|  |
| --- |
|  |
| ONR Technical Inspection Guide (TIG)  LC 27 – Safety Mechanisms, Devices and Circuits |



ONR Technical Inspection Guide (TIG)

LC 27 – Safety Mechanisms, Devices and Circuits

**Head of Profession** – Operational Inspection

**Authored by** – Nuclear Safety Inspector

**Approved by** – Nuclear Safety Inspector

**Issue:** 6.1

**Published**: May 2025

**Next scheduled review**: May 2028

**Document reference**: NS-INSP-GD-027

**Record reference**: [ONRHH-822789359-20576](https://prodonrgov.sharepoint.com/sites/HOW2Hub/_layouts/15/DocIdRedir.aspx?ID=ONRHH-822789359-20576)

Revision commentary

|  |  |
| --- | --- |
| Issue | Description of update(s) |
| 6.0 | Minor clarification incorporated into paragraph 4.2. Updated review period. |
| 6.1 | Minor update - Review of content, no fundamental changes to the basis of the guidance, however there has been a focus on the regulatory language and flow of the document to better support inspectors application. |

# Introduction

1. Technical Inspection Guides (TIGs) support inspectors undertaking compliance inspections to make regulatory judgements in relation to the adequacy of compliance and in providing regulatory advice on specific Licence Conditions (LCs) to licensees.
2. The purpose of this guidance is to facilitate a consistent approach to Licence Condition (LC) 27 – Safety Mechanisms, Devices and Circuits (SMDCs).
3. The guidance should not be regarded as exhaustive or mandatory, but provides a clear framework for inspectors to judge the suitability of the licensee's arrangements and the adequacy of their implementation.   
   The main outcomes of LC 27 inspections typically focus on verifying compliance with the following requirements:

* Ensuring that plant is not used unless the necessary SMDCs[[1]](#footnote-2) are installed and functioning.
* Ensuring SMDCs are on the LC 28 Plant Maintenance Schedule and subject to maintenance, inspection or test as declared in the safety case.
* Ensuring appropriate classification (and labelling) of the SMDC and the related essential services.

1. This guidance should be read in conjunction with ONRs policy on risk-informed and targeted engagements (RITE) [1], which sets out how ONR expects inspectors to target regulatory engagements in a risk-informed manner. It supports inspectors in deciding what to engage dutyholders on, based on their judgement of risk prior to and during regulatory engagements

# LC 27 – Safety Mechanisms, Devices and Circuits

1. The LC states:

‘The licensee shall ensure that a plant is not operated, inspected, maintained or tested unless suitable and sufficient safety mechanisms, devices and circuits are properly connected and in good working order.’

# Purpose and outcomes of LC 27

1. The main purpose of this LC is to ensure that the licensee is not operating plant unless the defined SMDC’s are installed, functioning and appropriately tested/maintained. The regulatory outcomes being sought by LC 27 are also therefore linked with the other following LCs.

* LC 6 (Documents, records, authorities and certificates)
* LC 7 (Incidents on Site)
* LC 12 (Duly authorised and other suitably qualified and experienced persons)
* LC 11 (Emergency arrangements)
* LC 14 (Safety documentation)
* LC 15 (Periodic review)
* LC 17 (Management systems)
* LC 23 (Operating rules - limits and conditions in the interests of safety)
* LC 24 (Operating instructions)
* LC 25 (Operational records)
* LC 28 (Examination, inspection, maintenance and testing)

# 

# Guidance on the inspection outcomes for LC 27

1. LC 27 does not formally require the licensee to make and implement adequate arrangements as some other LC’s do. To effectively comply with this LC the licensee will have established arrangements, process or procedures which provides them with assurance that legal compliance with this LC is met.
2. How the licensee ensures that plant is not operating unless the defined SMDC’s are installed, functioning and appropriately tested/maintained, is for them to define in their arrangements, which you will need to clarify as part of the inspection.
3. In judging the adequacy of the arrangements, the following is neither exclusive nor exhaustive. It is therefore important to sample not only the scope and adequacy of the arrangements, but also how these arrangements are being directly implemented in practice at the work place, ensuring discussions are held with various levels of management involved and also with the workforce physically undertaking the tasks / activities at the workplace.

