tank of the hot water storage unit.

The thermal conductivity of insulation changes over time and is negatively affected by temperature and humidity. The increase in thermal conductivity occurs within days after injection and stabilises thereafter. A tank with poorly applied insulation will experience degradation within the insulation properties over time. A hot water tank tested within the first few weeks of manufacture will likely have a better test result compared to one tested months after manufacturing.



In the short term, NRCS and SABS Testing Laboratories should adopt a testing regime to accommodate possible changes in the insulation, by only conducting energy performance testing after and within a predetermined amount of time to allow the degradation effects to stabilize after manufacturing. Since the intention of the S&L programme is to provide long term energy savings, the energy efficiency requirement should be achieved irrespective of the testing date. In the long term, this subject should be investigated and researched further to determine the effect of degradation, possibly through conducting tests on tanks of various ages. It is further recommended that considerations should be given for insulation in the existing standards or new standards be drafted to provide guidance in the application of insulation for manufacturers.

2.2.3: Health risks through design and testing

The high water storage temperatures are largely driven by health factors. Water temperatures above 60°C help eliminate pathogens transmitted through water such as Cholera, Typhus, and Legionella, the latter being the greatest concern. Legionella is channelled through pipes into artificial reservoirs (water storage) and favours growth in temperatures ranging from 20°C to 45°C. Only extended exposure to temperature above 60°C is known to eliminate the disease.

Depending on the location of the thermostat and design of the tank, the upper parts of the tank will reach the desired temperature while the lower part of the tank will be at a lower temperature, potentially ideal for the growth of harmful diseases. Various studies have highlighted this risk and, according to a topical expert, the testing standards in SANS 151 do not fully account for the thermodynamic properties that can harm the public's health through these means. Legionella is addressed in other standards that include SANS 1352 and SANS 10252-1.

Additional to the health risk, the consumer will not have access to the volume of hot water stated in the specifications of the product due to the thermodynamic effects inside the tank. An uneven build-up of heat in specific locations of the tank also increases heat loss. This risk can be reduced by clearly defining the testing, construction, and installation methods of hot water storage units to control and test the temperature distribution of the hot water.

The study recommends further investigation into this topic and the ability of SANS 151 to address the effects. Such a study may involve measuring and modelling of the heat transfer within the tank, considering various positions of the element and the effects of stratification. The prevalence of diseases could also be investigated through sampling of water from various existing hot water storage tanks, as installed in households.



NRCS response:

The long-term strategy of NRCS will be to amend VC 9006 and determine a scope that is appropriate and requirements that are relevant for all technologies under the amended regulation. NRCS will participate in the discussions and formulation of the standard.



2.3: Governance concern

2.3.1: Testing procedures and capacity

At the time of this study, there were only two organisations accredited to test to SANS 151 in South Africa, namely, Test Africa and SABS. Test Africa is a private company and does not have full testing capability, which means that a manufacturer or importer is still dependent on SABS laboratory services for the remainder of the testing requirements.

The industry raised various concerns at the testing laboratories, many of which pertain directly to the processes and available capacity and the correctness of the testing and whether it is done with the required sensitivity, both in terms of client interactions and the methods used. Added to this, SABS informed the researchers that all products tested at SABS in the first seven months of 2018 failed, largely due to a lack of compliance to SANS 151 and not efficiency.

The high failure rate has a cost impact on firms but also creates capacity constraints at the laboratories. The requirement for system based testing results in complete failure due to a minor fault, complete retesting of the entire sample is consequently required.

SABS representatives stated during the workshop that after the initial launch of VC 9006, their constraint was capacity, which was subsequently resolved. It was stated during the workshops that SABS had limited testing and delays in testing in 2017, and that it is only in 2018 that SABS have been testing at full capacity. Researchers requested evidence, yet no evidence was forthcoming.

It was not possible to investigate this within the scope and timelines of the project. However, sufficient considerations should be given to this by the regulator when enforcing VC 9006. There is also the risk that through the renewed VC 9006 implementation efforts the laboratories will become constrained through the renewed demand in compliance testing.

