## Issue Record

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<td>Replaces issue two (small scale change-amendments are limited to Appendix I – Obstructive Sleep Apnoea and Excessive Daytime Sleepiness)</td>
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## Superseded Documents

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## Supply

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Part 1 Introduction

1.1 Purpose of this document

This document gives details of a recommended method which, if followed, would meet the fitness requirements in Railway Group Standard GO/RT3451, for train movement staff.

Should an infrastructure manager or a railway undertaking choose not to follow the recommended method of meeting the requirements of GO/RT3451 laid out in this document, it should assure itself that the method it is following is as effective, and no less safe, than the method that is recommended here.

All requirements from GO/RT3451 are reproduced in the sections that follow and contained within boxed text. Recommendations are provided as a series of sequentially numbered clauses prefixed ‘RC’, immediately below the text to which it relates. Where there are no recommendations or guidance to support a specific requirement, this is stated.

Further information and guidance relevant to the requirements of GO/RT3451 are contained in the appendices to this document. The appendices are not mandatory.

Specific responsibilities and compliance requirements are laid down in the Railway Group Standard itself.

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1.3 Approval and authorisation of this document

The content of this document was approved by Traffic Operation and Management Standards Committee on 3 February 2009.
Part 2  
Recommendations for Train Movement – Staff suitability and Fitness Requirements

2.1 Responsibilities common to infrastructure managers and railway undertakings

2.1.1 Medical examinations - medical practitioners

| GO/RT3451 Section 2.1.1 Train dispatch, shunting and train driving - medical examinations |
| 2.1.1.1 Infrastructure managers and railway undertakings shall arrange for medical examinations to be carried out by or under, the supervision of a registered medical practitioner. |

RC01 It is recommended that medical examinations be carried out by, or under, the supervision of a registered medical practitioner with:

a) expertise of occupational medicine  
b) knowledge of the hazards of the work concerned and of the railway environment  
c) an understanding of how measures intended to eliminate or reduce risks from those hazards could be affected by lack of medical fitness

If it is not reasonably practicable for a physician meeting the requirements specified above to conduct or exercise direct supervision over medical assessments, then it is recommended that arrangements be in place for the medical assessor and employer to have access to such a physician for advice on the interpretation of medical fitness standards, and to monitor consistency of their application.

2.1.2 Medical examinations – minimum content of general medical examinations

| GO/RT3451 Section 2.1.1 Train dispatch, shunting and train driving - medical examinations |
| 2.1.1.2 Infrastructure managers and railway undertakings shall arrange for a general medical examination to be carried out on persons whose duties include train dispatch, shunting and train driving. |
| 2.1.1.3 Infrastructure managers and railway undertakings shall include an examination of sensory functions within general medical examinations. |

RC02 It is recommended that general medical examinations include, in addition to the sensory functions:

a) a general medical examination  
b) blood or urine tests to detect diabetes mellitus and other conditions as indicated by the general medical examination  
c) screening for drugs of abuse where clinically indicated

GE/RT8070 and GE/GN8570 contain requirements and guidance on policies for preventing drug abuse and alcohol from affecting railway operations and to support compliance with the Transport and Work Act, 1992.

Further information and guidance is available in appendices G and H to this document in respect of diabetes.
Recommendations are given under separate headings for visual acuity, colour vision and hearing. Further information and guidance is also provided in appendices A to D, inclusive, in this document.

2.1.3 Medical Examinations – General Medical Examinations

<table>
<thead>
<tr>
<th>GO/RT3451 Section 2.1.2 Train dispatch, shunting and train driving – general medical examinations</th>
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<tbody>
<tr>
<td>2.1.2.1 Infrastructure managers and railway undertakings shall not permit persons to carry out train dispatch, shunting or train driving work where there is reason to believe that a person is suffering from any medical conditions or be taking any medication, drugs or substances, which are likely to cause:</td>
</tr>
<tr>
<td>a) sudden loss of consciousness</td>
</tr>
<tr>
<td>b) a reduction in attention or concentration</td>
</tr>
<tr>
<td>c) sudden incapacity</td>
</tr>
<tr>
<td>d) a loss of balance or co-ordination</td>
</tr>
<tr>
<td>e) significant limitation of mobility</td>
</tr>
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In addition, medical examinations of persons whose roles and responsibilities include train driving shall include electrocardiograph (ECG) examination at the first medical assessment, then at the first assessment after reaching the age of 40 and at each periodic reassessment thereafter.

No recommendations are made or guidance given for meeting these requirements.

2.1.4 Medical Examinations – frequency of medical examinations for train dispatchers and shunters

<table>
<thead>
<tr>
<th>GO/RT3451 Section 2.1.3 Train dispatch and shunting - frequency of medical examinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.3.1 Infrastructure managers and railway undertakings shall arrange for medical examinations of persons whose duties include train dispatch or shunting, using the following frequencies:</td>
</tr>
<tr>
<td>a) prior to employment</td>
</tr>
<tr>
<td>b) every 10 years for staff aged up to 40 years</td>
</tr>
<tr>
<td>c) every 6 years for staff aged between 41 and 49 years (inclusive)</td>
</tr>
<tr>
<td>d) every 4 years for staff aged between 50 and 59 years (inclusive)</td>
</tr>
<tr>
<td>e) every 2 years for staff aged 60 years and over</td>
</tr>
</tbody>
</table>

No recommendations are made or guidance given for meeting these requirements.
2.1.5 Medical examinations - visual acuity for train dispatchers and shunters

<table>
<thead>
<tr>
<th>GO/RT3451 Section 2.1.4 Train dispatch and shunting – visual acuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.4.1 Infrastructure managers and railway undertakings shall not permit persons to carry out train dispatch or shunting work where there is reason to believe that a person’s vision, or the means used to correct it, could impair their performance.</td>
</tr>
<tr>
<td>2.1.4.2 Infrastructure managers and railway undertakings shall test the visual acuity of persons, whose duties involve train dispatch or shunting, using the following criteria:</td>
</tr>
<tr>
<td>a) distance vision shall be at least 6/9 in the better eye and 6/12 in the other eye. The use of spectacles or contact lenses is permitted to meet this requirement</td>
</tr>
<tr>
<td>b) where contact lenses are used, the test shall be repeated using the person’s corrective spectacles that would normally be carried by the person when on duty</td>
</tr>
<tr>
<td>c) where spectacles or contact lenses are used, uncorrected visual acuity shall be at least 3/60 in each eye</td>
</tr>
<tr>
<td>d) no pathological condition likely to cause visual impairment shall be present</td>
</tr>
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</table>

For guidance on visual correction, infrastructure managers and railway undertakings are recommended to refer to the guidance for train drivers in Appendix A to this document.

2.1.6 Medical examinations - Colour vision for train dispatchers and shunters

<table>
<thead>
<tr>
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<tr>
<td>2.1.5.1 Infrastructure managers and railway undertakings shall not permit persons to be involved in train dispatch or shunting with defective colour vision, if the work requires the differentiation of colours.</td>
</tr>
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RC03 It is recommended that the use of coloured spectacles or contact lenses as a means of passing a colour vision test or to perform tasks requiring normal colour vision is not permitted.

RC04 It is recommended that infrastructure managers and railway undertakings adopt a suitable common method of testing and refrain from changing the test or testing procedure if possible.

RC05 It is recommended that every person who may have to perform tasks that require normal colour perception knows whether they have normal or abnormal colour vision and the information is made available to their manager.

Further guidance can be found in Appendix C to this document.

2.1.7 Medical examinations – Hearing for train dispatchers and shunters

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<td>2.1.6.1 Infrastructure managers and railway undertakings shall test the hearing of persons, whose duties involve train dispatch and shunting using audiometry.</td>
</tr>
<tr>
<td>2.1.6.2 Infrastructure managers and railway undertakings shall confirm persons, whose duties involve train dispatch and shunting have sufficient hearing to enable them to hold a telephone conversation and to be able to hear warning sounds, alert tones and radio messages.</td>
</tr>
</tbody>
</table>
RC06 It is recommended that hearing assessments take account of the individual’s normal working environment, including ambient noise levels and the communications equipment available.

RC07 It is recommended that the following values be used as guidelines to assess a person’s results from an audiometric test:
   a) the hearing deficiency should not be higher than 40dB at 0.5 and 1 kHz
   b) the hearing deficiency should not be higher than 45dB at 2kHz for the ear with the worst air conduction of sound

RC08 It is recommended that in special cases, subject to medical opinion, persons whose duties involve train dispatch and shunting be allowed to use hearing aids to meet the hearing levels recommended in RC06 and RC07 of this document. Such cases would normally arise at a periodic medical examination, when an employee was found to have increased hearing loss. Measures which infrastructure managers and railway undertakings are recommended to take to prevent increased risk to railway operations from the use of hearing aids are in preparation (see Appendix D to this document).

2.2 Responsibilities of infrastructure managers

   GO/RT3451 Section 2.2 responsibilities of infrastructure managers
   2.2.1 There are no requirements applicable only to infrastructure managers other than those contained in section 2.1 of this document.

2.3 Responsibilities of railway undertakings

2.3.1 Minimum age for train drivers

   GO/RT3451 Section 2.3.1 Train driving – minimum age
   2.3.1.1 Railway undertakings shall not permit persons less than 21 years of age to drive trains, unless undergoing training and accompanied by a competent train driver.

   No recommendations or guidance are given on this requirement.

2.3.2 Medical Examinations – frequency of medical examinations for train drivers

   GO/RT3451 Section 2.3.2 Train driving – frequency of medical examinations
   2.3.2.1 Railway undertakings shall arrange for medical examinations to be conducted on persons whose duties include train driving, at the following frequencies:
      a) prior to employment
      b) every 5 years for staff aged up to 55 years
      c) every 2 years for staff aged between 56 and 62 years (inclusive)
      d) every year for staff aged 63 years and over

   No recommendations are made or guidance given for meeting these requirements.
2.3.3 Medical Examinations – frequency of medical examinations for competent persons

<table>
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<tr>
<td>2.3.3.1 Railway undertakings shall arrange for medical examinations to be conducted on persons whose duties include travelling as a competent person with a train driver, using the following frequencies:</td>
</tr>
<tr>
<td>a) prior to employment</td>
</tr>
<tr>
<td>b) every 10 years for staff aged up to 40 years</td>
</tr>
<tr>
<td>c) every 6 years for staff aged between 41 and 49 years (inclusive)</td>
</tr>
<tr>
<td>d) every 4 years for staff aged between 50 and 59 years (inclusive)</td>
</tr>
<tr>
<td>e) every 2 years for staff aged 60 years and over</td>
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2.3.4 Medical Examinations – colour vision for train drivers and competent persons

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<tbody>
<tr>
<td>2.3.4.1 Railway undertakings shall not permit persons to drive trains or travel as a competent person with a train driver where there is reason to believe that a person’s vision, or the means used to correct it, could impair their performance.</td>
</tr>
<tr>
<td>2.3.4.2 Railway undertakings shall use the following criteria to test the visual acuity of persons whose duties involve train driving or travelling as a competent person with a train driver (other than where on-train equipment failure requires the competent person only to monitor driver vigilance):</td>
</tr>
<tr>
<td>a) distance vision shall be at least 6/9 in the better eye and 6/12 in the other eye; the use of spectacles or contact lenses is permitted to meet this requirement</td>
</tr>
<tr>
<td>b) where contact lenses are used, the test shall be repeated using the person’s corrective spectacles, that would normally be carried by the person when on duty</td>
</tr>
<tr>
<td>c) where spectacles or contact lenses are used, uncorrected visual acuity shall be at least 3/60 in each eye</td>
</tr>
<tr>
<td>d) no pathological condition likely to cause visual impairment shall be present</td>
</tr>
<tr>
<td>e) no progressive eye diseases</td>
</tr>
<tr>
<td>f) binocular near vision of at least N8, with spectacles or contact lenses if worn (applicable only to persons undertaking driving duties)</td>
</tr>
</tbody>
</table>

Further guidance and recommendations on visual acuity and correction can be found in Appendix A to this document. Appendix B contains information and guidance on laser eye surgery.
2.3.5 Medical Examinations – colour vision for train drivers and competent persons

GO/RT3451 Section 2.3.5 Train driving and travelling as a competent person – colour vision

2.3.5.1 Railway undertakings shall not permit persons with defective colour vision to drive trains or travel as a competent person with a train driver on Network Rail managed infrastructure.

