



# **SIRE 2.0 Ergonomic Guidance for using an Inspection Tablet**

**Version 1.0**

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## Introduction

An important element of the SIRE 2.0 programme is the introduction of an intrinsically safe tablet computer to assist the Inspector. To support SIRE Programme Submitters instructing inspectors undertaking SIRE 2.0 inspections, OCIMF has obtained expert ergonomic advice. That advice is set out in this document. The advice considers using the tablet for an 8-10 hour inspection and offers guidance on how to mitigate identified ergonomic risk factors. This advice will be updated in light of experience of inspections and feedback provided to OCIMF.

## Inspection work practices

### Task duration and breaks

An inspection typically takes approximately eight hours with a maximum of ten hours actual inspection time excluding breaks and interruptions. Usual practice is for inspectors to take a 30-minute meal break mid-point in the inspection, but they can stop for a short break at any time during the inspection as required.

### Personal Protective Equipment (PPE)

PPE used during an inspection will include, as appropriate to working location onboard, safety shoes, overalls, hard hat, ear protectors, eye protection and gloves.

### Environment and equipment

Approximately 40% of an inspection takes place outside and is exposed to the elements. Seating is estimated to be available for 20% of an inspection, with 80% of the time spent standing and moving.

Generally accepted ergonomic guidance is that seating should be provided where possible to avoid static postures and lower limb issues. In the SIRE 2.0 inspection case, the nature of the work is dynamic, and inspectors are moving throughout the inspection which should reduce the risk of static loading in standing.

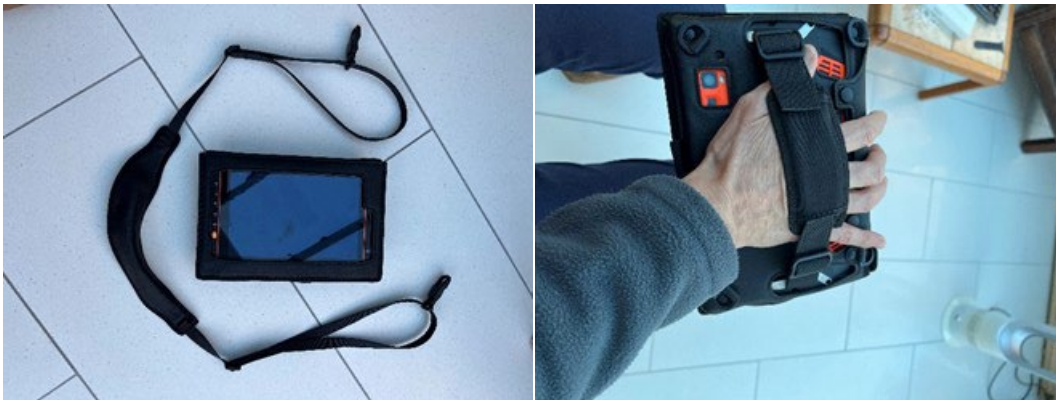
The use of a tablet introduces the need for ergonomic guidance. The inspector should look for the opportunity to work in a seated position as often as practical to mitigate the potential static loading associated with tablet use by sitting and placing the tablet on a work surface so that it can be viewed at a suitable height and angle to reduce neck flexion.

Table 1 – Ergonomic issues and potential solutions

Ergonomic issues identified	Mitigations
Timing and breaks	Inspectors should be aware of the importance of breaks and movement, including the carrying out of micro-exercises and avoidance of prolonged static postures.

