IEC TR 62757

Edition 1.0 2019-07

TECHNICAL REPORT

AMENDMENT 1

Fire prevention measures on converters for high-voltage direct current (HVDC) systems, static var compensators (SVC) and flexible ac transmission systems (FACTS) and their valve halls

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

This amendment has been prepared by subcommittee 22F: Power electronics for electrical transmission and distribution systems, of IEC technical committee 22: Power electronic systems and equipment

The text of this amendment is based on the following documents:

Draft TR	Report on voting
22F/520/DTR	22F/526/RVDTR

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

4.1 General

Add, to the end of the first sentence of the first existing paragraph, the words "and current transducers."

4.2.3.2 Thyristors and diodes

Add, after the first existing paragraph, the following new paragraph, which is the second paragraph of 4.2.3.3.

The thyristors and diodes themselves are non-flammable and, because failure relieves other components from significant voltage stress, it is often arranged that other component faults lead directly or indirectly to thyristor short circuit, thereby avoiding a hazardous condition elsewhere.

4.2.3.3 IGBT and similar semiconductor devices

Change the existing title of 4.2.3.3 by the following new title:

4.2.3.3 IGBT- diode pairs

Delete, in the first sentence of the first existing paragraph, the words "at the time of writing".

Delete the second existing paragraph.

4.2.3.4 Capacitors

Replace the last existing paragraph by the following new paragraph:

Capacitors that are dry type, normally containing polyurethane, silicone gel or N2 and SF6 gas, have no flammable fluids that can leak out of the housing.

4.2.3.5 Reactors

Replace, in the first existing paragraph, the second sentence by the following new sentence:

A mode of failure of valve reactors is overheating due to total or partial blockage of the cooling pipes or the leakage of a joint within the reactors.

4.2.3.8 Light guides

Replace the existing subclause, including its title, by the following new subclause and title:

4.2.3.8 Fibre optics

Fibre optics, either individually or in bundles, involve a risk of fire ignition, if exposed to conductive surface contamination or uncontrolled voltage distribution along the fibre optics. Certain types of fibre optics jacket material may sustain combustion and transfer fire within the valve structure.

4.2.5.1 Water based systems

Insert, in the second sentence of the first existing paragraph, the word "pressure" *to read:* "The flow, pressure, temperature and [...]".

4.2.7 Failure of surge arresters

Insert, in the existing text, the word "destructive" *before* "operation".

6.2.1 General

Replace, in item a) of the first existing paragraph, the term "IGBT" by "IGBT/diode pairs".

Replace, in the first existing paragraph, item d) by the following new item:

d) Voltage sourced *converter* (VSC) d.c. capacitors (if applicable);

Replace, in item j) of the first existing paragraph, the word "Support" by "Support/suspension".

6.2.2 On-line monitoring

Replace, in the first existing paragraph, the fourth sentence by the following new sentence:

To avoid the risk of arcing, which might cause ignition, such levels should be short-circuited by other means, for example using parallel connected by-pass devices.

Add, in the last sentence of the second existing paragraph, the word "subsequent" before "short-circuit", and the word "devices" after "semiconductor".

Replace the last sentence of the fifth existing paragraph by the following new sentence:

Even small cooling water leaks should be detected as soon as possible because leakage water spread on insulating surfaces decreases the dielectric strength and increases the risk of ignition.

6.3 Supervision of other valve hall equipment

Replace the first existing paragraph by the following new paragraph:

The other equipment within the valve hall may, depending on the design, include wall bushings or transformer bushings, arrester, valve d.c. capacitor, voltage divider, current transducers and earthing switches.

Replace, in the first sentence of the fourth existing paragraph, the word "foam" by the word "solid".

7.2.2 Air sampling systems

Add the following new paragraphs after the first existing paragraph:

There are 3 classifications when designing aspirating system.

EN 54: Class A or NFPA 72: VEWFD

– Very high sensitivity for the earliest possible warning of smoke in many business critical, high airflow or high risk environments, transport time 60 s.

EN 54: Class B or NFPA 72: EWFD

– Enhanced sensitivity for effective early detection in challenging environments or within critical equipment, transport time 90 s.

EN 54: Class C or NFPA 72: SFD

– Normal sensitivity for general fire detection in normal rooms or inaccessible spaces, transport time 120 s.

Due to the high damage potential in HVDC and FACTS valve halls Class A or VEWFD respectively should be a target.

Table 1 – Fire extinguishing agents

Replace the existing table by the following new table:

Table 1 – Fire extinguishing agents

Type	Agent	Suitable for use in confined spaces	Global warming potential	Atmospheric life time
Inert gases	IG-01	Y	0	0
	IG-100	Y	0	0
	IG-541	Y	0	0
	IG-55	Y	0	0
Carbon dioxide	CO2	N	1	0
Hydro fluorocarbons	HFC-125	Y	3 400	32,6 years
	HFC-23	Y	12 000	260 years
	HF-227ea	Y	3,500	36,5 years
	HFC-236fa	Y	3,500	36,5 years
	HFC Blend B	Y	-	-
	FIC-217I1	N		
Hydro chlorofluorocarbons	HCFC-124	N	609	5,8 years
	HCFC Blend A	Y	-	-
C6-fluoroketone	C6F12O	Y	1	5 days

9.1 General

Add, in the first sentence of the third existing paragraph, the words "or FACTS" *after* "HVDC".

9.2.2 Natural ventilation

Replace, in the second sentence of the first existing paragraph, the semicolon by a full stop and replace the next word "the" *by* "The".

11.1 General

Add, in the second sentence of the first existing paragraph, the words "or FACTS" after "HVDC".

11.2.1 General

Add, in the first sentence of the first existing paragraph, the words "or FACTS" after "HVDC".

12.2.5 Fire detection systems

Add, in the third existing paragraph, the words "and FACTS" after "HVDC".

12.2.6 Fire suppression systems

Add, in the first sentence of the first existing paragraph, the words "or FACTS" after "HVDC".

A.1 General

Replace, in the second paragraph, the last existing sentence by the following new sentence:

The statistics demonstrate that older installations, where not all recommended fire prevention measures had been adopted, have a much higher fire incident rate.

Table A.1 – HVDC converters owners/suppliers reference list (May 2012)

Replace, in the fourth row, second column, the word "Rostok" by "Rostock".

Replace, in the 31st row, second column, the word "Hensey" by "Henday".

A.4.1 Overheating of valve components due to reduced cooling

Replace, in Tables a) to d), the words "Transmission capacity" *by* "Nominal transmission capacity".

A.4.5 Insulation failures

Replace, in Table h), fourth row, second column, the text "0 MW" by "500 MW".

A.4.6 Failures of equipment associated with the valve hall

Replace, in the existing table, sixth row, second column, the text "0 MW" by "0 h".

A.4.7 False alarms

Replace, in Table a), second row, second column, the words "Not reported" by "500 MW".

Replace, in Table b), second row, second column, the words "30 MW" by "500 MW".

Replace, in Table c), second row, second column, the words "Not reported" by "600 MW".

Bibliography

Add the following new references:

NFPA 72, *National Fire Alarm and Signalling Code*

EN 54, *Fire detection and fire alarm systems*

Regulation (EU) No 517/2014 of the European Parliament and the Council of European Union on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006 – Official Journal of the European Union, 20.05.2014

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