
Proposed Flammable Gases and Oxygen Tank Wagon Code of Practice

Submission to the Environmental Risk Management Authority (ERMA)
20 June 2008

Background to IPENZ

The Institution of Professional Engineers New Zealand (IPENZ) is the lead national professional body representing the engineering profession in New Zealand. It has approximately 10,000 Members, including a cross-section of the engineering community from students to senior Fellows in management or governance positions in important design or construction organisations. IPENZ is non-aligned and seeks to contribute to the community in matters of national interest giving a learned view on important issues, independent of any commercial interest.

In making these comments IPENZ has drawn particularly on the knowledge of its Members who work in road transport engineering, or are otherwise aware of the issues.

Executive Summary

IPENZ thanks the Environmental Risk Management Authority (ERMA) for the opportunity to comment on the proposed “Flammable Gases and Oxygen Tank Wagon Code of Practice” (CoP) consultation paper. We note ERMA’s desire that this CoP will provide users with a method of meeting the requirements of the Hazardous Substances (Tank Wagons and Transportable Containers) Regulations 6-29, 32-37 and 42 (Reg or Regs).

In 2007 IPENZ made a submission on the proposed CoP for tank wagons carrying liquids. IPENZ congratulates ERMA on the greatly improved standard of the present consultation draft as compared with that of 2007. In particular, we are pleased to note that ERMA has now closely adhered to the international typographical conventions used in technical writing.

IPENZ recommends that ERMA’s approved engineering design Test Certifiers be Chartered Professional Engineers assessed within the previous five years as being competent in this branch of mechanical engineering.

IPENZ recommends that the designers mentioned in A1.1 be assessed within the previous five years as being competent in this branch of mechanical engineering anywhere on the spectrum of technician, technologist, or professional.

Submission

The following recommendations and comments are numbered in correspondence with the consultation draft.

1.3.1 Performance-based regulations

IPENZ agrees that regulations made under an Act should specify a desired outcome without prescribing how to achieve it, that is, be performance-based.

1.3.2 Prescriptive subsidiary documents

IPENZ agrees that approved codes of practice should provide users with a method of meeting the regulatory requirements, that is, prescribe solutions that are deemed to comply with the regulations. Approved codes of practice may cite other documents such as design guidelines and standards.

2.1.1 Is the phrase “as far as practicable” in the first line meant to refer to the strength of construction or the fire resisting materials? ERMA’s intention is not clear. IPENZ suspects the latter, in which case the sentence should read “The vehicle shall be strongly constructed, as far as practicable of fire resisting materials.”

2.3.1.3 The sentence “*The height of the collision bumper measured from the ground to the lowest surface of the bumper shall be not less than 600 mm and not more than 1000 mm*” appears to be more restrictive than Reg 23(1) which puts the limits at 500 mm and 1000 mm.

2.3.4.3 Is a load of 10 tonnes to be taken as a force of 98.1 kN or 100 kN? We note that the Regs specify some loads in tonnes, but the time is overdue for technical writers to specify forces in force units (eg kN), masses in mass units (kg or tonnes), and to make it clear that the term “load” could be either a mass or a force depending on the context. The phrase “design action” may be useful.

2.4.6.2 The phrase “hazardous atmosphere zone” needs to be defined. IPENZ suspects it comes from the AS/NZS 2430.3 series of Standards. The requirements under i, ii, and iii also need to be defined – they may refer to AS/NZS 2381.1:2005. If so, the designation EEx may mean Ex ‘e’.

2.4.6.3 The source of the IP designations needs to be cited.

2.4.6.5 As written, the clause refers only to LPG. What does ERMA require for other flammable gases and oxygen?

2.4.7 Where is clause 2.4.11?

2.4.9 If the ACoP is to include a prescriptive element, a source document for “suitable electrical equipment” should be cited.

2.5.1 “*The type and number of fire extinguishers to be fitted to the vehicle are specified in Table 2.1 of this Code*” is better English.

2.7.2 Fire Resisting Shields

...*the person in the driver’s cab, not the person in the drivers cab.*

...*radiant heat transfer that exceeds 2.56 kW/m², not 2.56 kw/m2.*

2.9.1 Is the 100 mm clearance between the back of the cab and the front of the load tank, or is it between the back of a fitting behind the cab and the front of the articulated cargo tank? We do not see how to interpret the sentence “*Any fittings carried in this space will not compromise the integrity of the load tank*”.