NRCS response:

The test laboratories must indicate their test capacity and turnaround time to deliver test results to meet the demand of current market and future demands. If the laboratory is unable to meet the demand upon implementation of the amended technical regulation, the NRCS might consider the sales permit route (but not the preferred consideration). The perfect scenario would be to implement amended technical regulation when the laboratories are able to meet the demand.

SABS Laboratory Services response:

SABS LSD observed comments from industry regarding insufficient capacity and long turnaround times. Laboratory management continues to work at improved testing scheduling, including projects to expand laboratory capacity. It is important to note that:

- Testing durations vary based on sample design
- Longer turnaround times are experienced as some standard test clauses are subcontracted (i.e. Annex B scope)
- Near future capacity is based on a project in 2019 to effect laboratory upgrade aimed at 25% increase in current testing capacity per annum, while testing turnaround times will be improved by 50%. The capacity in the Geysler lab (SANS151) is being expanded as follows:

Geysler Lab	Current: 3 x work benches, able to test 3 samples in parallel	Future: 4 x work benches, able to test 4 samples in parallel	Testing Turnaround Range: Minimal 2 Months Longest 7 Months
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SABS LSD Testing capability for SANS 1307 “Domestic storage solar water heating systems”, are as follows:

- The SABS LSD solar testing facility is equipped as follows:
 - 6 x Fatigue bays
 - 6 x Solar performance bays
 - 1 x Freeze container
 - 1 x Hail testing gun
- The laboratory has the capability to test 6 systems per two days depending on the weather, if it is cloudy there will be delays.



2.3.2: Communication

Various stakeholders stated that they are not given access to the testing process nor adequate feedback on why and how their product failed, making it difficult to implement the necessary changes that will see them pass the next set of tests. Various related concerns were raised, including speculation that the testing is not done correctly, since no access is granted to view the testing. The researchers have not been provided with any evidence of this, even though this was requested.

Transparency during testing is not a requirement, but it could assist the industry in understanding the failure parameters and also to provide assurance to companies utilizing the testing facilities that the tests are done in the correct manner. The SABS confirmed that they do not permit industry access before or during the testing of their product, however, executive approval can be sought to inspect the unit. When similar tests are conducted in private (non-accredited, yet calibrated) labs by industry, it is claimed that a different set of results are obtained, creating even more concern.

The study recommends that transparency be considered to an extent that provides industry sufficient confidence that the right processes are being followed. This should be done together with an investigation into SANS 151 to ensure that various interpretations of the standards do not lead to further disagreements. However, such allowances should not risk exposure of competitor's products or open the possibility of unfair advantage or influence over the testing or staff. The high failure rate is a concern that should be addressed by investigating the reasons for failure.



SABS Laboratory Services response:

SABS is structured with three key divisions as informed by the Standards Act of 2008. These are Standards (SABS SOC), Certification and Laboratory Services, with the latter two being divisions in the subsidiary SABS Commercial SOC.

SABS has a Customer Services division, which utilises digital technology for customer query routing. Depending on the customer requirements, the routing will be addressed to the appropriate division and business unit manager for resolution. Escalation of issues such as complaints can be requested, with Senior Cluster Management, Divisional Executive Management and finally the CEO being the appropriate route of escalation.

General Standards queries such as which standard to use or how to purchase a standard are attended by the Standards Sales team. Recommendations for changes to the standards are governed by a strict change management process and coordinated through the Technical Committees. These committees ensure a collective process and strives to achieve adoption of standards through consensus gained through extensive stakeholder engagement.

Certification queries are attended by the Certification Sales team. Existing Mark Scheme clients will have a lead auditor assigned, who serves as a primary contact to the client and has means to escalate issues / coordinate technical queries through the Certification Manager.

Testing related queries are attended by the Laboratory Manager. Existing Mark Scheme clients will find that the Laboratory Manager will coordinate all responses related to testing for the Mark Scheme through the Certification Manager.

