

RAC Technical Workshop – Elsenburg 2019

SANS applicable to Air-Conditioning Systems / Cold Storage Refrigeration Systems

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Intro

- Industry - 11 Years
- Started in Commercial RAC – Technician, Installation, Maintenance, Project Manager
- Joined GEA Africa in 2011
 - Industrial Refrigeration / SANS 10147, 347, PER...
 - Industrial refrigeration installations – Food, Beverage, Dairy, DCS
 - Project Manager
 - Heading up Service division projects team
 - Currently in Engineering & design division for large industrial projects
 - Worldwide GEA Engineering Standardisation project

Agenda

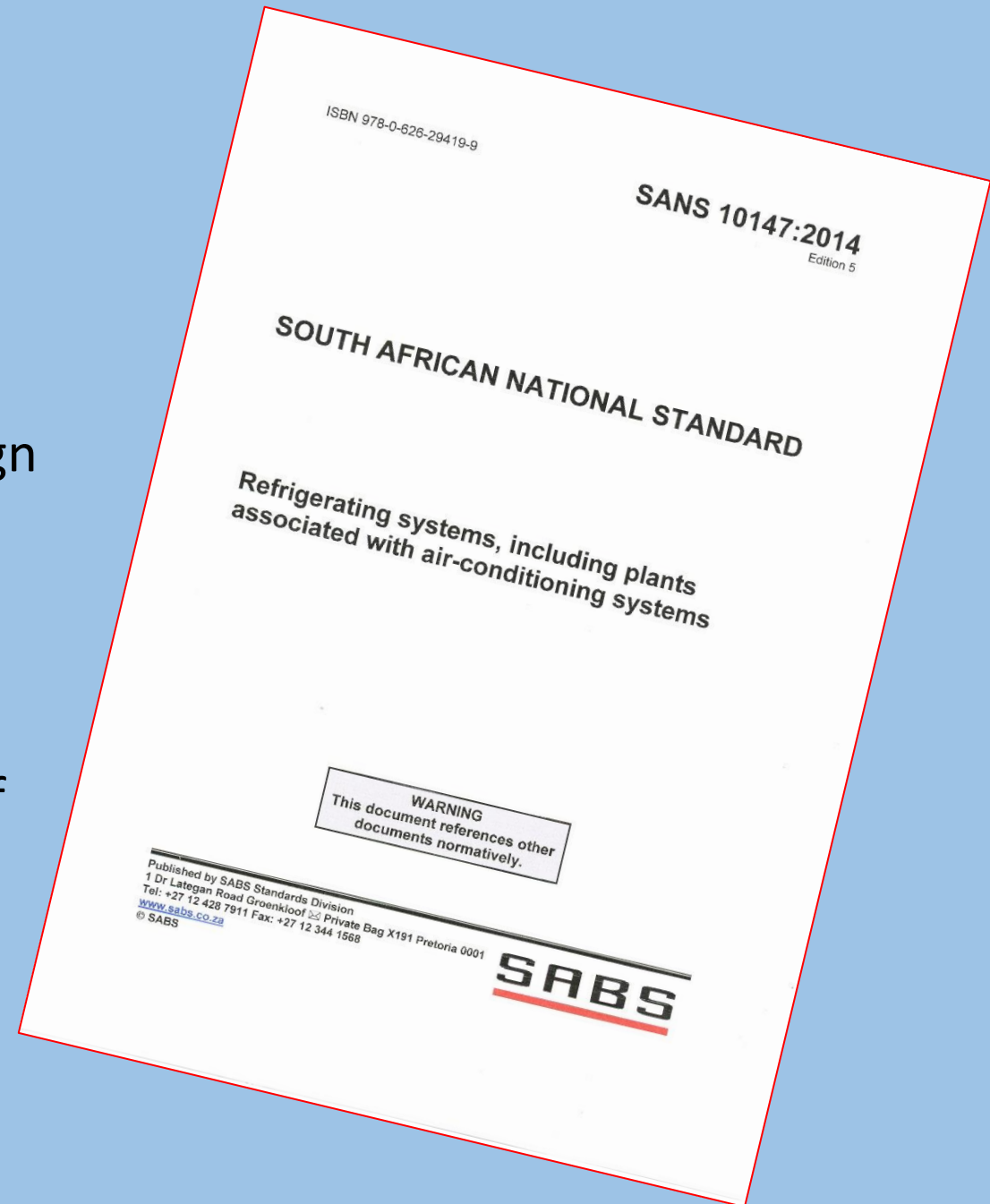
- SANS 10147:2014 Ed.5 Level of Competence – Annex D
- SANS Codes Relevant to RAC industry
- Design and Construction Processes for RAC Systems – Applicable legislation
- SANS 10147 edition 6 – Future

SANS 10147

Extract:

“This document was revised (2014) in order to align it with current practices and to comply with the requirements of the Montreal Protocol on substances that deplete the ozone layer.