RC09 It is recommended that the use of coloured spectacles or contact lenses as a means of passing a colour vision test or to perform tasks requiring normal colour vision is not permitted.

RC10 It is recommended that railway undertakings adopt a suitable common method of testing and refrain from changing the test or testing procedure if possible. Further guidance can be found in Appendix C to this document.

2.3.6 Medical Examinations – hearing for train drivers and competent persons

GO/RT3451 Section 2.3.6 Train driving and travelling as a competent person – hearing

2.3.6.1 Railway undertakings shall test the hearing of persons, whose duties involve train driving or travelling as a competent person with a train driver, using audiometry.

2.3.6.2 Infrastructure managers and railway undertakings shall confirm persons, whose duties involve train driving or travelling as a competent person with a train driver have sufficient hearing to enable them to hold a telephone conversation and to be able to hear warning sounds, alert tones and radio messages.

RC11 It is recommended that hearing assessments take account of the individual’s normal working environment, including ambient noise levels inside and outside the driving cab, and the communications equipment available.

RC12 It is recommended that the following values be used as guidelines to assess a person’s results from an audiometric test:
   a) the hearing deficiency should not be higher than 40dB at 0.5 and 1 kHz
   b) the hearing deficiency should not be higher than 45dB at 2kHz for the ear with the worst air conduction of sound

RC13 It is also recommended that the following are not present:
   a) anomaly of the vestibular system
   b) chronic speech disorder (given the necessity to exchange messages loudly and clearly)

RC14 It is recommended that in special cases, subject to medical opinion, persons whose duties involve train driving or travelling as a competent person with a train driver be allowed to use hearing aids to meet the hearing levels recommended in RC11, RC12 and RC13 of this document. Such cases would normally arise at a periodic medical examination, when an employee was found to have increased hearing loss. Measures which railway undertakings are recommended to take to prevent increased risk to railway operations from the use of hearing aids are in preparation (see Appendix D to this document).
Appendix A  Visual acuity for train drivers

The contents of this appendix are for guidance and are not mandatory.

A.1 Introduction
The visual standard is intended to ensure that train drivers are able to perform their duties safely and efficiently in the cab as well as when outside the train on or near the line.

This appendix does not cover laser eye surgery which is covered in Appendix B.

This appendix does not cover colour vision, which is covered in Appendix C.

A.2 Visual acuity – general
The standard for distance vision for train drivers is the same standard that is recommended for personal track safety purposes for other staff and is also aligned with the DVLA standard for vocational [road] drivers.

The near vision standard of N8 with permitted correction applies to ensure that drivers are capable of interpreting written material and instruments in the course of their duties.

Distance vision is usually applied to objects over 3m away. ‘Near vision’ is intended to mean normal reading distance of 30cm. Train drivers who are able to meet both near and distance standards are unlikely to have difficulty with vision at distances between 0.3m and 3m, so no intermediate vision standard has been defined.

Where vision is corrected with glasses, unaided visual acuity cannot be worse than 3/60 in either eye. This is because of concerns about high degrees of myopia (short-sightedness) where the necessary corrective lenses are of high power and may produce distortion of peripheral visual fields or double vision due to prismatic effects.

All train drivers (and other staff) who rely on their ability to differentiate between colours to make safety critical decisions should understand the importance of regular vision examinations and, if visual correction is required, the need to wear up-to-date prescription lenses. This will help to ensure adequate visual acuity when driving and to minimise the occurrence of colour misperception.

A.3 Visual correction
Train drivers may use spectacles or contact lenses to meet the vision standard during the course of their duties, as long as their uncorrected and corrected vision meets the minimum requirements shown in GO/RT3451.

A.3.1 Spectacle design
There is no mandatory standard for the design of spectacles for train drivers (nor any requirement for employers to supply such spectacles), however, individual employers may have specific arrangements for the supply of spectacles to their train drivers and these arrangements may stipulate particular design characteristics.

In general terms, it is recommended that lenses be as large as possible while being comfortable and lightweight. Frames should also be lightweight and not impede peripheral vision. For bifocals, the reading segment should be as small as practicable in order to provide the maximum area of lens for unimpeded distance vision.

A.3.2 Correction types
The following types of lenses are in general use for spectacles:

a) single vision – distance
b) single vision – near
c) bifocal

d) plano-reading bifocal

e) progressive (‘varifocal’)

Any of the above lens types can be obtained as photochromic lenses, designed to darken as light levels increase and which are an alternative to ‘clip-on’ sunglasses over clear spectacles or prescription sunglasses. Photochromic lenses may adjust to low light conditions unpredictably and have an unforeseen effect on drivers’ visual acuity when moving from bright light to dim light, eg when entering a tunnel after being in bright sunlight. In addition, photochromic lenses rely on ultraviolet light for their action and modern windscreen glass may exclude ultraviolet light, rendering them ineffective as sunglasses. The dispensing optician should be able to state the lens manufacturer’s specification for the expected rate of change. If railway undertakings decide to permit drivers to use photochromic lenses when on duty, they should:

a) remind drivers of the need to inform their optician of the essential need for them to maintain forward vision, without impairment of colour perception, when passing from high to low lighting conditions

b) monitor the use of such lenses.

It is recommended that permanently tinted prescription lenses are not permitted for train driving, other than as sunglasses of a specified colour and depth of tint (see below). This is because some tints may affect colour perception and reduce visual acuity in poor lighting conditions.

A.3.3 Bifocal spectacles

Bifocals with a reading correction in the lower segment but no correction in the main part of the lens (plano-reading) may be supplied in preference to full-lens reading spectacles. Some train drivers find this less distracting than putting on and removing reading glasses repeatedly. Train drivers could also use full lens reading spectacles if they cannot adjust to bifocals.

A.3.4 Progressive (‘varifocal’) spectacles

The inclusion of a middle distance correction (between long distance and reading) will reduce the amount of the lens available for distance vision, which is the most critical component for train driving. If a train driver reports problems with middle distance vision then specialist advice will be needed on the design of suitable spectacles for this purpose.

Research in Australia (Wood, Atchison and Chaparro) [1] has shown that it is possible for red signal lights to be misperceived by spectacle wearers as orange or yellow in specific circumstances. Typically, the effect occurs when the signal light appears small because it is 600-900m away and there are generally bright surrounding lighting conditions. The effect is most noticeable for the spectacle wearer when the distance portion of their correction is slightly too strong. Wearers of progressive spectacle lenses may be more likely to report this effect because of the possibility of viewing the signal through the portion of lens intended for intermediate vision. However, the effect may also occur with single vision spectacles if the correction is slightly too strong.

Progressive lenses are permitted for equivalent roles in other transport sectors and individual railway undertakings should decide whether to permit their train drivers to use spectacles with progressive lenses. The growing popularity of progressive lenses and changing cab or instrument design may increase the demands for this type of correction. On the other hand, the risk of restricted visual field when viewing distant objects, of signal colour misperception and of the uncertain impact on signals passed at danger (SPAD) occurrence and investigation may outweigh these demands.

The Australian research paper referenced above does not advocate prohibition of progressive lenses for such tasks, but it is important that considerable care is taken with the design and fitting of the spectacles, so that the train driver is not looking through the
intermediate vision corridor during distance tasks and thus experiencing unwanted positive
defocus when looking for signals or signs. It is important that train drivers inform their
manager if they are wearing or intending to acquire spectacles fitted with progressive
lenses, so they can be advised of the potential problems and ways of mitigating them.

A.3.5 Sunglasses
To provide protection from sun glare and to prevent adverse effects on signal colour
recognition, train drivers may wear frame or clip-on sunglasses. It is recommended that
sunglasses worn for driving duties comply with the relevant requirements of BSEN1836
[2], including the requirements of Filter Category 2, to ensure that colour perception is not
impaired. Drivers who wear corrective spectacles may wear prescription sunglasses as an
alternative to clip-on sunglasses which meet the recommended requirements for
sunglasses specified above.

See section A.3.2, above, for guidance about the use of photochromic lenses.

A.3.6 Contact lenses
Contact lenses are acceptable as a means of correcting visual acuity by train drivers.
However, it is possible that someone wearing them for the first time may experience
discomfort which may be distracting and persistent while their eyes become accustomed
to the lenses and the wearer used to the techniques of inserting contact lenses and the
disciplines of caring for them. When discomfort occurs, the wearer may be tempted to
remove the lenses to alleviate the problem.

If a train driver wishes to wear contact lenses (instead of spectacles) at work, especially if
they have not worn them previously, it is recommended that railway undertakings are
satisfied that:

a) the wearer is able to show that the lenses can be tolerated in place for the duration
   of a complete turn of duty of the maximum rostered length
b) the nature of the driving task and the working environment is suitable for the
   wearing of contact lenses (for example, the duration of any expected exposure to
dust)
c) a pair of spectacles capable of correcting the user’s visual acuity to the minimum
   standard is carried when on duty, in the event of the loss of a lens or discomfort
   prompting removal of a lens(es).

If contact lenses are worn, GO/RT3451 requires that assessments of visual acuity are
repeated with the spectacles normally carried with them when on duty. Assessments
should also be made without lenses in place.

Where contact lenses are prescribed and corrective spectacles are not an alternative for
medical reasons, it may be necessary to seek specialist advice as well as addressing
points (a) and (b) above, before making a final decision on employment as a train driver, in
case there is a pathological condition present

References (Appendix A)

1. When Red Lights Look Yellow: Wood JM, Atchison DA, Chaparro A; reported in
2. BS EN 1836 Personal Eye Protection (formerly BS2724)
Appendix B  Laser eye surgery

The contents of this appendix are for guidance and are not mandatory.

B.1 Introduction

This appendix has been compiled to help employers make risk-based decisions when cases of laser eye surgery are reported.

Laser eye surgery is unlikely to be a necessity simply for the purpose of meeting the visual acuity standards. Employers should not encourage or promote the use of eye surgery in these circumstances because the risks of surgery can be avoided by choosing to wear spectacles or contact lenses instead.

An employer cannot prevent an individual from having eye surgery, or any other treatment, if they choose to. However, it may be necessary to discuss the potential impact on their employment.

B.2 Laser treatment techniques

PRK, LASIK and LASEK are acronyms for three common laser eye surgery techniques - they are not proprietary or trade names but generic descriptions:

a) PRK - Photo-refractive keratotomy
b) LASIK - Laser in-situ keratomileusis
c) LASEK - Laser in-situ epithelial keratomileusis.

LASIK is by far the most popular treatment at present and is normally associated with rapid recovery and improvement of vision. Certain patients may be unsuitable for LASIK or choose not to have it because of some of the complications that may occur. LASEK is essentially a modified form of PRK and may eventually prove to be more popular than LASIK.

Treatment methods are constantly improving and the risk of complications is diminishing with better technology and skilled surgeons. New procedures are always being developed and the Royal College of Ophthalmologists has published some excellent guidance for patients contemplating laser eye surgery and other forms of treatment [1].

B.3 Surgical and post-operative procedures

Typically the patient will spend less than a day in hospital for treatment and will use antibiotic and anti-inflammatory eye drops for about a week. Artificial tears are used for a slightly longer period, sometimes up to six months.

After surgery the patient will be unfit for ordinary work for 3-7 days while useful vision recovers. However, vision often takes 1 week to 3 months to become stable, depending on the type of treatment. In some complicated cases this process can take 3-9 months. People who depend on normal vision for their job (e.g. train drivers) will not be able to perform their duties until their vision becomes stable.

If one eye is treated at a time, further periods of absence are possible. Typical post-operative follow up might be at 1 and 7 days followed by checks at 1 and 3 months to establish that visual acuity is stabilising and no other problems are developing.

Patients with low or moderate degrees of short-sightedness do well after laser surgery with about 90% managing the 6/6 (normal) line and almost all managing 6/12 on the opticians chart without the use of glasses. Results are not quite so good for long-sighted or very short-sighted people.
B.4 Complications

The incidence of complications following laser corrective eye surgery is difficult to determine for a variety of reasons, including:

a) Variability of the skill and experience of surgeons
b) Variable techniques and equipment used
c) Rapidly advancing knowledge and technology
d) Variable definitions of success and failure
e) Differences in the eyes that are treated
f) Commercial pressures to quote low levels of complications.