For Customer Specific Requirements (CSR) testing sales and queries, the Laboratory Manager is authorised to directly engage the client, with escalation directed to the Cluster Manager if necessary. Should a client at any time require Certification (Mark Scheme) related feedback, it will be directed through the Certification Manager.

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SABS Laboratory Services response: ...continued

The laboratories strictly apply the requirements of the SANS for testing methods and related protocol. Any change to SANS is considered CSR testing and the laboratory will only provide a results report (subject to the capability to test). CSR testing supports partial testing and other customer specific requirements but does not serve the requirements for compliance testing as prescribed by SANS, i.e. conformity requirements as prescribed by Certification's (Mark Scheme) Special Permit Conditions (SPCs) and by NRCS in the VCs (regulatory requirements). Such partial testing and customer specific testing will therefore not serve as motivation to deviate from SANS requirements and will not replace such requirements. CSR Testing only provides a results report to a client provided sample and never a compliance statement. A key test for the client is that the Certification body and regulator will always take samples independently and randomly.

Moreover, the laboratories will not entertain any queries regarding testing for the Certification body nor regulator and queries in this regard will be referred to the appropriate body for coordination and response.

Should a client wish to recommend changes to SANS, it must follow the appropriate change management process coordinated by the TC.

SABS welcome customer enquiries through our website, info@sabs.co.za and call centre 0861 27 7227.



2.3.3: Compliance and enforcement

Although the energy efficiency clause from the amended VC 9006 came into effect on 12 August 2017, at the time of this study, no actions have been taken on non-compliant manufacturers. However, products have been stopped at the ports of entry. The market is still supplied with lower than class B (thus non-compliant) hot water storage units from local manufacturers. This may disadvantage the compliant manufacturers that invested in improving their product as well as importers.

The efforts of companies submitting their products are somewhat hampered due to some companies willingly avoiding or postponing compliance. Some companies stated that they have not submitted their products for testing and are still supplying non-compliant products to the market. Such instances cannot be ratified until proper enforcement is implemented.

Compliance is possible in many cases, as seen through the fact that some standard hot water storage products have passed the requirement and obtained a Letter of Authority (LOA) from NRCS. This might not be the case for 'non-standard' water heating' units, as explained in previous sections. Details of the 'passed' and 'failed' products are not available to researchers.

According to NRCS, all applications for LOAs are subject to evaluation and they are under no obligation to accept test reports from any testing lab, including SABS. This was perceived by industry as implying that SABS test results are not sufficient. NRCS has clarified that this only happens in rare circumstances and only one such incident was recalled.

Some stakeholders were under the impression that VC 9006 imposes restrictions on importers and manufacturers, but not on the plumbers or purchasers of the products, which includes the insurance industry. However, the NRCS clarified that the regulation applies to all stakeholders for the selling of the product, which includes display, offer, advertise, etc. Manufacturers are able to export products that may not meet South African standards if they apply for and obtain a licence to do so.

The study recommends that enforcement should take place with sensitivity towards 'non-standard water heaters' that may not be able to comply, due to technical reasons provided in previous sections. Sufficient consideration should be given to the technology and the attempts of the companies to achieve compliance.



NRCS response: Since the start of the study, enforcement has increased and various actions taken to ensure compliance by all stakeholders:

- The VC 9006 project team has inspected all importers and manufacturers of SWH to determine compliance with the compulsory specification requirements
- Various retail outlets were also visited to verify compliance in the SA market
- Sanctions were imposed on non-compliant source companies
- NRCS requested the South African Insurance Association (SAIA) to confirm the commitment of their members with the requirements of VC 9006. Ten insurance companies were selected to respond to NRCS on their implementation and adherence to VC 9006. SAIA also published the requirements in their monthly newsletter. Insurance companies were instructed to only use a class B energy efficient SWH for replacement or new installations
- NRCS allowed source companies to deplete old stock not meeting the class B energy efficiency requirement by means of a sales permit. All sales permits for VC 9006 will expire 1 August 2019
- The NRCS accepts test reports from accredited labs as proof of compliance, however all test reports have to be evaluated to ensure that all the requirements of the compulsory specification are fulfilled. The NRCS is continuously working with Test laboratories to ensure that the test reports address all requirements of the VC

Outstanding on VC 9006 enforcement project:

- Joint operation with NCC which is planned for end June 2019
- Follow up visits to source companies

Challenges:

- Testing of SWH and turnaround time to provide results
- Other technologies like copper geysers which find it difficult to meet class B energy efficiency requirements
- Lack of cooperation from a major manufacturer to remove non-compliant stock from the market, which is not covered under their sales permit. Stock intended for export purposes are not allowed to be sold in the SA market if it does not comply with the requirements of the technical regulation.