It is intended to provide an authoritative source of basic safety principles for use by responsible and competent persons or organizations.”



SANS 347

Extract:

“The risk of injury arising from defects in the construction of pressure equipment and non-pressure equipment is related to the consequences should failure occur during use.

These consequences are primarily dependent on the hazard level. An increased hazard level requires an increased degree of independent conformity assessment or verification.

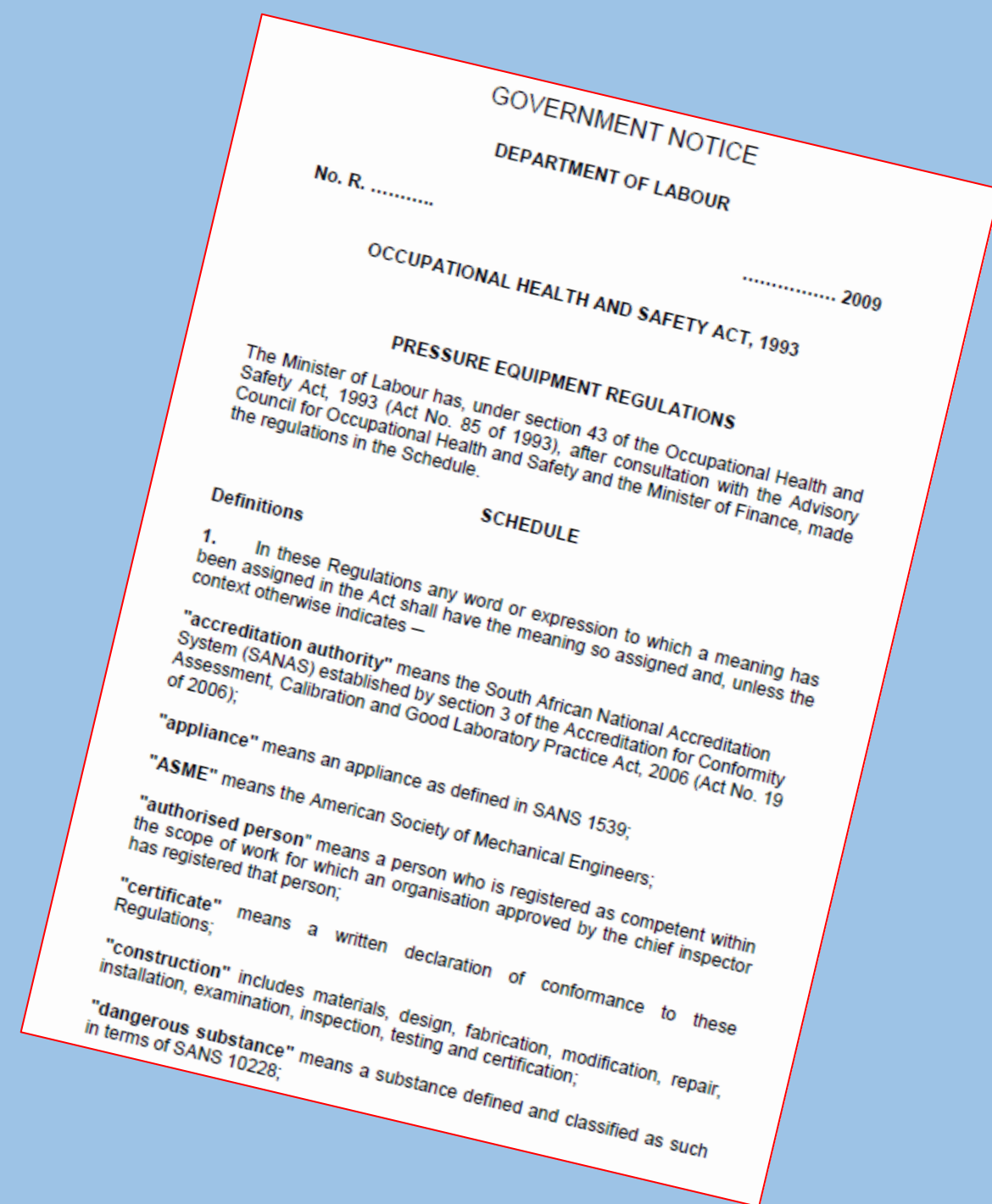
Should a certified management system be controlled by the manufacturer, the involvement of the approved inspection authority (AIA) will be decreased.”



