

Power Line Spotter Visual Standard

Background

The factors I have considered are listed below.

Task visibility factors	
Size of task	0.75" diameter cable
Distance of task	40 ft
Illumination	Daylight
Contrast	Black against mixed background
Colour	Black cable
Time available to view task	Variable
Glare	Possible from bright sky/sun
Atmospheric conditions	Variable
Depth Perception	See below

Depth perception

Workers with binocular vision will have superior depth perception compared to monocular workers. Binocular vision is measured as stereopsis, and workers should have a recommended minimum stereopsis of 40 sec arc. (It should be noted that stereopsis can reduce with age, measurably over the age of 46 years).

Depth perception can be reduced by factors including uncorrected prescriptions, uncompensated ocular muscle imbalances, amblyopia (lazy eye), anisometropia (unequal prescriptions for each eye) and tropias (squints).

At low light levels depth perception is significantly reduced.

Visual Acuity

From the given task size (0.75" diameter cable) and viewing distance (40 ft) the minimum visual acuity required is calculated to be 20/13. This is better than average, and to set a visual standard this good would exclude competent workers. If the viewing distance was reduced to 20 ft then the visual acuity required would be 20/20. The visual acuity measurement is written as 20/xx where xx is the letter size viewed at 20 feet from the chart as shown in chart 1.

Visual Field

A normal visual field extends 60° superiorly, 70° inferiorly, 95° temporally and 60° nasally from the straight ahead position. As the spotter would usually be required to look up I would place greater importance on the superior visual field, and less on the inferior visual field.

Ocular motility should be full; a worker must be able to rotate their eyes in all directions normally. A person with limited ocular motility is likely to have other co-existing problems which are likely to render them unsuitable for such spotting work this standard is design for.

Uncompensated phorias, (latent squints), are likely to reduce a person's stereopsis and therefore their ability to carry out cable spotting tasks. This is very difficult to place a figure on as some people will cope with their phorias better than others. I would recommend an eye examination to determine if the phoria is compensated and therefore unlikely to affect their cable spotting ability.

Environmental factors are difficult to quantify, but issues such as rain / condensation reducing spectacle visibility, glare from overhead sun, and poor contrast of dark cables against dark environment / dark skies and overall reduced light levels could significantly reduce the visibility of cables. These would require assessment from onsite safety officers/site managers. **If conditions are unsuitable then I would expect work be suspended in the interests of safety.**

There could be solutions found, Polaroid eyeglasses or contact lenses would be two possible solutions (anti-fog lenses/coatings do not usually work to reduce spectacle lens condensation). However it is probably unreasonable to expect a spectacle wearer switch to contact lenses, but Polaroid lenses could be provided. The distance between cable and spotter should be reduced as much as possible in the event of any adverse conditions.

In my opinion the most important factor is the distance and the position of the spotter relative to the cable. If the spotter were to be under or directly below the cable the spotting job would be much easier as the above depth perception requirements would then be greatly reduced. **Could the spotter position be specified and enforced?**



The picture supplied showing the cable viewed from behind the jib is a good example of a poor choice of spotting location. For example a crane drive driving directly towards an overhead cable, perpendicular to the cable direction, would have great difficulty judging the exact distance from the hoist wire to the cable. The greater the angle away from perpendicular the crane driver approached the cable the easier it is so judge the distance from hoist wire to cable.

Applicants for occupations such as the Fire Brigade and Police in the UK are required to have an eye examination visual standard form completed as part of their application. This is usually funded by the applicant.

Recommended definition

I therefore recommend the following requirements, which could be determined at a routine eye examination.

Unaided or best corrected Visual acuity in each eye:

20/13 if the cable is 40 ft or closer to the spotter

20/17 if the cable is 25 ft or closer to the spotter

20/20 if the cable is 20 ft or closer to the spotter

No uncompensated phoria, no tropia.

Full ocular motility

Stereopsis should be a minimum of 40 sec arc

Visual Field I recommend a minimum visual field of 50° superiorly, 50° inferiorly, 75° temporally and 40° nasally, as tested by automated perimetry with the spotter wearing any corrective appliance normally used on site, not by hand.

I advise the spotters be checked at least two yearly, and for spotters over 50 years old annually.

On site test

It is critical that the correct size letter and viewing distance is used. Lighting of the chart is important, and should be a **consistent with the conditions prevailing on the day/evening in question**. A good quality black letter should be printed on white paper/card. Alternatively charts are available to buy.

Potential wire contact to spotter	Visual acuity required	Test letter size viewed at 20 ft
40 ft	20/13	0.23" or 5.8mm
25ft	20/17	0.29" or 7.3 mm
20ft	20/20	0.34" or 8.7 mm

Chart 1

I should add that my recommendations are just that, recommendations. Every site will be different and each worker should be assessed for suitability for the task they are given. Satisfying the visual standard does not imply competence for the job only visual ability. Any doubts about workers suitability for spotting task should be individually assessed by the onsite safety officer. The information is correct as written to the best of my knowledge as of 30th June 2004. Peter Turner, MCOptom, piturner@blueyonder.co.uk

VIEW THIS CARD FROM 20 ft

(IN WORST LIGHTING FOR TODAY'S CRANE OPERATIONS)

40 ft from potential wire contact to spotter – 0.23" type

r e g h o c u x z l l e d w n l t u q o p t h
a n k g o d f o r o s h a t h j l k m v n p q

25 ft m from potential wire contact to spotter – 0.29" type

o e d w n u q o p t h a n k g o
d f o r o s h a l t u v h g o v n

20 ft from potential wire contact to spotter – 0.34" type

h j l k m v n u x z l l e d w
q o p t h a n k g o d f o r o
s h a l t u v h e u o p r s t