2.3.4: Standards writing

Technical Committees (TCs) prepare South African standards. SANS 151 was prepared by the National Committee SABS/TC 075. The structures within the TCs should allow relevant technical considerations to prevent bias to specific technology types. Similarly, SABS Standards Division should provide sufficient oversight to prevent the implementation of unsuitable or discriminatory requirements. With this considered, inconsistent and potentially discriminatory requirements exist and the changes to the MEPS, brought about by VC 9006, have not been incorporated into SANS 151 after more than three years of awareness of the publication of the amended VC 9006.

Many manufacturers and importers stated that they no longer participate in the TCs or meetings due to bad experiences at such meetings. Without their representation, the technology they sell will not necessarily be included during the drafting or revising of standards. There is also a concern that working group members are drawn from the TC, thus serving on the technical and subcommittees and sufficient diversity in representation is not achieved. This compromises the intent and effectiveness of working groups. The risk is increased by having a small manufacturing industry that is required to volunteer their time and by increasing the general scope and incorporating all aspects of hot water storage into a single standard that is reliant on a single TC. The researchers received many negative comments over the practices of the working groups and technical committees, however, this cannot be investigated under the scope of the study, since it requires an investigation into subjective concerns, group structures, and historical matters.

Without clear and well-informed guidance from the standards body and diverse knowledgeable representation, the current setup can empower industry members in the working groups to define how their equipment must be constructed, how it must be tested, what the test results should be and where the cut-off levels are. Any changes that are implemented through other standards or specifications, such as VC 9006 or proposed by international standards, are still reliant on the same group to implement. As an example, although VC 9006 states requires a class B energy efficiency, it is still reliant on SANS 151 to provide definitions, testing and the calculation methodology for a class B rating and thus the compliance levels.

Various definitions and technical requirements are seen to disadvantage certain technologies. However, despite the concerns raised by stakeholders, this is not sufficient to conclude that SANS 151 is written with malicious intent. The current setup does pose the risk of such unintended or intended negative impacts if the process is not properly managed. The responsibility for ensuring that the standards are not used as a mechanism for exclusion lies with SABS Standards Division.

The effectiveness of the TC's should be investigated to determine if the rules and regulations are properly implemented and sufficient representation is achieved. Methods should be sought to



increase attendance and the utilization of remote participation. Any deliberate promotion of own interests or attempts to negatively influence different technology should be addressed in accordance to the SABS National Norm. There should also be sufficient independent technical expertise sought on complex matters and to assist with deadlocks or disagreements.

SABS Standards Division response:

The development of SANS is underpinned by the SABS Norm and a plethora of normative documents (policies and procedures) that forms the governance framework of publications. This is supported by the “SABS code of Conduct for Standards Development Participants” which committee members are committed to abide by as well as the “Competition law guidelines for participants in the South African National Standards Development process”. This document maintains and encourages effective competition in the marketplace through international best practice principles.

Remote participation in Standards development is highly encouraged at SABS and enhancement of tools to achieve this is being considered for implementation.

There are many institutions that actively participate in the development of SANS including research institutions like the CSIR and academia. Base documents as well as research outputs provide such working material during the process of developing national standards and this will continue to be encouraged by SABS.

It should be noted that there are scopes of standards that are complex and require R&D activities to deliver the requisite data in development of SANS and as such extended time frames need to be allowed for such actions to take place which may impact on the original expected publication date and SANS 151 is one such standard.