Reports of complications range from 1-40% of cases, depending on the source. Many relate to issues of failure to correct the vision exactly to normal, a difference between the two eyes or problems reading. All of these can usually be corrected with re-treatment or glasses. Other problems relate to infection, comfort or sensitivity and tend to settle quite readily. Complications relating to the corneal “flap” in LASIK can often be corrected and serious sight threatening complications are very rare.

Complications of an occupational significance include:

a) Reduced visual acuity.

As a rough estimate up to 4% of all treatments will result in a reduction of two lines of best corrected visual acuity on the opticians chart (the best that can be achieved even with glasses or contact lenses).

b) Decreased night or low light vision.

Patients may experience difficulty discerning detail in low light or low contrast conditions. Some report problems with halos, glare or starbursts around objects or light sources. These problems are often temporary and recover over a six-week period but in some cases the problem persists. Newer surgical techniques help to minimise this problem.

B.5 Assessment of job applicants

The British Society for Refractive Surgery (BSRS) has published information [3] concerning the assessment of job applicants with a history of refractive surgery. An examination to consider the suitability of a refractive surgery patient for a particular profession should include:

a) A slit lamp examination to confirm that the eye has returned to normal and that there is no significant loss of corneal transparency.

b) Refraction, topographic examination and pachymetry to screen for keratectasia. The candidate should provide details of their pre-operative refractive error and if possible details such as their post-operative corneal thickness and the nature of any complications that may have occurred during or following the procedure.

c) Candidates should have their visual performance assessed using a technique sensitive to the presence of scattered light and aberrations. The Snellen letter chart is inadequate alone but a low contrast logMAR chart or contrast sensitivity test provides some information.

d) Candidates should not be considered until all medication has ceased.

These are specialist examinations that are likely to be outside the capabilities of most occupational health service providers. Current Royal College guidelines indicate that most of this information should be given to the patient and recorded in their notes. The employee could be asked to obtain a report from their ophthalmic surgeon. Alternatively an independent examination and report could be arranged. In any case an occupational physician with knowledge of the rail environment should review the information.
B.6 Long term implications

There is already a chance that the eyesight of workers who have not undergone laser eye surgery will deteriorate between normal periodic medicals and existing procedures take account of that. Furthermore, all employees have a duty to report to their manager if they believe they are unfit for work because of failing vision. Additional measures following laser eye surgery should be aimed at controlling any additional risk that arises as a result of the surgery.

Laser eye surgery techniques were introduced quite recently and they are rapidly improving. It is almost impossible to estimate the likelihood of long-term visual complications or deterioration of vision that would not be amenable to correction with glasses or other means. The indications are that the incidence of these problems will be very low but they may arise within a period that is shorter than the normal frequency for periodic medical examinations. Employers and their occupational health providers should have appropriate procedures for detecting these cases amongst train drivers following laser eye surgery.

B.7 European requirements

The Conventional Rail TSI Traffic Operation and Management and the Directive on the licensing and certification of drivers permits laser eye surgery for train drivers subject to annual examinations or at intervals set by the occupational doctor.

B.8 Summary

Laser eye surgery is a matter of individual choice and can be associated with some complications so it should not be encouraged or required simply for the purpose of meeting visual standards.

Patients undergoing surgery will require a period of time off work and their visual acuity may take a number of months to stabilise. In a very small number of individuals the effects of surgery could make them unfit for driving in the long term or even permanently.

Employers may experience additional costs in the short term due to temporary unfitness and in the long term due to increased numbers of medical assessments or medical reports.

The effects on visual acuity may be variable in the months following laser surgery. It is important to have appropriate procedures to ensure that the risk of that variability affecting driving is controlled. These procedures are likely to involve assessment by an occupational physician, who will probably liaise with the ophthalmic surgeon responsible for post-operative follow up. Three months away from train driving may not be necessary in every case or for all types of treatment.

Employers should consider the operational implications where a return to work is delayed or impossible and employees should be advised of the possible consequences for their employment.
References (Appendix B)

1) The Royal College of Ophthalmologists
   http://www.rcophth.ac.uk/about/public/laser

2) U.S. Food and Drug Administration
   LASIK Eye Surgery website
   http://www.fda.gov/cdrh/LASIK/default.htm

3) British Society for Refractive Surgery
   http://www.bsrs2000.fsnet.co.uk/refractive.htm
   Report on the current status of refractive surgery (July 2002) Produced by the council on behalf of the British Society for Refractive Surgery

4) Catharine Chisholm, Research Fellow, Applied Vision Research Centre, Department of Optometry and Visual Science, City University, London EC1V 0HB.
Appendix C  Colour vision

The contents of this appendix are for guidance and are not mandatory.

C.1  Background

About 8% of males and 0.4% of females have an inherited defect of colour vision that typically causes confusion between certain red and green colours.

Inherited colour vision defects will persist throughout an individual’s life and it is very important that they are detected before embarking on a career where there is a requirement for normal colour vision.

Late detection of colour vision defects and consequential declaration of unfitness can be very costly for the employee and their employer, as well as potentially dangerous.

Acquired defects can develop later in life and affect both men and women. Acquired defects are much more variable in their occurrence, severity and duration than inherited defects. They may affect the perception of yellow and blue as well as red and green and are often associated with other visual impairments and medical conditions. These cases will require individual specialist assessment under the guidance of an experienced railway doctor.

Where normal colour vision is important for safety reasons, colour vision testing is crucial in deciding on fitness for work. Colour vision and colour vision testing is a complex subject and an excellent introduction will be found in two HSE publications aimed at employers and occupational health professionals.

It is not possible to correct abnormal colour vision by wearing coloured spectacles or contact lenses, although colour discrimination may be improved in some specific circumstances.

As with many occupational settings there are situations in the rail environment when normal colour perception is a requirement for operational safety reasons. Obvious examples relate to the recognition of signal colours when train driving, coloured warning flags and signs on the lineside or controls in a signalling control centre or identifying different colour-coded wires in safety related equipment. However, there is no single list that includes all rail occupations that require normal colour vision.

In any event, it is the responsibility of the employer to identify the risks arising out of any work activity and to eliminate or control them. This will include an analysis of tasks that require normal colour vision. In some circumstances the elimination of colour vision dependent tasks or the provision of non-colour dependent information will be the preferred control measure.

Notwithstanding any risk assessment for specific occupational tasks, the commonest requirement for railway work is the ability to recognise signal red, green and yellow under all conditions.

C.2  Testing of colour vision

Over many years large numbers of rail workers have been required to pass a colour vision test at the pre-employment stage and at subsequent periodic medical examinations. Fitness standards for many groups, such as train drivers, guards, signallers, crossing keepers and shunters have included normal colour vision as determined using a specific colour vision test, the Ishihara Test. In some cases, employers and occupational health providers have chosen for particular reasons to use alternative testing methods, for example the City University Test.

Many different tests are available for detecting the presence of colour vision defects and some can also give an indication of the degree of abnormality. However, different tests
may not be equivalent when measuring the same aspect of colour vision. Therefore some individuals may be able to pass one test but not another and this has important implications for interoperability and for the employee that wishes to change their employer or job.

For operational safety purposes in the rail industry there is no requirement to determine the degree of colour vision deficiency and a test that simply discriminates between normal and defective is sufficient. This is because an incident could occur where incorrect colour discrimination was suggested as a possible cause and it would be almost impossible to refute that if the employee had any degree of colour vision defect.

Colour vision tests need to be easy to administer while giving accurate and reproducible results. The Ishihara Test meets these requirements and is very sensitive for detecting red-green abnormalities.

Ishihara is not useful for detecting blue-yellow deficiencies but these are less likely to have operational safety implications. Where a rare or acquired defect is suspected, or specific colour dependent tasks require it, the responsible occupational physician may recommend alternative or additional tests.

References (Appendix C)

**Referenced in the text**

None

**Other references**


3) Current and withdrawn Railway Group Standards can be found at http://www.rgsonline.co.uk/rail/search.html and those with a reference to “colour vision” can be found by entering that phrase into the full text search field.
Appendix D Hearing

The contents of this appendix are for guidance and are not mandatory.

This appendix might be revised in accordance with the research project T664 once the results are evaluated. The final report of project T664 is available on the RSSB website.

D.1 Introduction

RSSB, on behalf of infrastructure managers and railway undertakings, has commissioned research (RSSB project reference T664) into the feasibility of staff using hearing aids to meet the recommended levels of hearing defined in this document, for safety critical tasks associated with train movements. The research follows a pilot study by South West Trains (SWT), where a number of drivers and guards, whose hearing was found to have deteriorated between periodic medical assessments, faced redeployment to other duties. The result would have been a loss to the individuals involved, who were otherwise competent and fit to perform their duties, and to SWT, who were faced with replacing experienced front-line staff.

This appendix was drafted prior to the completion of the research, to explain the background to the requirement shown in GO/RT3451 [1] and the recommendations in Part 2 of this document. It also draws the attention of infrastructure managers and railway undertakings to the requirements of the Disability Discrimination Act (DDA) [2], which affects their decisions relating to the employment of people who may have hearing loss greater than the maximum recommended in this document.

D.2 Disability discrimination

The DDA enshrines the principle that disabled people should not be discriminated against in employment or when seeking employment. The Act defines disability as a physical or mental impairment that has a substantial and long-term effect on a person’s ability to carry out normal day-to-day activities.

D.3 Hearing and railway safety critical work

Hearing requirements for railway staff engaged in safety critical work were based on the need to be able to hear:

a) spoken safety communications using a range of media, including face to face speech, in outside as well as enclosed environments
b) audible warnings and alerts in driving cabs
c) audible warnings, such as train horns, when on or near the line, when carrying out work on the infrastructure or when other duties such as driving or shunting necessitated going on or near the line.

The type of work to be carried out and its environment are significant factors in assessing the hearing requirements for safety critical work, and may change over time. For example, train driving in some parts of the network is less dependent on communications from (external) signal post telephones than was previously the case (see section 4 below).

D.4 Hearing criteria

Hearing loss criteria were defined in Railway Group Standards (RGS) covering safety critical work. Though often applied as mandatory by occupational practitioners, the specific criteria were presented in non-mandatory language, owing to the practical difficulties of precise measurements on the borderlines. Following the implementation of the DDA, decisions resulting from the application of the hearing criteria during periodic medical assessments (and possibly pre-employment assessments) became open to legal challenge. In GO/RT3451, which supersedes previous standards for staff involved in train movements – driving, train dispatch and shunting – the only mandatory measure is for a
hearing test using audiometry. The criteria (slightly modified) are now clearly stated as being non-mandatory recommendations (see Part 2 of this document).

The recommended criteria also include having ‘sufficient hearing to enable them to hold a telephone conversation and to be able to hear warning sounds, alert tones and radio messages’. This is a new criterion, reflecting the changing train driving environment, with increasingly quiet cabs, new alarm and alert sounds, and train protection systems. For over 60% of trains operated on the network managed by Network Rail, cab-secure radio (CSR) removes the need for the driver to leave the cab to talk to the signaller outside the train, using a signal post telephone (SPT), often seen as a difficult environment for drivers to hear what was being said by the signaller. A new radio system Global System for Mobile communications – Railways (GSM-R), currently being trialled, will bring this facility to almost all drivers within the next 5 years.


D.5 The research

The research was initiated by RSSB following the work by SWT. It was also a response to the changes brought about by the DDA and technical developments in hearing aid equipment in the past 10 years (especially digital hearing aids). The unreliability of older types of equipment, especially outdoors in poor weather or in crowded areas, had previously been a factor weighing against managers and occupational health practitioners agreeing to their use.

The research provides information and criteria which will enable infrastructure managers and railway undertakings to assess the risks from someone, whose hearing does not reach recommended levels, using hearing aids to compensate for the deficiency. It also advises on measures which infrastructure managers and railway undertakings may be able to apply to mitigate any increased risks to train movements.

Such measures may include:

a) performance and other specifications for hearing aids suitable for use for train drivers and other staff involved in train movements
b) a full understanding of any underlying causes of hearing loss of the individual involved
c) ensuring the individual staff member involved understands his or her responsibilities for the use, management and maintenance of the equipment
d) possible controls on the supply and maintenance of equipment and batteries
e) changes to safe systems of work for individuals using hearing aids and special monitoring of their hearing as well as their use of hearing aids.