2.9.5 Fatigue design methods

Following 2.9.4.2, IPENZ recommends that the limit state and allowable stress standards be cited. The clause could read “*Fatigue of the Tank wagon chassis mountings shall be included in the design of the Tank wagon (e.g. by reducing stress concentrations). The methods for limit state fatigue design in steel shall be those given in NZS 3404: Part 1 section 10. The methods for allowable stress fatigue design in steel shall be those given in AS 3990 appendix B. The methods for allowable stress design in aluminium shall be those given in NZS 1664: Part 2.*

At present we know of no limit state standards for aluminium structural design.

2.9.5.1 Fatigue design load cases

ERMA appears to have only partially understood the recommendation IPENZ made on the corresponding clause 3.3.1(d) in 2007. The IPENZ recommendation can be summarized by altering the load cases to read:

- | | |
|----------------------|---|
| (i) vertically up | fatigue force range of 0.6 g M about the static force level specified in 2.9.4.1. |
| (ii) vertically down | fatigue force range of 0.6 g M about the static force level specified in 2.9.4.1. |
| (iii) laterally | fatigue force range of 0.4 g M about the static force level specified in 2.9.4.1. |
| (iv) longitudinally | fatigue force range of 0.4 g M about the static force level specified in 2.9.4.1. |

IPENZ notes that the phrase “fatigue force range” is used in NZS 5446 *Heavy motor vehicle towing connections* and so will be familiar to engineers working in the trucking industry.

If further explanation is required, IPENZ notes that the required limits of fatigue force range are given by:

- | | |
|----------------------|-------------|
| (i) vertically up | (1±0.3) g M |
| (ii) vertically down | (2±0.3) g M |
| (iii) laterally | (1±0.2) g M |
| (iv) longitudinally | (2±0.2) g M |

thus maintaining the order given in 2.9.4.1.

The explanation can then be omitted.

As we did in 2007, we note that Reg 11(2) specifies fatigue pressure cycles from -7 kPa to the recommended operating pressure. This requirement could be included in the ACoP by adding another fatigue load case:

- | | |
|--------------|------------------------------|
| (v) pressure | pressure, (pressure – 7 kPa) |
|--------------|------------------------------|

2.10.6 Test Certifiers

As we did in 2007, IPENZ continues to recommend that ERMA's Test Certifiers conducting engineering design reviews be Chartered Professional Engineers.

2.12 Overseas Designs

As we did in 2007, IPENZ continues to recommend that ERMA's Test Certifiers conducting engineering design reviews be Chartered Professional Engineers.

2.14.2 Transport by sea.

IPENZ suggests that this clause reads:

Tank wagons that transport hazardous substances by sea (e.g. across Cook Strait) shall comply with the applicable New Zealand Marine Transport Regulations and in particular with the ship's vehicle deck securing requirements specified in NZS 5444:Part 2 Load anchorage points for vehicles.

3.1.8

Does ERMA require a “quick closing internal valve”?

3.2.3

We suspect ERMA requires a “manually operated shut-off valve”.

We suspect ERMA requires this valve to have an extension spindle for ease of operation”.

3.2.4.1

IPENZ is aware that since the Electricity Act was amended at the end of 2006, regulations made under that Act are in the process of being amended. We therefore suggest that the date “1997” be removed.

5 Transport of cylinders

The numbering system deviates for that used earlier in the consultation draft. IPENZ recommends the earlier system.

5.2 In bulk...

“Test Certifier” needs capitals for consistency.

“...are to withstand loads...”

7 Transport of cryogenic liquids

7.3.6 What labelling requirements does ERMA mean to cite?

9.5 Accidents and Incidents

Who is required to report to the police?

“Test Certifier” needs capitals for consistency.

10.1.3.1

“Test Certifier” needs capitals for consistency.

Appendix A Means of compliance with this code

IPENZ agrees with the clause 1.3.2 statement that an Approved Code of Practice provides users with...a degree of prescription and assistance.

A1.1

IPENZ disapproves of the idea of specifying that design be done by a “*qualified person with relevant experience in the road transport industry*”. An A Grade mechanic with experience on heavy trucks fits this description, but is most unlikely to be competent in the fatigue stress analysis required by 2.9.5.1, or even the static stress analysis required by 2.9.4.1.

IPENZ recommends that the design be done by a person qualified under Land Transport Rules as a heavy vehicle specialist certifier (HVSC) as a chassis design engineer. Such a person may be a Chartered Professional Engineer, but is not necessarily so.

IPENZ suggests that these designers be assessed as currently competent and listed on one of the IPENZ registers. We note that AS 3900 (cited above in 2.9.5) defines an engineer as a person qualified for Corporate Membership of the Institution of Engineers, Australia.