A balanced representation of members in committees is an important objective of the Standards Division and we will continue to rigorously monitor the participation and representation of members to ensure relevance and address efficiencies of committee administration.



Conclusion

The DoE drove an initiative to reduce the electricity consumption of electric domestic hot water storage units, specifically targeting standard units that will have the largest overall impact, by driving the amendment of VC 9006 to include energy efficiency targets. However, there has been limited compliance to VC 9006. A large number of possible reasons for non-compliance were identified based on workshops and interviews with stakeholders. Some are deliberate or intentional non-compliance, some through confusion and misunderstanding, and other through structural and technical constraints that prevent or previously prevented compliance.

VC 9006 is partially succeeding in achieving its aim of improving the energy efficiency of products, but it expands beyond its original intention. Standard electrical hot water systems are complying with more LOAs issued in 2018. It will therefore succeed in reducing the electricity demand from hot water storage units, but the standards also negatively affect less popular technology.

The study found that there are significant problems that need to be addressed, irrespective of the compliance levels achieved, this is due to good practice and other investigated topics. These include: alignment with international standards; suitability of existing standards; definitions and testing within standards; conflict and uncertainty between standards and compulsory specifications; stakeholder relationships; enforcement of regulations; and standards' writing structure and operations, among others. Amendments to both VC 9006 and SANS 151 are required to address the issues identified.

This study also found that more research should be done on various contentious issues. Changing the standards will impact other standards, and as such, a clear map or guideline is required. However, the SABS has stated that they do not have a research division that is capable of investigating the concerns raised. There is thus an open question as to who can take the lead on such research.

It is noted that since the start of this project, various positive changes have occurred, these changes include the enforcement of VC 9006 by NRCS, the implementation of Customer Specific Requirements Testing by SABS, an increased number of compliant manufacturers, among other. These positive developments may continue and consequently, some of the issues raised in this report may no longer be relevant to the reader.



Appendix A. Official SABS communiques

A.1: CSR Communiqué to Stakeholders – 16 April 2019



Dear SABS Stakeholder,

RE-INTRODUCTION OF CUSTOMER SPECIFIC REQUIREMENTS (CSR) TESTING

In the interest of improved stakeholder relations the South African Bureau of Standards (SABS) would like to bring your attention to the fact that we delivered a presentation to the Portfolio Committee on Trade and Industry in the National Assembly, on Wednesday the 6th March 2019.

Our presentation focused on the recent organisational developments and the status of the SABS Turnaround Plan, which has been compiled by the co-administrators appointed by Minister Rob Davies. Included was an update on the critical subject of “partial testing”.

As you might be aware, in 2015 the SABS made a decision to limit all testing requirements to testing against a full South African National Standard (SANS). The unintended impact on business and industry has been severe. **The dti** and the SABS have received numerous complaints and requests to reinstate partial testing.

Our Laboratories Management Team has commenced with a customer and industry engagement process with the aim of further developing an understanding of what the industry requirements for Customer Specific Requirements (CSR) testing are and how the SABS can build our testing capacity to support such activities.

Currently, all new proposed CSR testing will follow a review process before being authorised by the SABS Executive: Laboratory Services. The SABS has implemented a development program to ensure that all of our laboratories are enabled with the required processes and procedures to execute on CSR testing.

We have, thus, implemented a program to enable the testing of certain components of the various national standards (SANS) which includes the testing of non-SANS standards or other customer specific testing requirements. After the initial industry feedback we noted that in order to support local manufacturing and enhance their export competitiveness, our laboratories will be required to expand their testing capabilities to test beyond national standards. Accreditation is still dependent on external laboratory accreditation processes and accreditation to non-SANS standards and methods will be explored on a case-by-case basis, dependent on market viability. It is therefore important to appreciate that accreditation to a non-SANS test methods will require stringent evaluation and correspondingly, an adequate lead-time for implementation.

In most instances, CSR testing is likely to originate from a customer-sourced sample and therefore, the test report that we will issued, will be in the form of a data report with a watermarked certificate stating “*For Customer Information Only*”.