* Inspect the licensee’s arrangements/procedures and confirm that they have been reviewed in accordance with their quality management system requirements.
* Ensure SMDCs appropriate for any operations are identified (and appropriately labelled) from the plant safety case, LC 23 (1), and there is a system in place to ensure that sufficient SMDCs are in place and operable at all times.
* Ensure appropriate classification of the SMDC – for clarity, an SMDC is required to act in response to a fault, i.e. when something has gone wrong, to protect against a radiological consequence, but has no role in normal operations. As such, the removal of the safety function of the SMDC should not interfere with normal operations. Examples of SMDCs / non-SMDCs are presented at [Appendix 1](#_Appendix_1_–).
* Ensure where SMDCs are supported by essential services   
  (e.g., electricity) that these services are classified and maintained accordingly.
* Establish which SMDCs are required under the various conditions of operation of the plant and that the operating instructions (LC 24) require the availability of required SMDCs for a particular plant state (identified under LC 23) to be confirmed prior to planned entry into such a state.
* Confirm that the SMDCs are on the LC 28 Plant Maintenance Schedule and subject to maintenance, inspection or test as declared in the safety case and to periodic surveillance by the operators.   
  Examine maintenance instructions / proof tests to ensure that where reasonably practicable a full end-to-end test is being completed to confirm availability of the SMDC.
* Confirm all persons responsible for ensuring compliance (operations and maintenance) are identified / trained / duly appointed and SQEP to undertake their duties (LC 12).

1. Check that the procedures require suitable records to be kept demonstrating compliance with LC 27. These records should be identified in LC 25 arrangements and be kept in accordance with LC 6 procedures.

* Inspect records of compliance with the condition to test their veracity. Where non-compliance is found, ensure this is notified, recorded and reported as required by LC 7 and that action has been taken to rectify / install new equipment or the affected process / plant shutdown.
* Where any “substitution” or equivalent arrangements have been implemented in the event of unavailability of any claimed SMDCs; the inspector should ensure that they have been appropriately implemented and that they provide a broadly equivalent line of protection.

# References

|  |  |
| --- | --- |
| [1] | ONR, “ONR-RD-POL-002 - Risk-informed and targeted engagements (RITE),” [Online]. Available: https://www.onr.org.uk/publications/regulatory-reports/regulatory-policy/onr-rd-pol-002-risk-informed-and-targeted-engagements-rite-policy/. |
| [2] | ONR, “NS-TAST-GD-003 - Safety Systems,” [Online]. Available: https://www.onr.org.uk/publications/regulatory-guidance/regulatory-assessment-and-permissioning/technical-assessment-guides-tags/nuclear-safety-tags/technical-assessment-guides-tags-nuclear-safety-full-list/. |
| [3] | ONR, “Safety Assessment Principles for Nuclear Facilities - 2014 Edition, Revision 1 (January 2020),” 2020. |

# Appendix 1 – Information on / examples of SMDCs / non-SMDCs

Examples of SMDCs / non-SMDCs are presented in Table 1 for information.  
ONR’s nuclear safety technical assessment guide (TAG) - NS-TAST-GD-003 – Safety Systems [2] - provides further guidance regarding the requirements for SMDCs, with additional details found in ONRs Safety Assessment Principles (SAPs), specifically those relating to safety systems engineering (ESS.1 to ESS.27, [3]).

Table 1 - Examples of SMDCs / non-SMDCs

|  |  |
| --- | --- |
| Examples of SMDCs | Examples of non-SMDCs |
| Reactor pressure vessel safety relief valves | Reactor pressure vessel |
| Main boiler safety relief valves on gas-cooled reactors | Reactor fuel |
| Backup diesel generators | Main boiler feed pumps |
| Fire detection and suppression systems | Sea wall - Passive civil structures (e.g. a sea defence wall) are considered to be out-with the scope of the LC 27 term “Mechanisms, Devices and Circuits”. The availability of a passive civil structure can reasonably be expected to be assured; hence it is not considered a SMDC. |

\*It should be noted that systems which protect only against industrial safety consequences only are not SMDCs.

1. SMDC - “A system that acts in response to a fault to protect against a radiological consequence” - ONR’s Safety Assessment Principles (SAPs) for Nuclear Facilities [2]. This term is mainly used by ONR in LC 27 and rarely by licensees or internationally. [↑](#footnote-ref-2)