The list of possible measures should not be regarded as exhaustive or as a prediction of the evaluation of the research project. The research was carried out by consultants including experts in audiology and occupational medicine, as well as the technical specifications of hearing aid equipment. Three railway undertakings took part and were involved in the steering group overseeing progress.
References (Appendix D)

1) GO/RT3451 Train Movement – Staff Suitability and Fitness Requirements

2) Disability Discrimination Act 1995 (c. 50)
   [Link](http://www.opsi.gov.uk/acts/acts1995/1995050.htm)

3) Technical Specification of Interoperability relating to the subsystem ‘Traffic
   Operation and Management’ of the trans-European conventional rail system
   2006/930/EC

4) Technical Specification for Interoperability relating to the Operation subsystem of
   the trans-European high-speed rail system 2002/734/EC

5) Directive on the certification of train drivers 2007/59/EC.
Appendix E  Safe Use of Medicines

The contents of this appendix are for information and guidance and are not mandatory.

E.1 Introduction

Around 800 million NHS prescriptions are dispensed each year and the general public spends £2 billion on over-the-counter remedies [1]. It is not surprising that many people who are attending for work on a regular basis will also be taking medicines. However certain medicines may cause drowsiness, impaired concentration or other unwanted effects that make it unsafe for a person to do their job where there is a risk of injury to themselves or others.

The guidance in this appendix is aimed at people who are responsible for ensuring that workers are fit and able to perform their duties safely, especially safety critical workers, though it will be relevant to other groups. The guidance sets out the main issues and offers general advice. An in-depth discussion of the effects of individual medicines and specific occupations is beyond the scope of this document and references to more detailed information have been provided.

E.2 Definitions

**Medicine**
Has the same meaning as ‘medicinal product’ in the Medicines Act 1968. Medicines may be supplied on prescription, pharmacy only or general sale.

**Psychotropic medicines**
Medicines that are capable of affecting the mind, emotions or behaviour. They include antidepressants, tranquillisers and anti-psychotic medicines (used to treat serious mental illness).

**Over the counter medicines**
These medicines include all medicines on general sale to the public via all sources including the internet and those available through a pharmacy. Alternative medicines and herbal remedies/medicines are also classified in this definition.

E.3 Legal and regulatory requirements

Many people will be aware of the legal requirements to prevent drug and alcohol misuse while people are working on the railway. However they may not realise that the same provisions apply to ordinary medicines if they could affect a person’s ability to work safely.

It is an offence under section 27 of the Transport and Works Act 1992 [2] for employees to carry out, and for employers to allow employees to carry out safety critical work while under the influence of drugs or alcohol. The law defines ‘drug’ as any intoxicant other than alcohol. That would include prescribed or over-the-counter medicines, if they cause intoxication. The employer needs to exercise ‘due diligence’ to prevent the commission of an offence under this section and that is usually supported by a drugs and alcohol policy.

Even in cases where specific railway legislation does not apply there are general duties under the Health and Safety at Work Act that impose similar requirements on employers and employees.

The Railway Group Standard GE/RT8070 [3] and GE/GN8570 also set out measures for railway undertakings and infrastructure managers to control risks caused by the effects of drug and alcohol use. In that context a drug means any substance that could affect a person’s ability to carry out their duties safely, including medication either prescribed by a medical practitioner or purchased over the counter.
Drug and alcohol policies are likely to define ‘drug’ as any substance that could affect a person’s ability to carry out their duties safely, including medication either prescribed by a medical practitioner or purchased over the counter.

E.4 How can medicines affect safety?

Many medicines are known to produce some impairment of function. These are usually medicines that have effects on the central nervous system. Typical problems include:

- a) drowsiness
- b) poor concentration
- c) slow reactions
- d) poor co-ordination
- e) inability to assess danger
- f) inability to assess the level of impairment.

A few medicines can produce adverse effects in other ways, notably visual impairment.

These effects can vary between individuals and even in the same individual depending on many factors such as:

- a) overall duration of use of the medicine
- b) the dose of medicine taken and whether the dose has been changed recently
- c) when the medicine is taken in relation to working hours
- d) the preparation or brand of medicine
- e) concurrent use of alcohol
- f) level of fatigue
- g) interactions with other medicines used at the same time
- h) the effect of the underlying health problem
- i) factors specific to the individual such as age, sex, weight and metabolism.

Many medicines that can impair performance in the initial stages may be well tolerated after a period of time and dose adjustment. Also it should be noted that medicines might alleviate or overcome some of the effects of illness that would otherwise cause impairment at work, for example pain or mood disturbance.

Because of this wide range of variables it is difficult to conduct research that would make it possible to reliably predict who will be affected, when and to what extent.

Some good research relates to motor vehicle driving, which is a common and potentially dangerous activity requiring a high degree of alertness, good co-ordination and adequate vision. Carter deals with the subject in more detail in ‘Fitness to Drive’ [5].

Research published by the Health and Safety Executive in 2004 [6] showed that psychotropic medication can reduce performance efficiency, and so affect safety at work. Such effects have been shown to be present for groups of medicines known as benzodiazepines, tricyclic antidepressants and the SSRI antidepressants.

Certain over the counter medicines are known to cause drowsiness, and therefore have the potential to affect operational safety. Most are used for the treatment of coughs and colds, allergies, pain, nausea and gastrointestinal upsets. Antihistamines are the largest group known to have these effects.[7]
Less frequently encountered medicines that may impair performance include eye drops used to dilate the pupils at eye clinics and general anaesthetics, which may exert an effect for several hours after recovery.

**E.5 Labelling of medicines (see also Appendix F)**

Cautionary and advisory labels for dispensed medicines are listed in the British National Formulary. About 260 medicines have to carry labels 2 or 19, which relate to drowsiness when driving or operating machinery. A further 40 medicines are listed under the section on driving, indicating they may affect driving in some way and the patient should be counselled by the pharmacist. These lists are constantly updated.

Medicines for the treatment of severe pain, psychosis, depression, anxiety, epilepsy, migraine and Parkinson’s disease make up the majority of the list along with antihistamines, which are frequently available ‘over the counter’. Insulin is a special case and has been dealt with in separate guidance.

**E.6 Why not produce a list of prohibited medicines?**

Some medicines will almost always be incompatible with safety critical work, for example strong antipsychotic medication or powerful morphine related painkillers (narcotic analgesics).

Also, the use of certain medicines is clearly an indication that expert medical opinion will be required concerning safety critical work, for example insulin or anti-epileptic medication. Nevertheless the employee may still be fit for their duties.

Medicines that require special labels because of potential effects when driving or operating machinery are listed in the British National Formulary (BNF) [8]. Although the list is extensive it does not include all medicines that may affect work in some way.

However many medicines are known to produce unwanted effects in certain circumstances but not in every case. It would not be reasonable to simply prohibit their use and it may amount to disability discrimination to do so. Therefore some form of individual assessment is required in these cases.

Finally any list of medicines is bound to become out-of-date very quickly as new medicines are invented and medical knowledge about existing medicines increases.

**E.7 What can employers do?**

In order to ensure operational safety and to comply with legal requirements each employer will have procedures to control the risks associated with the use of medicines in the workplace. These may include:

a) a requirement for employees to report medication use to a responsible person
b) a process for deciding which duties the individual can be assigned to and any additional arrangements
c) access to expert advice concerning the effects of medicines in relation to work on the railway
d) arrangements for regular review
e) provision of training and information for managers and workers.

**E.8 What can workers do?**

Workers have a personal responsibility to present themselves for work in a fit state and to report to their manager any concerns about their ability to work safely. Most people will at some time attend for work while taking or after taking some sort of medicine. Some may not realise the potential effects on their performance. If it is necessary to take medicines that may have effects during working hours the individual should:
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E.9 Summary

Many working people will benefit from using medicines occasionally and some may depend on medicines in the long term.

Employers have a responsibility to ensure that the risks associated with the use of medicines are controlled by following appropriate procedures.

Workers should comply with those procedures. They should take responsibility for working with their healthcare provider so that medicines do not interfere with their ability to work safely and effectively.

The range of medicines that may impair performance is large and it is not possible to produce a definitive list because of the numerous factors involved. Psychotropic medicines for depression, anxiety and serious mental illness form the largest group of prescription medicines that may affect performance. Strong painkillers can also cause problems. Antihistamine remedies for sickness and allergy are available over the counter and also deserve special attention.

a) Discuss their occupation with the doctor or pharmacist supplying their medicine.

b) Ask about the most appropriate time to take their medicine in relation to their working hours, and the dose to take.

c) Read the label and packet insert, noting any warnings or advice.

d) Be aware of the potential for medicines to interact with other medicines or alcohol.

e) Follow the procedure set out by their employer with regard to use of medicines.

f) Consult their doctor if they think their medicine may affect their ability to work safely or effectively. In many cases it will be possible to identify a suitable alternative medicine that is equally effective but produces fewer unwanted effects. Other options are to consider the timing or dosage of medication and to ensure that unwanted interactions with other medicines are avoided.
References (Appendix E)

1) Proprietary Association of Great Britain
   http://www.pagb.co.uk/pagb/primarysections/marketinformation/otcmarketgrowth.htm
2) Transport and Works Act 1992 (c. 42) S27 Offences involving drink or drugs on transport systems
3) Railway Group Standard GE/RT8070 Testing Railway Safety Critical Workers for Drugs and Alcohol and GE/GN8570 Guidance on the Management of Drugs and Alcohol
   http://www.rgsonline.co.uk/rail/search.html
   http://www.rsmpress.co.uk/bkcarter.htm
5) RR282 - The scale and impact of psychotropic medication use by workers, health and Safety Executive.
   http://www.hse.gov.uk/research/rrhtm/rr282.htm
6) Over-the-counter medicines and the potential for unwanted sleepiness (No.24)
   http://www.dft.gov.uk/pgr/roadsafety/research/rsrr/theme3/overthecountermedicinesandth4772
   http://bnf.org/bnf/extra/current/450051.htm
Appendix F  Cautionary labels for medicines – British National Formulary

The contents of this appendix are for information and guidance and are not mandatory.

F.1 Label 2

Warning. May cause drowsiness. If affected do not drive or operate machinery. Avoid alcoholic drink

To be used on preparations for adults that can cause drowsiness, thereby affecting the ability to drive and operate hazardous machinery; label 1 is more appropriate for children. It is an offence to drive while under the influence of drink or drugs.

Some of these preparations only cause drowsiness in the first few days of treatment and some only cause drowsiness in higher doses.

In such cases the patient should be told that the advice applies until the effects have worn off. However many of these preparations can produce a slowing of reaction time and a loss of mental concentration that can have the same effects as drowsiness.

Avoidance of alcoholic drink is recommended because the effects of CNS depressants are enhanced by alcohol. Strict prohibition however could lead to some patients not taking the medicine. Pharmacists should therefore explain the risk and encourage compliance, particularly in patients who may think they already tolerate the effects of alcohol (see also label 3). Queries from patients with epilepsy regarding fitness to drive should be referred back to the patient's doctor.

Side-effects unrelated to drowsiness that may affect a patient’s ability to drive or operate machinery safely include blurred vision, dizziness, or nausea. In general, no label has been recommended to cover these cases, but the patient should be suitably counselled.

F.2 Label 19

Warning. Causes drowsiness which may continue the next day. If affected do not drive or operate machinery. Avoid alcoholic drink

To be used on preparations containing hypnotics (or some other drugs with sedative effects) prescribed to be taken at night. On the rare occasions (e.g. nitrazepam in epilepsy) when hypnotics are prescribed for daytime administration this label would clearly not be appropriate. Also to be used as an alternative to the label 2 wording (the choice being at the discretion of the pharmacist) for anxiolytics prescribed to be taken at night.

It is hoped that this wording will convey adequately the problem of residual morning sedation after taking ‘sleeping tablets’. 
Appendix G Railway workers and diabetes – general guidance

The contents of this appendix are for information and guidance and are not mandatory.

G.1 Introduction

The purpose of the guidance contained within this appendix is to highlight the important factors that should be taken into account when assessing the fitness of people with diabetes when they carry out safety critical duties. The information is aimed primarily at managers who are responsible for ensuring that individuals are fit to perform their duties, and for making any special arrangements which are needed in individual cases. Separate guidance (see Appendix H to this document) is provided for occupational health practitioners.

Diabetes is a common condition in the general population that may present itself at any age, varies greatly in severity and may be associated with a range of other health effects that develop over time. This means that diabetes may affect different people in different ways at various stages of their working lives.