This is not a statement of compliance to a standard or a part thereof. However, this results report should assist industry with an independent verification of the specific characteristics of their product as determined by the specific standard or specification clause and it is anticipated to be utilised constructively by industry in the support of product development or otherwise in the application of specific buyer controls.

SABS COMMERCIAL SOC Ltd. Reg. No. 2000/013581/30

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Testing to Customer Specific Requirements (vs full SANS testing) also allow the laboratories to conduct testing to the Special Permit Conditions (SPCs) of the SABS Mark Scheme as well as specific testing requirements that the NRCS may propose through VC or other formal controls.

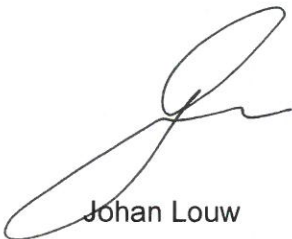
All other specific requirements are reviewed with our clients following a risk based approach, with consideration and sanction on a case by case basis authorised by the Executive: Laboratory Services.

We would like to request that you share this communicate with the members of your industry organisation regarding their individual or your industry CSR Testing requirements. We encourage industry groups and individual organisations to register for future communications, by sharing their contact details with our call center or by e-mail on info@sabs.co.za. We are also expanding our communications on social media platforms.

We would like to make use of the opportunity to thank you for your ongoing support for the SABS laboratories as we deliver our turnaround strategy.

Your feedback is welcomed.

Yours sincerely,



Johan Louw

Executive: Laboratory Services

Johan.louw@sabs.co.za

A.2: Customer Letter – Customer specific requirements testing



Dear Valued Client

In the interest of improved stakeholder relations and transparency, the SABS continues to enhance our communication to industry and other stakeholders on the services we offer. This communication serves to highlight the latest developments in the execution of the SABS laboratory turnaround plan.

A key element of the laboratory turnaround plan is the resolution of the subject of “partial testing”. In 2015 the SABS exercised a business decision to limit all testing activities to full SANS standards, following the identification of several risk factors associated with partial testing. The unintended impact on industry following this decision has been severe and the dti and SABS had received numerous complaints and requests to reinstate the application of partial testing. Key factors highlighted by our stakeholders include:

- Impact on industry on costs associated with full testing
- Costs associated with development testing, when only full testing could be sourced from the SABS laboratories
- Limitations associated with SABS only testing to SANS and constraints for industry where foreign standards have not been adopted as SANS
- Exclusion of testing to customer specific requirements, where SABS has the capability to perform independent testing against such requirements

To resolve the impasse, the SABS’s executive management has developed a risk based implementation plan to implement Customer Specific Requirements (CSR) Testing. This plan was adopted by the SABS Executive Committee and took effect in October 2018.

The SABS laboratories management has commenced engagement with a variety of customers and stakeholder groups and will continue to do so to allow further development and understanding of industry requirements for testing and how SABS can effect capacitation to support such requirements. Currently, all CSR Testing will be authorised following review by the SABS Executive for Laboratory Services. SABS has implemented a development program to ensure that all of the laboratory management structures are enabled with processes and procedures to manage and execute CSR Testing where practicable and enable direct transactional engagements such as the case for full SANS testing to be achieved in all laboratories. This program of risk management, revised operational processes and contracting models is being executed and the target is to achieve full institutionalisation within 6 months.

The SABS laboratories has thus implemented a program to enable the testing of certain parts of SANS including the accommodation of non-SANS standards or specific testing requirements (once accreditation and methods are in place). Our initial stakeholder feedback sessions noted that in order to support local manufacturing in export competitiveness, the laboratories are required to expand testing capabilities beyond SANS standards. It is also important to appreciate that accreditation to non-SANS test methods will require stringent evaluation and correspondingly adequate lead time for implementation.

SABS identified that CSR testing will support customer development and verification testing. CSR Testing will likely be from customer sourced samples and therefore the test reports will be in the form of a datasheet report and watermarked “for customer information only” and is thus not a statement of compliance to a standard or part thereof. However, it should assist customers in independently verifying specific characteristics of their product in its development programme.