<p>Changes to current work practices</p>	<p>Inspectors will have to make changes to their current preferred way of working due to the introduction of the tablet. Training has been provided to address the use of the tablet during the inspection and this document will provide ergonomic guidance.</p>
<p>Standing to work</p>	<p>Inspectors should be aware that they should sit wherever possible and practical to avoid prolonged static postures and lower limb problems and provide opportunity to reduce the neck flexion associated with viewing the tablet in standing as well as the potentially harmful upper limb postures associated with interacting with the screen in standing.</p>
<p>Environment Glare/reflection and exposure to elements</p>	<p>Inspectors should recognise the effects of glare and reflections. Where glare or reflection causes difficulty in viewing the screen, the inspector should seek a shaded location to reduce the effects glare or reflection.</p>

## Equipment: Tablet and accessories



**Photo 1 and 2: Tablet and accessories**

Photographs 1 and 2 demonstrate the straps and handles provided with the standard inspection tablet supply.

### Size and weight

The inspection tablet with the holder weighs 1 kg. The tablet measures 250mm long, 170mm wide, and 30mm deep.

## Manual handling

According to widely available Manual Handling Operations guidance, the weight of the tablet is not a significant risk factor but given that inspectors are working and holding this tablet for approximately eight hours, holding the tablet could create risks which are described in Table 2.

## Functionality

**Software:** There is a lot of information available to inspectors on the screen, but the expectation is that inspectors would not have to read any detail during the inspection and that data input can be minimal with just a few screen interactions required to record the date and time of raising a concern. Voice memos and photographs can be used to capture pertinent information so that the Subject of Concern (SOC), Nature of Concern (NOC) and negative comments or comments can be fully documented later.

**Hardware:** The tablet and case are weatherproof and specified to work in all temperatures and conditions that can reasonably be expected during an inspection.

A stylus can be used to operate the touch screen.

**Screen:** Interacting with the screen should be minimal while moving around the vessel. Many of the usual adjustments available on a tablet are fixed, for instance the screen brightness, screen rotation and inspection editor software font size.

## Case and straps



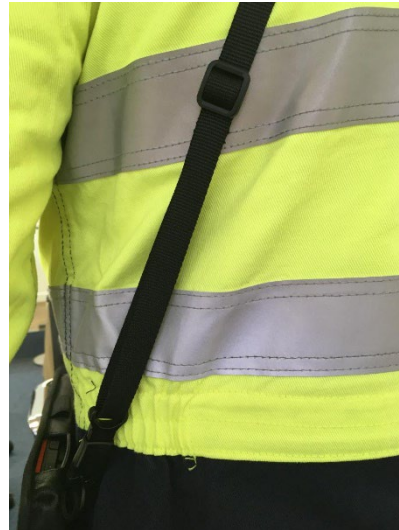
***Photos 3 and 4 – Potential positioning of strap***

Straps are adjustable in length and able to be attached at each corner of the tablet case. The longer strap may be positioned around the neck or across the body so that the tablet may be carried or stowed on the body while not in use. It is intended to be long enough so it can remain attached to the operator while in use to prevent dropping it.

The longer strap can be positioned in various combinations (diagonally or side by side). An experienced SIRE 2.0 Trial Inspector reported that the side by side arrangement felt more stable and against his body than the diagonal (see photo 5 and 6).



**Photo 5 diagonally secured straps**



**Photo 6 side by side secured straps**

There is also a hand strap to allow one hand to support the tablet while the other is free to input or engage with the screen. Details of strap positioning are discussed according to the tasks reviewed in Table 2.

Table 2 – Ergonomic issues and potential solutions

Ergonomic issues identified	Possible mitigations
Weight of tablet combined with task duration	Inspectors are encouraged to identify and use the best working position and strap arrangement by task (see tasks below) and according to their comfort to assist in reducing manual handling risks associated with carrying a tablet in various positions for a full inspection. Also, to follow guidance about taking breaks and maximising movement and micro-exercises.
Software	Inspectors should be familiar with the questions and the supporting guidance included in the CVIQ and the order of the standardised inspections so that they are able to adjust and select the order according to their preferred working methods. This should allow inspectors to keep data input and reading from the tablet to a minimum while moving around a vessel during an inspection.