PER

Extract:

“These Regulations shall apply to the **design, manufacture, operation, repair, modification, maintenance, inspection and testing of pressure equipment with a design pressure equal to or greater than 50 kPa**, in terms of the relevant health and safety standard incorporated into these Regulations under section 44 of the Act. “



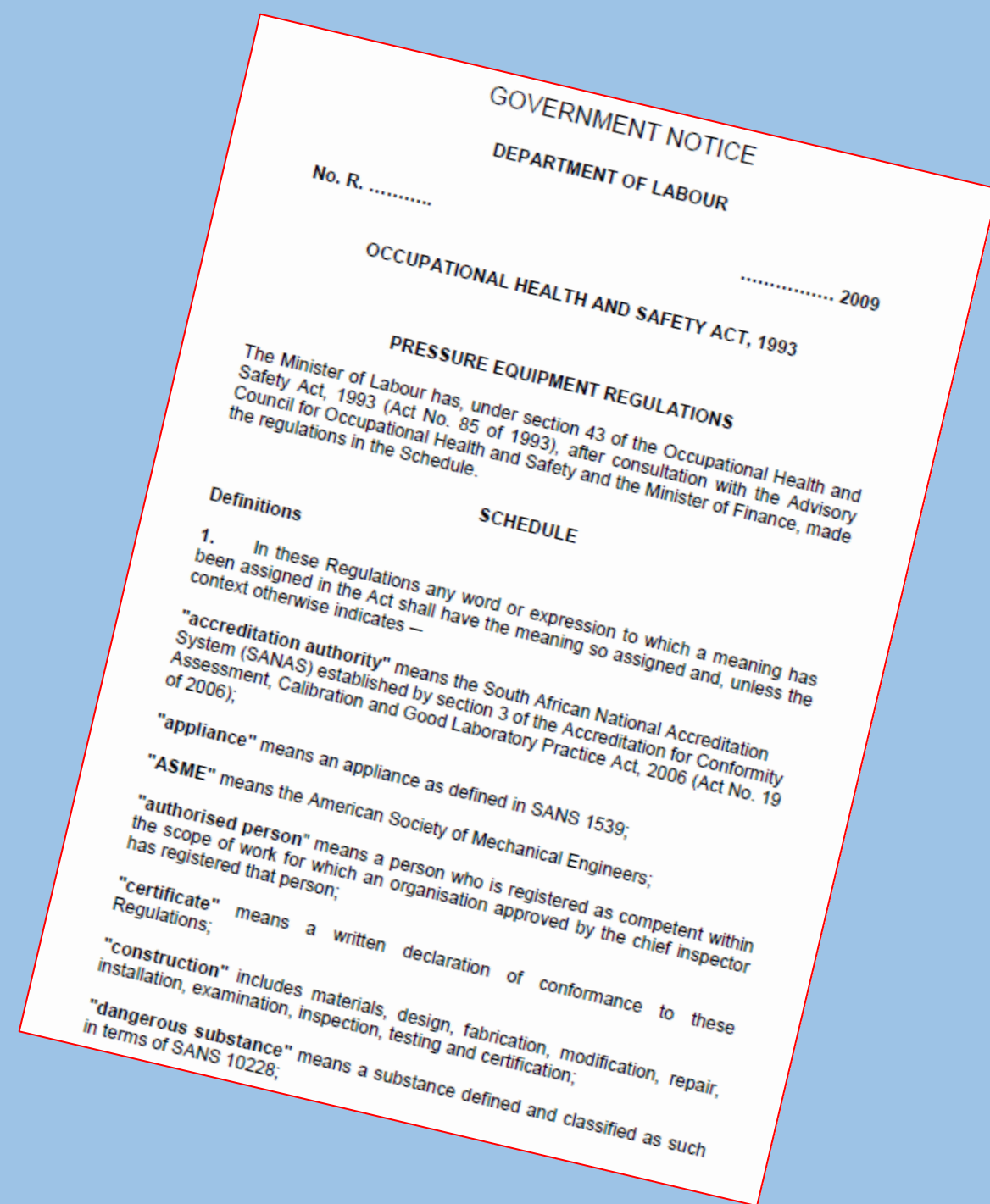
PER continued..

Extract:

“(1)Any person who **manufactures, imports, sells, offers or supplies any pressure equipment** described in these Regulations for use in the Republic shall ensure that such equipment complies with these Regulations.

(2) Any person who **erects or installs any pressure equipment for use in the Republic shall ensure**, as far as is reasonably practicable, that it is **erected or installed in a safe manner and without risk** to health and safety when properly used.

(3) **All pressure equipment for use in the Republic shall be categorized and submitted to the applicable conformance assessments of SANS 347** in addition to the requirements of the relevant health and safety standard incorporated into these Regulations under section 44 of the Act. “



Annex D of SANS 10147:2014

Levels of competence for personnel involved with refrigeration and air conditioning systems.

There are three levels of competence

- A: operational personnel
- B: installation and repair personnel
- C: designers, commissioning personnel and inspectors

A company that works in any field of refrigeration shall have **registered competent personnel**.

Note: Such company should have adequate equipment to enable the competent person to do the work

The training required for each level is set out in **Annex D**.