SABS COMMERCIAL SOC Ltd. Reg. No. 2000/013581/30

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We welcome you to engage your regular contacts within the SABS laboratories to explore your needs for CSR Testing and assess how SABS could provide services in this regard. We would like to make use of the opportunity to thank you for your ongoing business and support to the SABS laboratories as we deliver our turnaround strategy and work towards enhanced support for our local manufacturing industries in their quest for increased global competitiveness as well as ensuring improved compliance and quality of products entering the South Africa market.

We uphold our commitment to modernise our operations and explore ongoing methods to improve operational efficiencies and enhance customer experience. Your feedback is welcomed in this regard.

For all service related queries, please contact our central call centre to ensure that your query can be logged, tracked and resolved. The contact details are:

- Phone: 0861 27 7227
- Email: info@sabs.co.za

We thank you for your continued support.

Yours sincerely,

SABS Executive Management

A.3: SABS Geysers Lab Capacity – May 24



SABS Appliances Geyser Lab Testing Capability

Product Testing	Current Lab Capacity	Near Future Capacity	Test Duration	No. of Testing Companies (Local)	Comments
Geyser Lab	3 x work benches, able to test 3 samples in parallel	4 x work benches, able to test 4 samples in parallel	<ul style="list-style-type: none"> Minimal 2 Months Longest 7 Months 	2	<ul style="list-style-type: none"> Testing durations vary based on sample design Longer turnaround times are experienced as some standard test clauses are subcontracted (<i>i.e. Annex B scope</i>) Near future capacity is based on project Lab upgrade aimed at: 25% increase in current testing capacity per annum, while testing turnaround times are improved by 50%)

SABS Appliances Geyser Lab Testing Capability Cont...

SABS

Test standard/Clause	Sample Quantity		Testing Lab
SANS 60335-2-21	1	Fully assembled geyser tank with components	Fully SABS
SANS 60335-2-40 (Heat Pumps)	1	Fully assembled geyser tank with components	Fully SABS
SANS 151	1	Fully assembled geyser tank with components	Fully SABS
UV test for plastic materials exposed to sun	1	outer cover - Dome	Fully Subcontracted
Annex B (Additional Tests based on sample design)			
B.1. Mild steel containers	N/A	Not tested before. Lab has no test capability	N/A
B.2 Vitreous enamel lined steel storage containers	1	Geyser tank with/out components. Appliances lab to cut one of the samples being tested.	Fully Subcontracted
B.3 Polyethylene lined steel storage containers	1	Fully assembled geyser tank with components	Partially SABS & Subcontractor
B.4 Single shell Copper storage containers	0	No additional samples required. Appliances lab to cut one of the samples being tested	Fully Subcontracted
B.5 GRP storage water heaters	4	Inner tanks without components	Partially SABS & Subcontractor
B.6 Stainless steel for closed pressurised (HP)	0	No additional samples required. Appliances lab to cut one of the samples being tested	Fully Subcontracted
B.7 Stainless steel for non-pressurised (LP)	0	No additional samples required. Appliances lab to cut one of the samples being tested	Fully Subcontracted
B.8 Polybutylene inner container and outer glass-reinforced plastic (GRP) strengthner	1	Fully assembled geyser tank with components	Partially SABS & Subcontractor
	7	Inner lining materials cut to A4 sizes	
B.9 Polyethylene cistern type geysers	1	Fully assembled geyser tank with components	Partially SABS & Subcontractor
	7	Inner lining materials cut to A4 sizes	
B.10 Polypropylene cistern type geysers	1	Fully assembled geyser tank with components	Partially SABS & Subcontractor
	7	Inner lining materials cut to A4 sizes	
B.11 Polypropylene closed type geysers (for working pressure not exceeding 400kPa and no electrical heating element	1	Fully assembled geyser tank with components	Partially SABS & Subcontractor
	7	Inner lining materials cut to A4 sizes	
B.12 Closed type geysers with stainless-steel tubes integral with polyohthalamide (PPA) plastic manifolds as end caps (for a maximum pressure rating of 400kPa and no electrical heating element)	0	No additional samples required. Appliances lab to cut one of the samples being tested	Fully Subcontracted