<p>Data input – operation of tablet while wearing gloves</p>	<p>Inspectors should consider selecting gloves that provide the necessary person protection while using the tablet and, a stylus if this is the preferred method of interacting with the touch screen.</p> <p>Inspectors are encouraged to input the majority of data while in an appropriate environment and position for Display Screen Equipment (DSE) work which should assist in ensuring that minimal data input is required when having to wear gloves.</p> <p>Inspectors should consider alternative stylus designs for use while wearing their preferred gloves.</p>
<p>Adjusting the straps</p>	<p>Inspectors should consider strap position by task and make adjustments, where necessary, when changing tasks.</p> <p>This document provides guidance on strap adjustment and use.</p>
<p>Viewing the screen</p>	<p>The tablet screen may be subject to glare and reflection particularly when used outside and this may impact the usability in certain weather conditions.</p> <p>As the tablet screen brightness and font size is fixed:</p> <ul style="list-style-type: none"> <li>• Inspectors should have appropriate eyesight tests and glasses to optimise their ability to view the screen.</li> <li>• Inspectors should move into a shaded area, wherever possible, when the tablet screen is subject to glare or reflection.</li> </ul>

## Task 1 – Carrying the tablet when not in use

The nature of an inspection means that there is a lot of moving around between work and equipment areas on a vessel. Much of this is outside and there are stairs and uneven surfaces to negotiate, so inspectors require both hands to be free and able to hold handrails where needed.

The following photos show the tablet not in use and being carried while the inspector viewed equipment during a trial inspection. The tablet appears to be held next to his body in photo 7 so that he only has one hand free. The strap is positioned across his body and the tablet appears to slip around, in front of him as he bends forwards (photo 8).



*Photo 7 and 8 – Tablet in use during a trial inspection*

The same task was mocked up during an ergonomic assessment and, two possible positions were identified for the tablet when not in use:

- with the strap around the neck (shown in photo 12), or
- with the strap across the body as in photo 9.

The ergonomic assessment indicated that the round the neck method could result in the tablet swinging when the user moved and particularly when bending forwards to view equipment or tasks during the inspection. The cross-body method also resulted in some swinging (photo 9), but it was felt to be safer and less intrusive. It was noted that the movement of the tablet may result in the user placing one hand on the tablet to stabilise it while not in use, as seen in photos 7 and 8 above, and that this may present a safety issue as both hands are not free. Both hands are required to hold rails for steps and to ensure safety aboard a vessel. The ergonomic assessment indicated that the unintended movement of the tablet could be minimised by adjusting the strap and positioning the tablet behind the operator roughly in the small of the back (photos 10 and 11).





***Photo 9 – carrying the tablet (mock up)***



***Photo 10 and 11 – potential stable position of tablet while not in use shown with operator upright and bending forwards (mock up)***

Table 3 – Ergonomic Issues and potential solutions

Ergonomic issues identified	Possible mitigations
<p>Movement of tablet during inspection activities.</p> <p>The tablet should ideally remain stable when not in use and inspectors are moving or viewing activities and equipment for inspection.</p>	<p>Inspectors are advised to position and adjust the position of the tablet when not in use and when the inspector is moving to maximise the stability of the tablet.</p> <p>Ergonomic assessment mock up and discussion indicated that positioning the tablet behind them, in the small of the back, with the straps across the body may assist in limiting unwanted movement of the tablet causing obstruction to an inspector’s movement or sight line and/or causing a distraction from the task in hand.</p>
<p>Adjustment of straps</p>	<p>Inspectors should adjust the strap position and length according to their comfort, aiming to minimise the swinging when not in use and to allow easy viewing when in use.</p> <p>It is likely that a parallel rather than diagonal position of the two points of attachment from the strap will assist in keeping the tablet stable when not in use.</p> <p>It is likely that positioning the parallel straps at the bottom attachments rather than the top will assist in ease of use of the tablet as the straps appear to be less likely to obscure the screen.</p>
<p>Trade-off between secure stowing/ carrying of the tablet and ease of use without adjusting straps</p>	<p>The two possible positions for carrying the tablet with the strap are around the neck or across the body.</p> <p>Across the body appears to provide a more stable position when the tablet is not in use if the strap is adjusted so that the tablet sits behind the operator in the small of their back.</p> <p>This arrangement also appears to allow the screen to be used without being obscured by the straps when the operator slides it round to the front.</p>