G.2 About diabetes

G.2.1 Overview

Diabetes mellitus is a metabolic disorder characterised by excessive amounts of glucose in the blood. Insulin is a hormone that is responsible for regulating blood glucose levels and people with diabetes have insufficient insulin or cannot respond normally to it.

**Type 1 diabetes** typically develops in childhood or young adults when the insulin producing cells in the pancreas (beta cells) are destroyed by an auto-immune process. About 3 people in 1000 (0.3% of the population) are affected and they will require lifelong insulin injections and a special diet.

**Type 2 diabetes** usually develops after the age of 40 and affects 30 people in every 1000 (3% of the population). It is due to a resistance to the effect of insulin as well as a failure to produce sufficient quantities of insulin. Obesity and lack of exercise make the condition worse. Treatment is with diet, weight loss and tablets. Some patients eventually require insulin.

Diabetes is associated with a number of long-term complications including heart and circulatory problems, stroke, visual impairment, kidney failure and nervous system disorders. Research[1, 2] has shown that careful attention to blood glucose control will reduce the incidence of these complications. Patients who use insulin or certain types of tablets to bring their blood glucose down to normal levels have to balance their food intake and exercise carefully. Otherwise their blood glucose will continue to fall to dangerously low levels. The brain is dependent on glucose so low blood glucose (hypoglycaemia or ‘hypo’) is associated with impaired concentration and confusion, progressing to loss of consciousness. Sometimes the well motivated person with diabetes, who works hard to prevent their blood glucose rising above the normal range, may also encounter more frequent problems with hypoglycaemia. Further information can be found on the Diabetes UK website.

G.2.2 Disability issues

The Disability Discrimination Act [3] enshrines in law the principle that disabled people should not be discriminated against in employment or when seeking employment. The Act defines disability as a physical or mental impairment that has a substantial and long-term effect on a person’s ability to carry out normal day-to-day activities. In deciding whether an individual meets these criteria the effect of treatment is not to be taken into account. Therefore, those with all but the mildest degrees of diabetes could claim to be covered by the Act.
In the past people with diabetes, especially those using insulin, were barred from certain occupations as a matter of policy. This was often based on the idea that these individuals would be prone to hypoglycaemia or other health conditions that would make them unsafe or unreliable in their role. Although this may be true for some people with diabetes it is not true for all. Modern treatments and risk assessment methods have enabled some insulin treated individuals to perform safety critical roles just as well as other people.

People with diabetes have successfully challenged employers who sought to exclude them from jobs simply because they were ‘diabetic’, rather than assessing them as individuals. This means that a ‘blanket ban’ for people with diabetes is no longer acceptable, except where there is a legal requirement.

G.3 How diabetes may affect fitness for work

Diabetes may affect fitness for work gradually or suddenly. It is sudden, unnoticed or unexpected impairment that is the greatest concern for workers in safety critical roles.

G.3.1 General health

People with diabetes may suffer a gradual deterioration of their health due to long term complications such as angina, visual impairment or kidney failure. These are a matter of concern in people with diabetes, just as in other individuals with the same conditions. They can be assessed and managed within the normal periodic medical assessment. Where such a problem arises between medical assessments the employee has a duty to bring this to the attention of their employer, who will in turn seek the opinion of an occupational health professional.

Sometimes these long-term health effects can be associated with an increased risk of sudden incapacity due, for example, to stroke or irregular heart rhythm. These people may be medically unfit for certain jobs as a result of these risks but not simply because they have diabetes.

G.3.2 Hypoglycaemia

The main area of concern that is peculiar to people with diabetes is the risk of loss of awareness, impaired concentration or loss of consciousness while performing their duties, as a consequence of hypoglycaemia.

The symptoms of hypoglycaemia (a ‘hypo’) are due the release of adrenaline, as well as the reduced glucose available for the brain. The individual experiences hunger, nausea, anxiety, sweating and increased pulse rate associated with impaired awareness and concentration. If untreated they may progress to collapse, loss of consciousness and fits. Some people do not experience any of the early symptoms of a hypo and progress to impaired awareness, collapse or loss of consciousness without warning. This is known as hypoglycaemia unawareness or reduced hypoglycaemia awareness, which has important implications for work.

Hypoglycaemia may be symptomatic or asymptomatic (only identified on biochemical testing). Symptomatic hypoglycaemia may be mild and easily rectified by the individual, or severe i.e. requiring third-party assistance or causing coma or seizure.

Symptomatic hypoglycaemia may occur when the blood glucose is below about 4.0 mmol/l and endogenous insulin production normally ceases below this level in people who are not diabetic. Symptoms are common when blood glucose falls below 3.0 mmol/l and significant changes in brain function occur when the blood glucose falls below 2.6 mmol/l.

People with diabetes may experience symptoms of hypoglycaemia if they are treated with insulin or with certain tablets known as the insulin secretagogues (the commonest type being sulphonylureas, such as glibenclamide and tolbutamide). This is because the treatment action cannot be stopped when the blood glucose falls. Other medications do not normally cause hypoglycaemia if used as a single treatment.
Therefore the diabetic person who is at risk of hypoglycaemia must learn to balance their food intake (which raises blood glucose) against their treatment and exercise levels (which lower it). About 7% of people with diabetes will experience at least one severe hypo each year if they are treated with the insulin secretagogue group of medicines. The figure for hypoglycaemia rises to about 30% in insulin treated patients. However it is difficult to get accurate figures and it should be remembered that the majority of people with diabetes do not have any severe hypos, so individual assessment is always required.

**G.4 Safeguards and regular review**

Diabetes UK’s Driving and Employment Working Party has produced the following guidelines [5] for assessing the suitability of people with insulin-treated diabetes for employment where there may be a risk of injury or harm to themselves or to the public:

a) people should be physically and mentally fit in accordance with non-diabetic standards

b) diabetes should be under regular (at least annual) specialist review

c) diabetes should be under stable control

d) people should self-monitor their blood glucose, and be well educated and motivated in diabetes self-care

e) there should be no disabling hypoglycaemia (low blood sugar), and normal awareness of individual hypoglycaemic symptoms

f) there should be no advanced diabetes-related eye or kidney disease (retinopathy or nephropathy), nor severe symptomatic peripheral or autonomic nerve damage (neuropathy)

g) there should be no significant circulation disorders of heart, legs or brain (coronary heart disease, peripheral vascular disease or cerebrovascular disease)

h) suitability for employment should be re-assessed annually by both an occupational physician and diabetes specialist; and should be based on the criteria outlined above.

**G.5 Prevention of hypoglycaemia**

Over the past decade an increasing number of people with diabetes, including those who use insulin, have worked safely in occupations that were considered unsuitable in the past. These people understand the importance of avoiding hypoglycaemia at work and adopt a variety of strategies to achieve that:

a) maintaining a detailed knowledge of their diabetes and its treatment

b) frequent blood glucose monitoring

c) establishing a routine that includes regular meals and snacks

d) being able to react appropriately to changes in their blood glucose

e) keeping blood glucose high enough to avoid hypos during critical work periods

f) carrying carbohydrate food in case hypos are threatened or meal breaks are delayed

g) working closely with their doctor to choose tablets or insulins that are less likely to cause hypos

h) choosing insulin regimes that are more flexible.

**G.6 Medical assessment of rail workers with diabetes**

Concerns about people with diabetes and their fitness for safety critical work are based on the knowledge that some of these individuals have a greater than average likelihood of impairment of awareness or concentration, sudden incapacity or loss of consciousness.
Although such impairments may be due to gradually developing disorders such as visual impairment or ischaemic heart disease these are normally detectable in the context of the periodic medical examination. Hypoglycaemia is of particular concern because it is difficult to assess or predict and may affect otherwise healthy, well controlled patients with diabetes.

The rail environment differs significantly from other workplaces and occupational physicians working in this field are expected to have knowledge of the hazards involved.

Workers may be exposed to train movements when accessing the lineside environment or be expected to control the movement of trains when performing a signalling role. The physical demands of these jobs and working hours vary considerably. Even in the context of a single job such as train driving the risks may vary depending on the type of locomotive, the route and the train protection measures in operation.

In the UK rail industry, fitness standards apply to workers with safety critical duties but there have never been requirements specifically relating to diabetes. The operations Technical Specifications for Interoperability (TSI) for the European conventional [6] and high speed [7] rail networks and the Directive of the certification of train drivers [8] contain a general health requirement that operations staff 'must not' be suffering from medical conditions, or be taking medical treatment likely to cause:

a) sudden loss of consciousness
b) impairment of awareness or concentration
c) sudden incapacity
d) impairment of balance or co-ordination
e) significant limitation of mobility.

Similar wording was formerly contained in Railway Group Standards concerned with medical fitness requirements.

Whether there are regulatory standards or whether infrastructure managers and railway undertakings define their own fitness standards, the underlying principle of excluding people with conditions that are likely to cause these impairments is still important.

Diabetes and some treatments for diabetes have the capacity to produce effects under one or more of these categories. It is for the examining medical practitioner to advise the employer whether the employee can meet the general health requirement for their job. Any medical assessment will be performed by, or under the supervision of, a doctor having experience of occupational medicine and knowledge of the hazards of working in the railway environment.

If an individual does not meet all of the medical requirements the employer can still decide to permit the person to continue with their duties providing they take advice from their occupational physician and introduce measures to control the additional risks arising from the medical condition. In the case of an employee with diabetes, the occupational physician will take all of the relevant information into account and use their professional judgement before advising on fitness.

The employer has overall responsibility for deciding which duties an employee should be given, taking into account the advice from their occupational health provider. Should the employee disagree with their employers decision they should use the usual company procedures to resolve the matter.
References (Appendix G)

http://content.nejm.org/cgi/content/abstract/329/14/977?ijkey=da62b92445161d3e720507da5f8ccc1abdbea4f5&keytype2=tf_ipsecsha


3) Disability Discrimination Act 1995 (c. 50)  

4) Welsh case challenges stereotyping of people with diabetes. The Disability Rights Commission Tuesday, November 18, 2003  


6) Technical Specification of Interoperability relating to the subsystem 'Traffic Operation and Management' of the trans-European conventional rail system 2006/930/EC

7) Technical Specification for Interoperability relating to the Operation subsystem of the trans-European high-speed rail system 2002/734/EC

8) Directive on the certification of train drivers 2007/59/EC.
Appendix H  Railway workers and diabetes – guidance for medical assessors

The contents of this appendix are for information and guidance and are not mandatory.

H.1  Introduction

This appendix provides guidelines and advice for medical assessors with regards to rail workers and diabetes. The content has been peer-reviewed by the Association of Railway Industry Occupational Physicians (ARIOPS)[13] and endorsed as representing current good practice.

Appendix G provides information and guidance for railway managers.

Concerns about people with diabetes and their fitness for safety critical work are based on the knowledge that some of these individuals have a greater than average likelihood of impairment of awareness or concentration, sudden incapacity or loss of consciousness. Although such impairments may be due to gradually developing disorders such as visual impairment or ischaemic heart disease these are normally detectable in the context of the periodic medical examination. Hypoglycaemia is of particular concern because it is difficult to assess or predict and may affect otherwise healthy, well controlled patients with diabetes.

Studies of type 1 diabetic motor drivers have failed to reveal any convincing evidence of increased crash rates, possibly because the majority were either not affected by hypoglycaemia during the study period or had a very responsible attitude to avoiding driving if they were affected (these studies do not include fatal accidents). On the other hand each year there are hundreds of police reports to the Driver and Vehicle Licensing Agency (DVLA) of collapse at the wheel as a result of hypoglycaemia, which is considered to be a significant underestimate of the true number.

The rail environment differs significantly from other workplaces and occupational physicians working in this field are expected to have knowledge of the hazards involved. Workers may be exposed to train movements when accessing the lineside environment or be expected to control the movement of trains when performing a signalling role. The physical demands of these jobs and working hours vary considerably. Even in the context of a single job such as train driving the risks may vary depending on the type of locomotive, the route and the train protection measures in operation.

There was never a requirement within the Railway Group Standards (RGS) [1] specifically relating to diabetes. Following the publication of the Technical Specification for Interoperability (TSI) [2] for the conventional European rail network and the Directive on train driver licensing (2007/59/EC; the Directive) [3], which contain a general health requirement that:

‘Drivers shall not be suffering from medical conditions, or be taking medical treatment likely to cause:

a) sudden loss of consciousness
b) impairment of awareness or concentration
c) sudden incapacity
d) impairment of balance or co-ordination
e) significant limitation of mobility.’