SABS

Appendix B. Official NRCS communiques

B.1: Letter to SAIA – 10 Dec 2018



Our ref: SAIA/02

Enquiries: Mr. Isaac Malapela

Telephone: (+27) 012 482 8700

Date: 29 November 2018

Dear Sir/ Madam

RE: Enforcement of VC 9006 – COMPULSORY SPECIFICATION FOR “HOT WATER STORAGE TANKS FOR DOMESTIC USE”

This letter is to establish commitment and adherence of the insurance industry in respect to NRCS’s communique dated 31 October 2018 which informed SAIA members that all electrical/dual electrical geysers installed must comply with the requirements of VC 9006 thus being a class B energy efficient product and having a valid NRCS letter of authority. The compulsory requirement is applicable to all warranties and new installations.

NRCS requests a formal response from the selected insurance companies/brokers listed below on their commitment and actions taken to ensure compliance in respect to geyser installations:

1. Absa
2. Outsurance
3. Santam
4. MiWay
5. Auto and General
6. Alexander Forbes
7. Discovery Insure
8. Dial Direct
9. Standard Bank
10. Nedbank

The selected SAIA members must please advise NRCS within seven working days of their commitment and actions taken to ensure compliance with the technical regulation requirements.

Yours Sincerely

A handwritten signature in black ink, consisting of several vertical strokes followed by a horizontal line that loops back to the left, all enclosed within a larger, loopy oval shape.

Mr. I Malapela

Acting General Manager: Electrotechnical

National Regulator for Compulsory Specifications

Date: 07 December 2018

cc: The Department of Energy

B.2: Letter to Industry – 13 November 2018



Our ref: Industry/VC 9006

Enquiries: Ms. P Andrews

Telephone: (+27) 021 526 3400

Date: 12 November 2018

Dear Sir/ Madam

RE: ENFORCEMENT OF VC 9006 – HOT WATER STORAGE TANKS FOR DOMESTIC USE

This letter is to inform all stakeholders and industry members of the enforcement of VC 9006 which commenced on 1 August 2018, however manufacturers and importers will still be given an opportunity to deal with the current stock which does not meet the class B energy efficiency requirement by applying for a NRCS sales permit.

Sales permit applications must be uploaded on the online CRM systems at www.nrccs.org.za with all the supporting documents including the following:

1. Full SANS 151 test report including reports referred by this standard
2. Current or Previous LOA if any
3. Copy of SABS Mark permit if any
4. Indemnity letter which states that your company will be liable for any damage or incident which may occur during the term of the sales permit and that NRCS will not be held liable in any event.
5. Provide an implementation plan on how they will achieve full compliance to VC 9006, class B during the sales permit term.
6. Proof of payment, cost of a sales permit is R 2970.00
7. Evidence of latest levy payments

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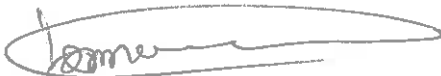
All sales permit applications will be subjected to technical evaluation before a concession will be considered. Successful applicants will be informed once the NRCS CEO approves the sales permit. Successful applicants will be granted a concession for the period 1 August 2018 to 1 August 2019 and applicable to all old stock produced or imported before 12 August 2018, no extension will be granted after this period. Any concession granted will be for the models and volumes of products covered by the scope of the concession, and will not prevent the NRCS from enforcing the compulsory specification from the effective date.

Please note no person may sell, import or manufacturer a commodity to which a compulsory specification applies if it does not meet the requirements of the applicable technical regulation.

Hot water storage tanks for domestic use can only be imported, sold or manufactured if it has a valid letter of authority or if the importer or manufacturer is in possession of a valid sales permit issued by the NRCS for the applicable concession period.

We trust the above clarifies the situation on VC 9006

Yours Sincerely



Mr. E Mamadise

CEO: National Regulator for Compulsory Specifications

Date: 13/11/2018

cc: The Department of Energy