## Task 2 – Holding the tablet for reading and entering data

Holding a tablet can create awkward postures so muscles fatigue quickly. The tablet may be held in two hands or with one hand while the other hand interacts with the tablet. It is usually the non-dominant hand doing the holding (stabilising) and the dominant hand working. See photo 10 below. This photograph shows the inspector not wearing gloves to use the input device and not using the strap handle on the back of the tablet case to hold the tablet. Wrist deviation is likely to result while using the tablet in this way. Two handed holding is demonstrated in photo 11 and does not allow the use of a stylus to interact with the screen, when held like this, users will tend to use their thumbs. The repeated action of pressing buttons/typing on a keypad, may lead to a gradual onset of pain in the thumbs and wrists.

With both holding methods, forearm fatigue is a likely resultant issue. The forearm muscles tire quickly when they are required to hold the hands up for long periods.



**Photo 10 – Tablet in use**



**Photo 11 – Wrist position when holding tablet**

Most wrist issues are likely to be a result of holding/supporting the tablet in these ways. Radial deviation, (bending the wrist toward the thumb when holding the tablet) is clear in both photographs, it is a non-neutral posture that is likely to be held for prolonged periods while using a tablet in this way and is likely to give rise to hand, wrist and forearm pain due to the static muscle loading involved.

The ergonomic assessment mock-up of the task indicated that the hand strap on the back of the tablet permits a better wrist position while still allowing the tablet to be held with one hand. See photo 12.

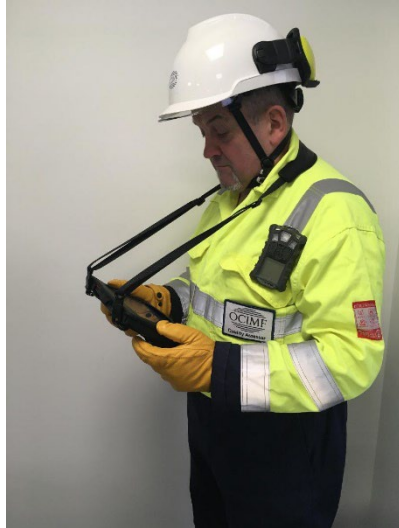


***Photo 12 – use of hand strap on the back of the tablet case***

The position of the long strap around the neck or cross body is also a factor in this task as the position of the tablet for reading and inputting data needs to be optimal for eyesight, comfort and ease of use. Holding a tablet up higher is more comfortable for the neck but it places the load on the arms, which fatigue easily. Holding the tablet down lower is more comfortable for the arms but puts the neck in an awkward position, as posture follows vision. The distance of the tablet from the operator's face should be approximately an arm's length to ensure it is at the optimal focal length.

Photos 12 and 10 show the different options for strap position and how this may affect the screen view. In both, the view of the screen is clear. The strap is positioned around the neck in photo 12 and cross the body in photo 10. The comfort of these positions will vary from person to person and will depend upon individual body dimensions and working habits.

Another factor is the strap position and where they are secured on the back of the tablet case as discussed in the task of carrying the tablet. Photo 13 shows how the placement of straps can impact the ability to view the screen. Photos 12 and 10 show two options for strap position where the screen is not obscured by the straps.



***Photo 13 – how strap position may obscure the screen and reduce the length available to adjust from task to task***

Ergonomically there is a trade-off between neck position and arm position for the operator to attain a neutral and comfortable posture to input and read data on the tablet.