The mandatory requirements in GO/RT3251 and GO/RT3255 have been withdrawn but replaced with a recommendation in similar terms and also including a reference to diabetes mellitus (as do the TSI and Directive) [see RC02 and RC03 in this document].
It is the role of the occupational physician to interpret the word ‘likely’ in the light of their knowledge of occupational medicine and the workings of the rail industry.

Three key factors must be addressed:

a) proper medical assessment  
b) safeguards and regular review  
c) strategies for prevention of hypoglycaemia.

H.2 Medical assessment

In 2004 the British Medical Association published a comprehensive update for healthcare professionals. The report [4] focuses on recent changes in our understanding of the epidemiology, aetiology and clinical management of diabetes, placing emphasis on controversial issues and recent advances.

People with diabetes will be subject to the same pre-employment and periodic medical assessment as other individuals in the same occupational groups. Complicating conditions such as ischaemic heart disease or visual impairment will be assessed in the normal way. This guidance concentrates on diabetes and its treatment.

Medical assessment of railway workers with diabetes should focus on three aspects; the diabetic history, the method of treatment and the job characteristics.

H.2.1 Diabetic history

Evidence of:

a) type of diabetes and date of diagnosis  
b) details of treatment regimen and date of commencing tablets or insulin  
c) most recent HbA1c reading as an index of overall glycaemic control  
d) any episodes of severe hypoglycaemia or ketoacidosis  
e) body weight and body mass index  
f) visual acuity  
g) diabetes related microvascular complications, i.e. retinopathy, neuropathy and nephropathy  
h) macrovascular complications (cardiovascular, cerebrovascular and peripheral vascular disease)  
i) any other risk factors i.e. smoking habit, blood pressure, lipid profiles  
j) involvement in their diabetes care  
k) any previous effect on their ability to work or to drive.

The occupational physician needs to ensure that sufficient documentary evidence exists to justify the advice given to the employer and may choose to obtain this information in a structured way from the employee and their diabetes specialist (see section 7.1).

H.2.1.1 Hypoglycaemia

Recently published research commissioned by the Department for Transport[5] gives some insight into the frequency of hypoglycaemia events (other research has produced similar findings[6, 7]). The study calculated the proportion of subjects having hypoglycaemia and the rate of hypoglycaemia events per year.

Care must be taken when interpreting these figures since in every group most people had no hypoglycaemia events at all (the median annual rate was zero), emphasising that severe episodes were confined to a few individuals.
Hypoglycaemia was classified as symptomatic or asymptomatic (only identified on biochemical testing). Symptomatic hypoglycaemia may be mild and easily rectified by the individual, or severe i.e. requiring third-party assistance or causing coma or seizure.

H.2.1.2 Severe Hypoglycaemia

a) Type 2 diabetes treated with sulphonylureas. Only 7% of this group reported having at least one severe hypoglycaemic episode per year and the figure ranged between 0 and 7 episodes.

b) Type 2 diabetes treated with insulin for less than two years. The figures for this group were very similar to the sulphonylurea treated group.

c) Type 2 diabetes treated with insulin for more than 5 years. About 25% of this group reported at least one episode of severe hypoglycaemia with a range of 0 to 10 episodes per year.

d) Type 1 diabetes less than 5 years since diagnosis. 22% of this group had experienced at least one severe hypo, ranging from 0 to 23 attacks per year.

e) Type 1 diabetes of over 15 years duration. 46% of this group reported having at least one severe hypo, with a range from 0 to 32 episodes per year.

H.2.1.3 Mild Hypoglycaemia

Type 2 diabetes groups had median rates of mild hypoglycaemic episodes which were considerably lower than those in Type 1 diabetes. The highest median rates of mild, symptomatic hypoglycaemia were observed in those with Type 1 diabetes started on insulin over the previous five years (rather than individuals with a duration of diabetes of over 15 years). In contrast, the Type 2 diabetic patients treated with insulin for less than 2 years were comparable to the sulphonylurea treated group and this has important implications occupationally.

H.2.1.4 Factors predicting episodes of Hypoglycaemia

It has been difficult to identify reliable clinical factors that are predictive of hypoglycaemia risk. Recent episodes of severe hypoglycaemia (i.e. requiring intervention from a third party) are probably the most reliable predictor of future severe hypos. Recurrent, recent, daytime episodes, especially those resulting in hospitalisation or accidents are of greatest concern.

Blood glucose monitoring results that fall within the range 3-4 mmol/l, especially in the absence of symptoms, may be an indicator of hypoglycaemia risk. These patients may also have HbA1c within the normal range.

Patients who attempt to maintain their blood glucose within the normal range at all times may encounter more hypoglycaemic episodes. In both the DCCT[6] and UKPDS[7] studies there was a two to three times increase in severe hypoglycaemic episodes in the intensively treated groups, compared to those on ‘routine’ therapy.

Lack of awareness of hypoglycaemia (see below) is a major concern when considering candidates for safety critical work.

Longer time since diagnosis and longer time on insulin are also associated with more episodes of hypoglycaemia. However in patients with type 2 diabetes recently started on insulin the risk is similar to that experienced by those on sulphonylureas, at least for the first two years.

Patients who have a poor understanding of diabetes and its treatment, or who fail to become involved with the management of their condition, tend to have more hypos.
Other factors that may indicate an increased risk of hypoglycaemia at work include variable exercise demands or eating habits and recent changes in treatment.

C peptide levels, a measure of residual insulin secretion, may offer some hope of a future clinical indicator of hypoglycaemia risk as higher levels of C peptide were associated with reduced risk of hypoglycaemia in the DfT research[5].

Guidance exists for healthcare professionals7 who are asked to provide information about people with diabetes in connection with driving or employment.

H.2.1.5 Hypoglycaemia unawareness

Hypoglycaemia unawareness occurs when the person does not experience the early symptoms of hypoglycaemia (such as hunger, nausea, tremor, sweating or palpitations) but develops unsteadiness, confusion or reduced awareness at the outset and progresses to incapacity or unconsciousness without being able to take corrective action.

Hypoglycaemia unawareness can occur in up to one third of those with type 1 diabetes, especially longstanding diabetes or after glycaemic control has been rapidly improved8. Frequent episodes of hypoglycaemia are thought to contribute to reduced awareness while careful diabetic control to avoid repeated hypoglycaemia can reverse the tendency to unawareness.

Consider the following questions when assessing individuals:

"What symptoms tell you that your blood glucose is getting low?"

Patients who report sweating, shaking, tremor and palpitations as their ‘early warning symptoms’ are likely to have adequate awareness. Those who report confusion, slurred speech and unsteadiness or difficulty walking are likely to have impaired awareness.

"Are you usually able to detect hypoglycaemia before your partner, or are they usually the first to realise that you are ‘hypo’ and draw your attention to it?"

The value of the patient’s testimony is strengthened if corroborated by a spouse, partner or friend. An even more objective gauge of hypoglycaemic warning is to check the patient’s diary of home blood tests or down-loaded meter results. Regular blood glucose readings of 3-4 mmol/l without symptoms are a likely indicator of impaired hypoglycaemia awareness. An HbA1c measurement within the normal range should also lead to careful consideration of the possibility of unrecognised hypoglycaemia.

(Dr K McLeod [8]).

H.2.1.6 Other factors

Whilst most risk arises from the effects of hypoglycaemia (see above), the risk of drowsiness and blurring of vision due to hyperglycaemia should be borne in mind. There is also potential for symptoms such as thirst and polyuria to distract attention and reduce efficiency. There is a great deal of variation between individuals in the level of blood glucose at which these symptoms become apparent. However, caution should be exercised where there is evidence of the blood glucose in excess of 12mmol/l on a regular basis and above 15mmol/l on an occasional basis during working hours.

H.2.2 Treatment

Dietary measures are always required in the management of diabetes. Many patients with type 2 diabetes will also require treatment with tablets, and some of them go on to require insulin. People with type 1 diabetes usually require insulin from the outset.

In the absence of diabetic complications individuals treated with diet alone will rarely be restricted in their employment providing they are subject to regular medical review. Those receiving treatment where there is a risk of hypoglycaemia may require restriction or
modification of their duties depending on the magnitude of the risk. Because of the variability between individuals and over time, each case should be assessed individually.

H.2.2.1 **Insulin secretagogues**

a) Sulphonylureas (e.g. gliclazide, tolbutamide, glibenclamide, chlorpropamide). These drugs act mainly by augmenting insulin secretion and consequently are effective only when some residual pancreatic beta-cell activity is present. Because of the increased output of insulin, the patient is at increased risk of low blood glucose (hypoglycaemia) and this is more of a problem with longer acting drugs such as chlorpropamide and glibenclamide.

b) Meglitinide analogues (repaglinide, nateglinide) act in a similar way to the sulphonylureas but have a shorter duration and earlier time of action. They may be preferable for certain patients because of a reduction in the severity and frequency of hypoglycaemic events, especially when mealtimes are erratic.

c) **Biguanides (metformin)**

This drug alters the sensitivity of the cells to insulin, thereby improving the action of insulin and also reducing the amount of extra glucose produced by the body. Since it acts only in the presence of endogenous insulin it is effective only if there are some residual functioning pancreatic beta cells. Metformin rarely causes hypoglycaemia.

H.2.2.3 **Alpha-glucosidase inhibitors (acarbose)**

This drug delays the absorption of food after meals, thus reducing the high levels of glucose in the post-absorptive state. It also may cause abdominal upset but when used alone will rarely cause hypoglycaemia.

H.2.2.4 **Thiazolidinediones (pioglitazone and rosiglitazone)**

Reduce peripheral insulin resistance, leading to a reduction of blood-glucose concentration. When used alone, they will rarely cause hypoglycaemia.

H.2.2.5 **Insulin**

People with type 1 diabetes are treated with insulin. Insulin may also be necessary for those with type 2 diabetes if diet, exercise and oral agents fail to control blood glucose. Where there is insulin resistance in type 2 diabetes, large quantities of insulin are required and this may place the patient at risk for hypoglycemia. Overall those with type 2 diabetes who have commenced insulin within the last two years have no more hypoglycaemia than those on tablets alone[5].

Insulin is available in short, medium and long acting formulations that may be used singly or in combination. This provides some opportunity for people with diabetes to adjust their treatment to suit their lifestyle while reducing the chance of hypos. Regimes with three or four daily injections have proved to be the most effective in terms of diabetic control but may be associated with increased risk of hypoglycaemia in some cases. Newer insulins such as the short acting analogues (Lispro, Aspart) and the long acting Glargine are useful for reducing hypos, post-prandially and nocturnally respectively.

H.2.3 **Job characteristics**

The primary concern for the person with diabetes is the development of impairment of awareness or concentration while performing their duties thereby placing themselves or others at risk. In the worst case the impairment could be due to sudden loss of consciousness. Careful consideration of job characteristics will help to identify situations where such impairment could be dangerous, for example:

a) operation of equipment requiring constant vigilance

b) safety critical decision making
c) lookout duties*
d) working alone
e) working on or near lines where trains have not been stopped (‘red zone’)*
f) responsibility for the safety of others
g) irregular meal breaks or access to eating facilities
h) inability to hand over to others when impending hypo or need for treatment/food
i) lack of opportunity to modify duties or introduce adjustments
j) driving duties associated with job
k) large fluctuations in the level of physical exertion.

*these activities are normally undertaken only by Network Rail employees or contractors.

In addition, it is possible to consider how existing ‘fail safe’ technology eg train protection, cab warning or vigilance warning systems or signalling systems would mitigate the risks arising from diabetes or its treatment.

H.3 Safeguards and regular review

Diabetes UK’s Driving and Employment Working Party has produced the following guidelines[10] for assessing the suitability of people with insulin-treated diabetes for employment where there may be a risk of injury or harm to themselves or to the public:

a) People should be physically and mentally fit in accordance with non-diabetic standards
b) Diabetes should be under regular (at least annual) specialist review
c) Diabetes should be under stable control
d) People should self-monitor their blood glucose, and be well educated and motivated in diabetes self-care
e) There should be no disabling hypoglycaemia (low blood sugar), and normal awareness of individual hypoglycaemic symptoms
f) There should be no advanced diabetes-related eye or kidney disease (retinopathy or nephropathy), nor severe symptomatic peripheral or autonomic nerve damage (neuropathy)
g) There should be no significant circulation disorders of heart, legs or brain (coronary heart disease, peripheral vascular disease or cerebrovascular disease).

