

# EN50549-1

# EN50549-2

# Intent & Scope

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PRESENTED TO 9<sup>TH</sup> ACER GRID CONNECTION ESC

CENELEC TC8X AHG

EN 50549-1: Requirements for generating plants to be connected in parallel with distribution networks -  
Part 1: Connection to a LV distribution network –  
Generating plants up to and including Type B

EN 50549-2: Requirements for generating plants to be connected in parallel with distribution networks -  
Part 2: Connection to a MV distribution network –  
Generating plants up to and including Type B

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# AGENDA

- 1 Intent, Framework and Scope
- 2 Correspondence RfG – EN 50549
- 3 How can EN 50549 support RfG implementation in a member state
- 4 Conclusion

# Please keep in mind

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## Directive 714/2009 8(7)

7. The network codes shall be developed for cross-border network issues and market integration issues and shall be without prejudice to the Member States' right to establish national network codes which do not affect cross-border trade.

**As issues regarding cross border trade of electricity are covered in RfG, topics not covered in RfG are, on a legal perspective, not understood as affecting cross border trade of electricity.**

# Intent

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## European foreword of EN 50549-1 and EN 50549-2

*This European Standard relates to both the RfG European Network Code and current technical market needs. Its purpose is to give detailed description of functions to be implemented in products.*

*This European Standard is also intended to serve as a technical reference for the definition of national requirements where the RfG European Network Code requirements allow flexible implementation.*

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# Framework and Scope

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- EN 50549 is written to be compliant and used in conjunction with COMMISSION REGULATION 2016/631 (RfG)
- EN 50549-1 and -2 cover all technical (essential) requirements (Title II) of RfG applicable for type A and type B generating modules and as such will support technical requirements of RfG
- EN 50549-10 (in development) will cover tests to provide compliance with requirements of part 1 and part 2 and as such will support the compliance procedures (Title IV) of RfG
- EN 50549 series does not address
  - general requirements and type thresholds (Title I)
  - procedures (Title III)
  - derogation, classification as emerging technology (Title V to VII)

# Framework and Scope

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**All RfG articles of Title II relevant for type A and type B generating modules correspond to clauses in EN 50549 part 1 and 2**

- EN 50549 clauses provide requirements being
  - detailed
  - exact
  - verifiable
  - standardized applicable all over Europe
- EN 50549-1 and -2 clauses provide configurability of functions to allow all flexibility of RfG by maintaining verifiability
- EN 50549-10 clauses will support conformity assessment to provide evidence of conformity



# Framework and Scope

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**EN 50549 intends to include all capabilities of generating plants necessary to operate generating plants in parallel to distribution grids**

- Therefore EN 50549-1 and -2 provides requirements needed for distribution grid management which are beyond the scope of RfG:
  - Connection scheme and coordination of switch gear,
  - voltage operation range (for type A and B),
  - reactive power capabilities and control modes (for type A and B),
  - interface protection (for type A and B) and anti-islanding function,
  - generation curtailment,
  - requirements to electrical energy storage systems (EESS),
  - requirements to generating plants below 800 W.

# Framework and Scope

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**EN 50549 intends to include all capabilities of generating plants necessary to operate generating plants in parallel to distribution grids**

- Therefore EN 50549-1 and -2 provides requirements needed for the stability of the interconnected system not yet included in RfG:
  - Robustness to voltage swells (OVRT),
  - Robustness to voltage sags (UVRT),
    - Recommended also for type A generators,
  - LFSM-U requirement,
    - explicitly required for EESS (Electrical Energy Storage Systems),
    - recommended for all other generating modules.

# Framework and Scope

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**EN 50549-1 and -2 scope excludes aspects of system integration:**

- Selection of point of connection,
- power system impact assessment e.g. assessment of effects on power quality, local voltage increase, impact on line protections operation,
- connection assessment, the set of technical verifications made as part of the planning of the connection.

**These issues depend on the structure of the distribution grid and the management procedures of the DSO.**

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# Correspondence RfG – EN50549

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**Annex C and H provide an overview over all described functions and the relevance in view of RfG**

- Annex C
  - lists all parameters providing flexibility in the clauses and typical ranges,
  - might be used as a template to publish national parameters.
- Annex H
  - is structured similar to a CENELEC Annex ZZ,
  - provides a clear overview which Articles of RfG are covered in the Standard.