Qualification to these levels is undertaken by the
South African Qualification and Certification Committee

In the categories of :-

- Level A: Operator or Trainee
- Level B: Refrigeration Technician, subdivided into
 - Commercial refrigeration
 - Ammonia refrigeration
 - Automotive air conditioning
 - Transport refrigeration
 - Marine refrigeration
- Level C: Inspector (no subdivisions)



- Some aspects of a persons competence will need to be **reassessed on a regular basis**.
- Persons shall **maintain their competence**, as appropriate, for example by the study of relevant literature and doing practical work

The minimum requirement for theoretical knowledge and practical experience for **Level A** shall be:-

- knowledge of basic health and safety requirements
- basic knowledge of relevant national legislation
- basic knowledge of SANS 10147
- handling of refrigerants
- personal protective equipment
- the refrigeration process, components & equipment
- electrical and control functions
- maintenance operations
- piping and instrumentation diagrams
- experience in plant installation and operation

The minimum requirement for theoretical knowledge and practical experience for **Level B** shall be:-

- detailed knowledge of all aspects set out in **Level A**
- detailed knowledge of SANS 10147 but **no requirement for carrying out calculations**
- **three years practical experience** in installation, operation, maintenance and repair of refrigeration systems

The minimum requirement for theoretical knowledge and practical experience for Level C shall be:-

- specialised and in-depth knowledge of all aspects set out in **Level B**
- be **competent** to ensure that a refrigerating system **complies** with the **requirements of this standard** that concern health, safety, environmental protection and energy efficiency.
- have **specialized and in-depth knowledge of legislation and regulations** relating to refrigerating systems and heat pumps.
- be **able to design systems, develop and check piping and instrumentation diagrams, instructions, manuals, etc.**
- be **able to give instructions concerning safety measures and procedures for the used refrigerants, etc.**

Design and Construction Processes for Refrigeration and Air Conditioning Systems

Receiving the enquiry

- 1 You receive an enquiry from a supermarket company, but it could be for any refrigeration or air conditioning equipment, for the supply and installation of a 400 kW medium temperature rack and a 100 kW low temperature rack.
- 2 You design the plant, selecting the compressors, condensers, sizing the pressure vessels and piping etc.

Check that the design meets SA legislation

- 3 Verify that the design meets the requirements of **SANS 10147:2014**. Do the pressure vessels, liquid receivers, oil separators etc. comply with the Health and Safety Standards listed in **SANS 347:2012**.
- 4 Does the piping system follow the standards set out in **ASME B31.5:2013**.
- 5 Are all the other requirements of the **Occupational Health and Safety Act** met?

You got the order - What to do next

- 7 Consult your **Authorised Inspection Authority (AIA)** and discuss with them what information they will need to **certify the pressure envelope of the finished installation**. This will typically comprise:-
 - a. Pipe and instrument diagram of the system
 - b. Type and material certificates of all components showing that they are fit for purpose i.e. pressure ratings etc.
 - c. Relief valve calculations
 - d. Manufacturers certificates for all pressure vessels
 - e. Piping pressure calculations signed of by a professional engineer/technologist
 - f. Weld procedures and welder qualifications

During construction

- 8 The AIA will want to visit site during construction, particularly to check what materials are being used, must be those they were given certificates for.
- 9 For welded piping, they will need to see the welders' qualifications and these must be to the weld procedures submitted.
- 10 At the completion of the installation the AIA will want to witness the pressure test.
- 11 The AIA will then issue a certificate of construction.

On handover

- 11 Together with the **instruction manual** (see SANS 10147 for details) the user of the plant must be issued with the **AIA's certificate of construction** plus a **Certificate of Conformity for Gas Installations** as per the Occupational Health and Safety Act, 1993. Regulations 17(3) of the Pressure Equipment Regulations, 2009 signed by a **Level C competent person**
- 12 The above Pressure Equipment Regulations also state that pressure vessels shall be **pressure tested every three years** but that an AIA can **waive** this procedure **twice**. Therefore, it is **mandatory for a pressure test every nine years**. However, for refrigeration systems there is a way around this. **Annex H of SANS 10147:2014 outlines a risk based inspection scheme** that if followed will obviate the need for this pressure test. If you **don't do the inspection, you must do the test**.

SANS 10147 edition 6 - Future

- Discussion with Nigel Amschwand
- Main topics open for discussion at SANS 10147 committee
 1. Clarifications on clauses and items that could be misinterpreted by the reader
 2. Safety legislation and new regulations for A2L and A3 refrigerants
 3. Adoption of EN ISO 22712 standard to replace SANS 10147: Annex D - level of competence
 - Cat A → BA – Basic Appreciation level
 - Cat B → WK – Working Knowledge level
 - Cat C → FO – Fully Operational Level
 - Cat D → LE – Leading Edge level