Suitability for employment should be re-assessed annually by both an occupational physician and diabetes specialist; and should be based on the criteria outlined above.

H.4 Prevention of hypoglycaemia

Over the past decade an increasing number of people with diabetes, including those who use insulin, have worked safely in occupations that were considered unsuitable in the past. These people understand the importance of avoiding hypoglycaemia at work and adopt a variety of strategies to achieve that:

a) maintaining a detailed knowledge of their diabetes and its treatment
b) frequent blood glucose monitoring
c) establishing a routine that includes regular meals and snacks
d) being able to react appropriately to changes in their blood glucose
e) keeping blood glucose high enough to avoid hypos during critical work periods
Recommendations for Train Movement – Staff Suitability and Fitness Requirements

RACOP

H.5 Fitness for safety critical work
The employer is responsible for ensuring that the risks to health and safety are adequately assessed and controlled (Health and Safety at Work Act 1974 etc; Railways and Other Guided Transport Systems (Safety) Regulations 2006 [ROGS]). When considering the risks arising out of an employee’s medical condition or treatment, the employer will seek the advice of their occupational health provider. The need for adequate liaison between management and occupational health is obvious.

H.5.1 Hypoglycaemia or impairment unlikely
Medical restrictions are not normally necessary for employees with uncomplicated diabetes treated with diet alone or with tablets that are unlikely to cause hypoglycaemia. These individuals should be reassessed annually by a member of the occupational health team, with referral to the responsible occupational physician when necessary. Some providers may choose to incorporate a self declaration approach similar to that used by the DVLA and the employee should be reminded to report any progression in their condition including changes in treatment and medical complications [11, 12]

H.5.2 Hypoglycaemia or impairment possible
Where diabetes is treated with insulin or other medication that is associated with hypoglycaemia then a more detailed assessment will have been carried out and the responsible occupational physician will be involved. Communication with the diabetes specialist will normally be necessary.

Unlike the situation in civil aviation or road transport, there are no legally based prohibitions on the employment of insulin treated diabetic patients in the rail industry. This means that individual assessment will be required and reasonable adjustments must be considered for each case, while maintaining the control of risk within the working environment.

The responsible occupational physician will want to consider the outcome of the medical assessment in the light of current medical knowledge, their knowledge of the rail industry, relevant information from other transport sectors and discussion with the responsible manager. The occupational physician should be able to explain how they have reached their decision.

If the employee is considered fit for safety critical duties, subject to any adjustments, then the occupational physician should discuss strategies for prevention of hypoglycaemia (see section 4, above) and ensure that there are Safeguards and regular reviews (see section 3) in accordance with the recommendations of Diabetes UK.

H.6 Summary
Where there is concern that a rail worker with diabetes may have an increased risk of injury or harm to themselves, or to others in the rail environment, because of their condition or its treatment, an individual assessment will be required.

Before the responsible doctor can issue a statement of fitness for safety critical work, with or without restrictions, they must be satisfied that:

a) a full medical assessment involving the occupational physician and the diabetic specialist has been carried out.
b) the job has been properly assessed and any adjustments or special arrangements will be adequate

c) the criteria for safeguards and medical review (section 3) can be met

d) strategies for the prevention of hypoglycaemia are adequate

H.7 Further reading – diabetes and fitness in other occupations

In order to place diabetes and the railway fitness criteria in context, a brief description of other transport and safety critical related fitness standards is provided. Some of these are well developed and based, at least in part, on scientific evidence. In some cases the evidence and standards will be equally relevant to the rail environment whereas in others there are important differences, such as train protection technology.

H.7.1 Motor drivers

The Secretary of State for Transport acting through the medical advisers at the Drivers Medical Group, DVLA, has the responsibility to ensure that all licence holders are fit to drive. The DVLA at-a-glance guidelines[14] are aimed at doctors and set out the medical requirements for Group 1 private (car, motorcycle) and Group 2 vocational (lorries, buses) driving licences.

The DVLA has a programme of research [15] into medical aspects of fitness to drive and have produced research report number 40 [16] which examines the role of risk analysis in the evaluation of fitness to drive.

People with diabetes controlled by tablets or diet alone may hold Group 1 or 2 licences providing they do not suffer from frequent hypoglycaemic episodes likely to impair driving, unawareness of hypoglycaemia or other complications such as visual impairment. Applicants are required to make a self declaration using form DIAB1 [17] and further information is gathered from the attending physician using form DIAB3.

Subject to the same conditions insulin treated diabetics may hold a Group 1 licence but the law prevents them from holding a Group 2 licence regardless of how well the condition is controlled. However, regulation changes in April 2001 allow ‘exceptional case’ drivers to apply for or retain their entitlement to drive class C1 vehicles (3500-7500kgs lorries) subject to annual medical examination.

The following qualifying conditions must be met:

a) There must have been no hypoglycaemic attacks requiring assistance whilst driving within the last 12 months. There must have been regular monitoring of the condition by checking blood glucose levels at least twice daily and at times relevant to driving. If an application is successful, there will be a future need to continue to monitor blood glucose levels at least twice daily and particularly, at times relevant to driving C1/C1+E vehicles.

b) Arrangements must be made for an examination every 12 months by a hospital consultant who specialises in diabetes. On examination, the consultant will require sight of blood glucose records for the last 3 months.

c) There must be no other condition, which would render a person a danger when driving C1 vehicles.

d) There will be a requirement to sign an undertaking to comply with the directions of doctor(s) treating the diabetes and report immediately to DVLA any significant change in the condition.

H.7.2 Firefighters

The Fire and Rescue Service have produced advice on the medical and occupational evidence for recruitment and retention of firefighters [19]. In the past, insulin treated firefighters were excluded from operational firefighting duties but that has been successfully challenged over the last decade or so. Current occupational health practice is to follow a policy of individual consideration of people with diabetes who wish to be firefighters. Guidelines produced by Diabetes UK are followed and firefighters often adopt specific coping strategies to safely maintain a normal work pattern. At the moment there is a number of operational insulin treated firefighters who have performed their duties without mishap due to hypoglycaemia. The Home Office brigades have amassed hundreds of man-years of experience in this area and a number of coping strategies have been identified that will help insulin-using firefighters to work safely. However, because of DVLA requirements, these individuals are not permitted to drive fire appliances because they are not eligible for a Group 2 licence.

H.7.3 Seafarers

The Maritime and Coastguard Agency approve doctors to carry out medical assessments of seafarers and the MCA have produced an Approved Doctors Manual [20]. The emphasis is to ensure there is no condition that represents an unacceptable health risk to the individual seafarer, other crew members or the safety of the ship. This goes beyond the risk of sudden incapacity and extends to fitness to undertake the full range of tasks on board ship and to cope with living conditions at sea. In particular the focus of medical assessment is on:

a) fitness to navigate a ship safely
b) fitness in both physical and psychological terms to deal with emergencies at sea
c) freedom from foreseeable risk of disease while at sea, especially where this might either spread to others on board, require emergency treatment or lead to evacuation or diversion.

Requirements vary depending on the type of vessel and its purpose however people with diabetes requiring treatment with insulin are normally excluded from watch keeping duties and service in distant waters. In many cases there are specific regulatory requirements that apply.

H.7.4 Pilots and aircrew

The Civil Aviation Authority Medical Division sets and implements medical requirements for professional flight crew, private pilots and air traffic controllers.

The Joint Aviation Requirements (JAR) are a series of regulations covering the whole of aviation that have been, or are being, implemented by the European states of the Joint Aviation Authorities (JAA). The JAA have produced a Manual of Civil Aviation Medicine [21], which is advisory only but indicates that patients who are treated with insulin are unfit to fly, and those on sulphonylureas are fit only to hold a private pilots licence. However some countries have found these restrictions too onerous and will issue national private pilots licences (NPPL) for use within their own borders. In the UK the medical criteria for the NPPL are aligned with the DVLA group 1 and 2 standards. Therefore it is possible for insulin treated individuals to obtain a pilots licence in certain cases.

Within civil aviation the ‘1% rule’ is widely adopted for multicrew operations. This states that the risk of a professional pilot becoming incapacitated should be no more than 1% per annum. The rationale for this rule will be found in the DVLA report 40 and the JAA Manual.

Flight engineers and air traffic controllers are subject to similar but less stringent criteria. The situation continues to evolve and a new system of European aviation regulation (EASA – the European Aviation Safety Agency) was introduced in September 2003, and will gradually supersede the JAR.
References (Appendix H)

1) Rail Safety and Standards Board. Railway Group Standards http://www.rgsonline.co.uk/
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13) www.ariops.org.uk Dr Andrew Colvin, ARIOPS Chairman, Atos Origin, 2nd Floor, Ca'D'Oro Building, 45 Gordon Street, Glasgow G1 3PE andrew.colvin@atosorigin.com

Further reading references

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http://www.rsmpress.co.uk/bkcarter.htm
Appendix I  Obstructive Sleep Apnoea and Excessive Daytime Sleepiness

The contents of this appendix are for information and guidance and are not mandatory.

I.1  Introduction

This appendix has been published to promote greater awareness of the risks associated with obstructive sleep apnoea and excessive daytime sleepiness, highlighting the important factors that should be taken into account when assessing the fitness of affected workers if they carry out safety critical duties. The information is aimed primarily at medical assessors but may also be of interest to those who are responsible for ensuring that individuals are fit to perform their duties.

The content has been peer-reviewed by the Association of Railway Industry Occupational Physicians (ARIOPS) and endorsed as representing current good practice.

I.2  Background

I.2.1  About Sleep Disorders

I.2.1.1  Excessive daytime sleepiness

Excessive daytime sleepiness (EDS) may be described as a tendency to fall asleep at inappropriate times while intending to stay awake. Non-medical causes of EDS include irregular sleep schedules (e.g. shift work), disturbed sleep, insufficient sleep or sleep deprivation. Fatigue management strategies often include measures to control the risks related to EDS due to non-medical causes.

EDS may also be a feature of a number of medical conditions, especially sleep disorders, of which there are many. This guidance focuses on obstructive sleep apnoea (OSA), which is a recently recognised sleep disorder that is present in about 2% of females and 4% of males in the middle aged population, depending on the definition used¹. A study of a large number of American lorry drivers² revealed that 17.6% had mild sleep apnoea, 5.8% had moderate sleep apnoea and 4.7% had severe sleep apnoea. Overall, the prevalence of sleep apnoea in lorry drivers was approximately 28%, much higher than that in the general male population. Recent research amongst UK train drivers indicated a prevalence of symptomatic OSA in the region of 7%, based on questionnaire responses³.

I.2.1.2  Obstructive sleep apnoea

Obstructive sleep apnoea is characterised by repeated episodes of complete or partial upper airways obstruction occurring during sleep (apnoeas or hypopnoeas). Episodes that last for 10 seconds or more are associated with sleep interruption and can cause a decrease in oxygen saturation in the blood. This sleep-wake cycle may occur hundreds of times a night. The symptoms that are suggestive of OSA are EDS, loud habitual snoring and apnoeic events witnessed or reported by spouses or others.

Formal diagnosis requires an assessment of respiration during sleep with evidence of repetitive oxygen desaturations or reductions in airflow.

The severity of OSA is expressed in terms of the number of respiratory disturbances (apnoeas or hypopnoeas) that occur per hour. This is referred to as the respiratory disturbance index* (RDI), which is measured using polysomnography, a specialist sleep study that is not available in an occupational health (OH) facility.

*RDI of 5 to 14=mild sleep apnoea, 15 to 30 = moderate sleep apnoea and greater than 30 = severe sleep apnoea.
In all but mild OSA, treatment with continuous positive airways pressure (CPAP) will be recommended. This involves breathing slightly pressurised room air delivered via a nasal or oral mask during sleep, which can produce a considerable improvement in symptoms.

OSA sufferers are at increased risk of coronary vascular disease, high blood pressure and stroke as well as obesity related illness. Research has shown that OSA sufferers are at increased risk of motor vehicle accidents, especially if the OSA is severe (see below). It is important to note that the increased risk is also present in some sufferers of OSA who do not experience any appreciable EDS. Therefore the detection of EDS alone cannot be relied upon to identify sufferers of severe sleep apnoea, who are more likely to be impaired during work and at increased risk of accidents.