*Generating plants compliant with the clauses of this European Standard are considered to be compliant with the relevant Article of COMMISSION REGULATION (EU) 2016/631, provided, that all settings as provided by the DSO and the responsible party are complied with.*

# Correspondence RfG – EN 50549

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- Annex H provides a clear overview which Articles of RfG are covered in the Standard

<i>Article</i>	Clause(s) / subclause(s) of this EN
13.1(a)	4.4.2 Operating frequency range
13.1(b)	4.5.2 Rate of change of frequency (ROCOF) immunity
13.2	4.6.1 Power response to overfrequency
13.3	4.4.3 Minimal requirement for active power delivery at underfrequency
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# Correspondence RfG – EN50549

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13.5	4.4.3 Minimal requirement for active power delivery at underfrequency
13.6	4.11.1 Ceasing active power
13.7	4.10 Connection and starting to generate electrical power
14.1	4.4.2, 4.5.2, 4.6.1, 4.4.3, 4.11.1 and 4.10
14.2(a)	4.11.2 Reduction of active power on set point
14.2(b)	4.12 Remote information exchange
14.3	4.5.3 Under-voltage ride through (UVRT)
14.4.	4.10 Connection and starting to generate electrical power
14.5(a)	4.6, 4.7, 4.9, 4.10, 4.11, 4.12
14.5(b)	4.9 Interface protection,
14.5(c)	4.1 General
14.5(d)	4.12 Remote information exchange
17.1	4. as applicable above
17.2	4.7.2 Voltage support by reactive power
17.3	4.5.3 Under-voltage ride through (UVRT)
20.1	4. as applicable above
20.2 (a)	4.7.2 Voltage support by reactive power
20.2 (b) (c)	4.7.4.2 Short circuit current requirements on generating plants
20.3	4.5.3 Under-voltage ride through (UVRT)

# Correspondence RfG – EN50549

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**How does EN 50549 clauses provide configurability of functions to allow all flexibility of RfG by maintaining verifiability**

- Example Clause 4.5.2, corresponding to Article 13. 1(b)
  - *With regard to ROCOF withstand capability a power generating module shall be capable of staying connected to the network and operate at ROCOF up to a value as specified by the relevant TSO,...*
  - *The generating modules in a generating plant shall have ROCOF immunity for a ROCOF equal or exceeding the value specified by the responsible party. If no ROCOF immunity value is specified, the following ROCOF immunity shall apply, making distinction between generating technologies:*
    - *Non-synchronous generating technology: at least 2 Hz/s*
    - *Synchronous generating technology: at least 1 Hz/s*
    - *The ROCOF immunity is defined with a sliding measurement window of 500 ms.*



# Correspondence RfG – EN50549

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## How does EN 50549 clauses provide additional detail

- Example Clause 4.11.2, corresponding to Article 14. 2(a)
  - *To control active power output, the power generating module shall be equipped with an interface in order to be able to reduce active power output following an instruction at this input port.*
  - Clause 4.11.2 Reduction of active power on set point provides further details:
    - Handling of minimum regulation level,
    - definition of adjustment increment at least 10%,
    - definition of a response envelop, response shall not be too fast, nor too slow,
    - definition of a required steady state accuracy.
  - Additional detail is necessary to design products and to provide conformity with the requirement.

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# How can EN 50549 support RfG implementation in a member state

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## **Generating plants of type A and type B are mass market products**

- Example: In Germany more than 1,6 Million PV plants have been installed within the last 15 years.

## **Standardised**

- Requirements and
- Compliance procedures are of high importance

## **to support efficient procedures for**

- generating unit manufactures,
- generating plant developers,
- distribution system operators.

# How can EN 50549 support RfG implementation in a member state

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- RfG does not foresee the support of harmonized standards, unlike regulations under the new approach
- support to RfG depends on national implementation.

**EN 50549 is the tool,**

- To become effective, the member state has to use it.

# How can EN 50549 support RfG implementation in a member state

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- EN 50549 is applicable for type A and B generating modules (mass market)
- EN 50549-1 and -2 support the essential requirements of RfG (Title II)
- EN 50549 -1 and -2 can be used as reference documents for the national implementation
  - EN 50549 -1 and -2 can be referenced by national documents clause by clause or as complete standard
  - If needed, parameters can be specified according RfG and used in EN 50549
  - Annex C can be used as template to publish national specification of non-exhaustive requirements
- EN 50549-10 will support compliance process once in place

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# Conclusion

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- EN 50549 is written to be compliant and used in conjunction with COMMISSION REGULATION 2016/631 (RfG).
- EN 50549-1 and -2 cover all technical (essential) requirements (Title II) of RfG applicable for type A and type B generating modules and as such will support technical requirements of RfG.
- EN 50549 intends to include all capabilities of generating plants necessary to operate generating plants in parallel to distribution grids, therefore goes beyond the scope of RfG.
- As RfG does not foresee the support of harmonized standards, support to RfG depends on national implementation of RfG.
- EN 50549 -1 and -2 can be used as reference documents for the national implementation.

# Conclusion

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**Thank you for your attention.**