IPENZ continues to suggest that ERMA’s engineering Test Certifiers be Chartered Professional Engineers. CPEng registrants are assessed as competent at intervals of five years, and are legally required to work only within their areas of competence.

A1.2 (e)

IPENZ recommends that this reads:

The static roll threshold certificate (LT400) required under Land Transport Rules.

A2.5

IPENZ suggests that this clause draws attention to clause 9.5 which requires a report to the Police.

A2.9

“Test Certifier” needs capitals for consistency.

Recommendations

IPENZ recommends that ERMA’s approved Design Test Certifiers be Chartered Professional Engineers assessed within the previous five years as being competent in this area of engineering.

IPENZ recommends that the designers mentioned in A1.1 be assessed within the previous five years as being competent in this area of engineering anywhere on the spectrum of technician, technologist, or professional.

IPENZ Submission Appendix 1

Engineering registers and their relationship to road transport engineering

Any comments on the appropriateness of engineering registers below are indicative of our views at present, but these may change when the other matters outlined in our submission are resolved.

A professional engineer's scope of work is regulated, by statute, through the Chartered Professional Engineers of New Zealand Act 2002 (the CPEng Act). Section 8(c) requires CPEng registrants to agree to be bound by the rules as amended from time to time, and s46(b) of the rules requires that a CPEng registrant must undertake engineering activities only within his or her competence. Should an allegation arise that a CPEng registrant has failed to work within his or her competence, that is, properly limit his or her scope of work, the duty to investigate the allegation and if necessary discipline the engineer falls on the Registration Authority. Section 4 of the CPEng Act interprets the Registration Authority to mean IPENZ.

Further, the competence standard for CPEng requires that engineers demonstrate the ability to follow good practice in New Zealand – this means working within any legislative or regulatory requirements that impact on their work.

Professional engineers presently doing tank wagon design, but not registered under the CPEng Act, may be IPENZ Members, and if so may use the postnominal MIPENZ. These people are bound by the IPENZ Code of Ethics, section 4(b) of which states that a Member must undertake engineering activities only within his or her competence. Should ERMA accept IPENZ's recommendation that design test certifiers be CPEng registrants, IPENZ would encourage non-CPEng designers to offer their qualifications and work experience for assessment, including those chartered in jurisdictions overseas.

The development of two other engineering registers is also relevant to ERMA's need for In Service Test Certifiers and Pre-commissioning Test Certifiers:

- Engineering Technology Practitioner
- Certified Engineering Technician

The Engineering Technology Practitioner register is aligned to the international benchmark standard for engineering technologists, including those in the mechanical discipline. Typically these practitioners hold a three-year degree in engineering (for example, Christchurch Polytechnic Institute of Technology has produced BEngTech graduates for almost 10 years). After relevant experience these practitioners have been able since 1 July 2007, apply to IPENZ for assessment against the competence standard, which includes the same provisions as CPEng about demonstrating capability to work within the local jurisdiction. The register rules are almost an exact replica of the CPEng rules, including a code of ethics and the requirements to demonstrate current competence five-yearly.

Competent engineering technologists doing mechanical design, but not registered on that new register, may apply to IPENZ for Technical Membership, and may use the postnominal TIPENZ. These people are also bound by the IPENZ Code of Ethics, section 4(b) of which states that a Member must undertake engineering activities only within his or her competence.

The other new register is Certified Engineering Technician. The register is aligned to the international benchmark standard for engineering technicians, including those in the mechanical discipline. Typically these practitioners hold a two-year diploma in engineering (a number of polytechnics have produced such diplomates for many years, and before that a number of New Zealand Certificates in Engineering were awarded in mechanical engineering). After relevant experience these practitioners have been able since 1 July 2007, apply to IPENZ for assessment against the competence standard, which includes the same provisions as CPEng about demonstrating capability to work within the local jurisdiction. The register rules are almost an exact replica of the CPEng rules, including a code of ethics and the requirements to demonstrate current competence five-yearly.

Competent engineering technicians doing road transport vehicle design, but not registered on that new register, may apply to IPENZ to become Associate Members, and may use the postnominal AIPENZ. These people are also bound by the IPENZ Code of Ethics, section 4(b) of which states that a Member must undertake engineering activities only within his or her competence.

Admission to the registers just described is not limited to qualification holders. There are assessment pathways for those who have experiential learning to undertake what is known as a “knowledge assessment”. Applicants who prove equivalent knowledge to a qualification can have their competence assessed in the same way as a qualification holder.