1.2.1.3 Other medical conditions

Other medical conditions associated with EDS include narcolepsy, Parkinson’s disease, other neuromuscular disorders, chronic respiratory disease and painful musculo-skeletal conditions. These conditions are not discussed further in this guidance, other than with respect to the identification of EDS that may be associated with them.

A detailed description of sleep disorders, their diagnosis and management is outside the scope of this guidance but references to further reading are provided.

1.2.1.4 Sleepiness versus fatigue

Sleepiness or the tendency to fall asleep should be distinguished from fatigue or tiredness. People may be fatigued without feeling sleepy, for example following physical labour or due to chronic illness. However many people may experience sleepiness associated with fatigue, for example after working long hours or due to social factors. RSSB has produced separate guidance on fatigue, much of which focuses on fatigue related sleepiness. The Health and Safety Executive has a human factors topic on fatigue and the Office of Rail Regulation has published guidance on the management of fatigue.

1.3 How sleep disorders may affect fitness for work on the railway

Simulator studies have shown that sleeps of up to 2 minutes may not be noticed or remembered by the subject and shorter periods of lack of awareness correlate with altered brain activity that is indicative of sleep; known as “micro-sleeps”. These findings are present in sleep deprived normal individuals. Most sleep related motor driving accidents typically occur in healthy males who are sleep deprived and fall asleep while driving at night. The impairment of driving in subjects with sleep deprivation, and with sleep disorders, can be similar to that of a driver with a blood alcohol concentration above the legal limit. However sleep does not occur spontaneously from an alert state and there is always a feeling of increasing sleepiness beforehand. Therefore the individual will have been aware there was a likelihood of falling asleep, even if they cannot recall the shorter episodes of sleep, and they have a responsibility not to continue with safety critical tasks in those circumstances.

Concerns about people with sleep disorders and their fitness for safety critical work in the rail industry are based on the growing body of research in other areas, especially road motor driving. Research has shown that OSA is associated with accident risk increased by 2-7 times when driving and that more severe cases of OSA have the greatest increase in risk.

** A possible exception to this would be uncommon clinical conditions such as narcolepsy, which would be a bar to employment as a safety critical worker.
Increased accident risk associated with severe OSA has been shown to be reduced by effective treatment\(^\text{10}\).

Although there are no comparable data for the rail industry yet, the indications are that OSA will be a significant issue in relation to safety critical work. Expert opinion is that some rail workers who suffer from EDS and sleep disorders such as OSA will have an increased likelihood of impairment of awareness or concentration, or even falling asleep, while performing safety critical work.

The rail environment differs significantly from other workplaces and occupational physicians working in this field are expected to have knowledge of the hazards involved. Workers may be exposed to train movements when accessing the lineside environment or be expected to control the movement of trains when performing a signalling role. The physical demands of these jobs and working hours vary considerably. Even in the context of a single job such as train driving the risks may vary depending on the type of locomotive, the route and the train protection measures in operation. Therefore the current medical knowledge will require interpretation by medical assessors in the light of their knowledge of railway work and the specific medical risk assessment of affected individuals in particular roles.

I.4 Managing the risks related to sleep disorders

I.4.1 Managers responsibilities

Managers should:

a) Make sure that employees understand the dangers of working while excessively sleepy. Those affected should be encouraged to seek medical advice and treatment, rather than ignoring or concealing their symptoms.

b) Seek the advice of their occupational health provider if they think an employee may be unfit due to any medical condition, such as OSA.

c) Consult with their OH provider to establish what individual adjustments or safe systems of work should apply if an employee is found to suffer from OSA.

d) Check that their OH provider routinely considers EDS and OSA when assessing the medical fitness of safety critical workers.

e) Arrange for the medical status of individuals involved in sleep related accidents and SPADs to be established, in order to exclude sleep disorders as an underlying cause.

The Rule Book (GE/RT8000) states that rail workers must not put themselves or others in danger, so there is a personal responsibility not to attempt to perform safety critical work while excessively sleepy.

Workers who suffer from OSA, with or without EDS, should also be:

a) Made aware that factors that cause sleepiness can affect them more than other people, for example alcohol, medicines, loss of sleep or irregular sleep patterns

b) Reminded of the importance of complying with the advice of their doctor and any recommended treatment

c) Reminded of the importance of looking after their treatment device

d) Encouraged to be open and honest about their symptoms so that they can receive appropriate treatment and support.

I.5 Medical assessments of rail workers with sleep disorders

Fitness standards that apply to railway workers with safety critical duties usually include a general health requirement that candidates shall not be suffering from medical conditions likely to cause impairment of awareness or concentration. There are unlikely to be specific
requirements relating to OSA or other sleep disorders and this is the same for other conditions e.g. heart disease or diabetes.

The content of medical assessments is a matter for the individual duty holder and their occupational health provider to decide, taking into account the nature of their operations. Medical assessors will be aware of the risks associated with EDS and OSA so medical assessments of safety critical workers will include elements of questioning and physical examination that will screen for these conditions. If the results indicate an increased probability of OSA then further medical assessment and possible specialist referral may be indicated.

Sleep disorders are common but specialist sleep laboratory studies are expensive and in great demand. Clinicians are developing ways of identifying patients who are most likely to have OSA and therefore be likely to benefit from specialist sleep studies that lead to effective treatments. Most of these methods are based on a combination of reported symptoms, physical measurements and simplified monitoring equipment\textsuperscript{11}.

Factors that are predictive\textsuperscript{12} of OSA include:

a) A history of disruptive snoring
b) Witnessed apnoeas or history of frequent reported choking/gasping during sleep
c) History of hypertension
d) Neck circumference greater than 40cm.

Medical assessments should address these factors, which can be combined in an algorithm or “clinical decision rule” used in an occupational context so that appropriate subjects can be referred for further investigation\textsuperscript{13,14}. An example of such a strategy based on “adjusted neck circumference” will be found at figure I.1.

Adjusted Neck Circumference of greater than 48, when considered in conjunction with the severity of symptoms, indicates a high probability of having a sleep study result that is diagnostic of sleep apnoea\textsuperscript{13}. ANC = neck circ (in cm) + 4 (if hypertension) + 3 (if reports of frequent snoring) + 3 (if reports of frequent choking /gastings/apnoeas at night).

The Epworth Sleepiness Scale\textsuperscript{15} gives an estimate of EDS and scores of 16 or more are indicative of moderate or severe sleepiness, which is associated with an increased risk of sleep related vehicle accidents. The absence of EDS is not a reliable indication that the subject does not have OSA so medical assessments must include other factors that are predictive of OSA. There is no validated procedure that can assess EDS in a way that is predictive of an individual persons accident risk and there are concerns about the objectivity of questionnaires in the context of a medical assessment where the subject’s livelihood may be at stake.

Medical assessments may be used as a screen to identify workers who could be at increased risk of accident because of EDS or underlying sleep disorder. For example, any worker with:

a) A prior history of OSA
b) An adjusted neck circumference score of more than 48
c) An Epworth Score of 16 to 24.

These workers will normally be considered to be unfit for safety critical work, pending further investigation and liaison with their doctor. Each case should be assessed individually and other factors may be taken into account before determining the workers fitness for work.

Specialist tests such as portable monitoring\textsuperscript{16} or polysomnography may be required to establish the severity of OSA. Individuals with severe OSA should not perform safety critical work until their condition has been properly evaluated and effectively treated.
I.6 Safeguards and regular review

Workers engaged on safety critical duties who suffer from EDS and/or OSA should be kept under regular review by the responsible occupational physician, for example on an annual basis.

General factors to be taken into consideration include

a) The nature of the individual's job.
b) How sleepy or alert is the individual during working hours?
c) Can they recognise the onset of sleepiness or might they doze unexpectedly?
d) Do they understand the factors that can make sleepiness more likely?
e) Are they able to take appropriate action if they become sleepy at work?

Specific factors in relation to OSA:

a) History of sleep disordered breathing.
b) Severity of the condition, including the RDI.
d) Level of compliance with treatment.
e) Associated medical conditions such as respiratory or cardiovascular disease and obesity.

Individuals with severe OSA (RDI>30) will not normally be considered fit for safety critical work until they are receiving and complying with effective treatment.

Effective treatment would be expected to reduce the level of symptoms and produce a reduction of the RDI to less than 15, which can be verified with portable monitoring or polysomnography.

Continued compliance with CPAP therapy is particularly important and may be verified, preferably using data logged by the CPAP machine.

Every case will require individual occupational health assessment and liaison with the treating physician will be necessary to establish the clinical status and progress of the subject. An example of letters and forms used to correspond with the treating physician can be found in DVLA Road Safety Report No. 45, pp19-21 (see further reading).

I.7 Summary

Excessive daytime sleepiness is often due to non-medical causes but may be related to underlying medical conditions such as sleep disorders. Obstructive sleep apnoea is a common sleep disorder that is related to increased accident rates, depending on its severity, and can be improved with appropriate treatment.

Medical assessments can be used to identify individuals who may have EDS or OSA so that further evaluation can be arranged. Individuals who are suffering from significant daytime sleepiness or untreated severe OSA are unlikely to be fit for safety critical work. Individual assessment, regular review and liaison with the treating physician are necessary. Compliance with and response to treatment should be objectively verified before recommencement of safety critical duties.

Workers have a personal responsibility not to work when excessively sleepy and managers should ensure that safe systems of work are followed.
Figure I.1  Example of a sleep apnoea evaluation and management strategy for safety critical workers.

* ANC - Adjusted Neck Circumference
  = neck circ (in cm) + 4 (if hypertension) + 3 (if reports of frequent snoring ) + 3 (if reports of frequent choking/gasping/apnoeas at night)

† RDI - Respiratory Disturbance Index (number of respiratory disturbances per hour )

‡ PSG - Polysomnography

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Rail Safety & Standards Board. Human Factors Fact Sheets
http://www.rssb.co.uk/expertise/human_factors/facts.asp

Rail Safety & Standards Board. GE/RT8000/G1 Rule Book - issue 3. General Safety Responsibilities
http://www.rgsonline.co.uk/docushare/dsweb/Get/Rail-43670/G1_3.PDF

Health and Safety Executive. Human Factors: Fatigue
http://www.hse.gov.uk/humanfactors/comah/fatigue.htm
Definitions

**Competent Person**
Travelling as a competent person with the driver of a train on which certain safety equipment (for example, Automatic Warning System, AWS) has been isolated or is defective. The circumstances in which this arrangement is permitted are defined in GE/RT8000 Module TW5 – Preparation and movement of trains - Defective or isolated vehicles on-train equipment.

**Medicine**
Has the same meaning as ‘medicinal product’ in the Medicines Act 1968. Medicines may be supplied on prescription, pharmacy only or general sale.

**Psychotropic medicines**
Medicines that are capable of affecting the mind, emotions or behaviour. Includes antidepressants, tranquillisers and anti-psychotic medicines (used to treat serious mental illness).

**Over the counter medicines**
These medicines include all medicines on general sale to the public via all sources including the internet and those available through a pharmacy. Alternative medicines and herbal remedies/medicines are also classified in this definition.

**Safety critical worker**
A person employed to carry out tasks defined as safety critical in the Railways and Other Guided Transport Systems (Safety) Regulations 2006 [ROGS] regulation 23(1).

**Sensory functions**
Visual acuity, hearing and colour perception

**Shunting**
Any movement of a train or vehicle other than a train passing normally along a running line.

**Train dispatch**
The integration of systems, equipment, procedures and instructions to ensure the safe departure of a train from any location.
References

The Catalogue of Railway Group Standards and the Railway Group Standards CD-ROM give the current issue number and status of documents published by RSSB. This information is also available from www.rgsonline.co.uk.

Documents referenced in the text

References given in the appendices to this document are not repeated here.
RGSC 01 The Railway Group Standards Code

Railway Group Standards
GO/RT3451 Train movement: staff suitability and fitness requirements
GE/RT8070 Testing Railway Safety Critical Workers for Drugs and Alcohol
GE/GN8570 Guidance on the Management of Drugs and Alcohol

Other references
2006/930/EC Technical Specification of Interoperability relating to the subsystem ‘Traffic Operation and Management’ of the trans-European conventional rail system
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