The amount of data entry during the inspection is intended to be minimal as inspectors can use a few keystrokes to input the basic details of an observation and then complete the details later once sitting at a desk. Most of the input during the inspection is likely to be done while standing but wherever possible, an inspector should take opportunities to sit. Where the inspector can sit, they should raise the tablet up to reduce neck flexion and angle the tablet up slightly. When the tablet is placed flat on a table or the lap, it requires neck flexion to view and interact with the screen. In addition, when the tablet is flat, there is more eye fatigue because the eyes must work harder to hold their position.

Table 4 – Ergonomic issues and potential solutions

Ergonomic issues identified	Possible mitigations
Strap position	<p>Inspectors are encouraged to adjust the tablet strap and be aware of their individual comfort levels so that the strap is used optimally. For this task (holding the tablet to interact with it) that means:</p> <ul style="list-style-type: none"> <li>• positioning the long strap so that the optimum position for the individuals' neck and forearms is achieved. This is advised to be cross body to minimise the need to adjust the tablet between the tasks of holding it while not in use and holding it to use.</li> <li>• attaching the strap to ensure that when the tablet is lifted to interact with the screen the straps do not obscure the screen.</li> </ul>
Use of hand strap	<p>Inspectors are advised to use the hand strap while interacting with the tablet to minimise the wrist deviation and potential over use of thumbs when holding the tablet with one or two hands using a pinch grip.</p>
Working practices	<p>Inspectors must complete the pre-inspection phase before boarding a vessel so that reading from the tablet during an inspection phase is minimised.</p> <p>Inspectors are advised to maximise the opportunity for entering data when they are in the seated position, ideally at a desk.</p> <p>All standing positions have a trade-off between neck and arm positions.</p> <p>Inspectors should take all the opportunities they can to sit during an inspection.</p>

<p>Awareness of posture</p>	<p>inspectors should consider the following:</p> <ul style="list-style-type: none"> <li>• Tilting the head forwards to look down at the tablet places a strain on the neck and upper back. <ul style="list-style-type: none"> <li>○ When the device is held directly in front of the face, at eye level, the neck is better able to retain a healthy and neutral position.</li> <li>○ If possible, consider moving eyes to look down rather than neck.</li> </ul> </li> <li>• Holding the tablet up to read or input may cause strain on the arms. <ul style="list-style-type: none"> <li>○ Consider sitting and placing the tablet on a surface where possible.</li> <li>○ When holding the device or typing keep wrists as relaxed as possible. Ensure wrists are straight and relaxed using a comfortable neutral grip of the device.</li> </ul> </li> <li>• Alternate between thumb and fingers and hands, if possible, to type when using the touch pad for data entry</li> <li>• Use voice functionality when appropriate.</li> </ul>
<p>Input device</p>	<p>Inspectors are advised to make glove and stylus selection based on their own comfort when using the tablet with gloved hands.</p>
<p>Sitting to input data during and after the inspection</p>	<p>Inspectors are advised to:</p> <ul style="list-style-type: none"> <li>• raise the tablet up and angle it to reduce neck flexion.</li> <li>• consider pairing a separate keyboard and mouse with the tablet when possible and when entering detailed information. A physical keyboard provides the user with tactile feedback.</li> </ul>

## Updating the advice

The ergonomic assessment used to formulate the guidance was derived from a limited number of inspectors and physical inspections. As more inspections are completed, inspectors will be able to provide feedback and suggestions to update and improve the ergonomic advice offered by OCIMF on behalf of its members.

OCIMF welcomes feedback from inspectors and requests that this feedback is provided through the Suggestions for Improvement (SFI) Portal, available through an individual inspector’s SIRE user account.

[SIRE 2.0 - Instructions for entering data into the Suggestions for Improvement portal](#)

The portal has been set up with a specific area for reporting ergonomic issues relating to the inspection tablet.



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