

# TECHNICAL REPORT



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## HVDC installations – Guidelines on asset management

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	9
3 Terms and definitions .....	9
4 HVDC asset.....	12
4.1 Asset background .....	12
4.2 Asset facilities.....	13
4.3 Asset components and layout arrangement.....	13
5 Asset management policy and strategy.....	16
5.1 General.....	16
5.2 Common policy and practices .....	17
5.3 Asset management framework .....	18
6 Risk management.....	19
6.1 General.....	19
6.2 Risk management requirements .....	20
6.3 Common policy and practices .....	21
7 Asset management life cycle activities.....	22
7.1 General.....	22
7.2 Asset management decision process .....	22
7.3 Life cycle costing .....	24
7.3.1 General .....	24
7.3.2 Forecasting O&M costs due to asset failures .....	24
7.3.3 Forecasting capital replacement costs due to asset failures.....	25
7.4 Spares strategies.....	26
7.5 Life extension strategies .....	26
7.6 Run to failure strategies .....	28
7.7 Refurbishment of HVDC system.....	28
8 Change management.....	28
8.1 General.....	28
8.2 Common policy and practices .....	29
8.3 Development of resources in HVDC system .....	29
8.3.1 General .....	29
8.3.2 Skill retention and development in HVDC system.....	29
8.3.3 Factors in deciding level of HVDC skill retention.....	29
8.3.4 Skill retention under different organizational relationships .....	30
8.3.5 Establishing a productive work culture .....	30
8.3.6 Alliances and partnership .....	31
8.3.7 Maintaining capabilities over the long term .....	31
9 HVDC maintenance .....	31
9.1 General.....	31
9.2 Common policy and practices .....	33
9.3 Special tools and maintenance equipment .....	34
9.4 Impact of major spares .....	35
9.5 Strategic spares.....	35
9.5.1 Philosophy and common practices.....	35

9.5.2	Sharing of strategic spares between users/utilities.....	37
9.5.3	Storage considerations .....	38
9.6	Work safety.....	38
9.7	HVDC thyristor valve maintenance – Periodic maintenance .....	39
9.8	Converter transformer maintenance .....	39
9.9	Converter transformer replacement.....	40
9.10	Reactor maintenance .....	40
10	Asset management of co-owned HVDC project.....	41
10.1	General.....	41
10.2	Project planning stage .....	41
10.3	Project implementation and commissioning.....	41
10.4	HVDC system maintenance management after commissioning.....	41
10.5	HVDC system operation management.....	41
11	HVDC reliability and availability .....	42
11.1	General.....	42
11.2	Performance monitoring policy and practices .....	43
11.3	General requirements on performance monitoring of HVDC system .....	44
11.4	Availability and reliability measurement.....	44
11.4.1	General .....	44
11.4.2	Scheduled maintenance outages .....	45
11.4.3	Outage and curtailment times .....	45
11.5	Verification of availability and reliability performance .....	46
11.6	Availability and reliability calculations .....	46
11.7	Reliability criteria of HVDC control and protection system .....	46
11.8	Alternative methods in achieving high performance.....	47
12	Documentation and records .....	48
12.1	General.....	48
12.2	Common policy and practices .....	48
12.3	Information management .....	48
12.4	Types of documentation.....	50
12.5	Document identification.....	50
12.6	"As-built" drawings and data .....	50
12.7	Submittal quantities and schedule.....	51
12.8	Inventory list .....	51
12.9	System studies, equipment specifications, calculations and drawings .....	51
12.9.1	General .....	51
12.9.2	Control system hardware design document.....	52
12.9.3	Digital control system software design document.....	52
12.10	Operation manuals.....	53
12.11	Maintenance manuals .....	53
13	Training requirements.....	54
13.1	General.....	54
13.2	Common policy and practices .....	54
13.3	Training for design engineers.....	55
13.4	Training for staff participating in commissioning.....	55
13.5	Training for operators and maintenance staff .....	55
13.6	Training on communication system .....	56
13.7	Training support.....	56

13.8	Advance or intensive training at factory.....	56
13.9	Operation and maintenance training.....	56
13.10	Training course content .....	57
13.11	Training materials .....	57
Annex A (informative)	Sharing of HVDC strategic spares .....	58
Annex B (informative)	User survey.....	59
Bibliography.....		60
Figure 1	– Typical bipolar thyristor based HVDC system .....	16
Figure 2	– Asset management perspective.....	19
Figure 3	– Issues influencing asset management life cycle decisions .....	23
Figure 4	– Operation and maintenance coordination of co-owned HVDC system .....	42
Figure A.1	– Typical method of sharing HVDC strategic spares.....	58
Table 1	– Main asset components of an HVDC system .....	14
Table 2	– Typical risk assessment parameters.....	21
Table 3	– HVDC equipment lifetime .....	27
Table 4	– Typical HVDC maintenance activities, intervals and methods .....	33
Table 5	– Time frame and scale of maintenance activities.....	34
Table 6	– Summary of maintenance methodologies .....	34
Table 7	– Special tools and maintenance equipment.....	35
Table 8	– Control and protection spares.....	37
Table 9	– Communication, control and protection miscellaneous spares .....	37
Table 10	– Storage of HVDC spare equipment.....	38
Table 11	– Equipment failures that caused unplanned outage time .....	43

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HVDC INSTALLATIONS – GUIDELINES ON ASSET MANAGEMENT**

## FOREWORD

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IEC TR 62978, which is a technical report, has been prepared by IEC technical committee 115: High Voltage Direct Current (HVDC) transmission for DC voltages above 100 kV.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
115/148/DTR	115/159/RVDTR

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

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

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

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## INTRODUCTION

Asset management is defined as the act of structured and coordinated efforts by an organization to optimally manage its assets and their associated performance, risks and expenditures over their life cycle.

The management of physical assets (their selection, maintenance, inspection and renewal) plays a key role in determining the operational performance and profitability of industries that operate their assets as part of their core business.

In general, High Voltage Direct Current (HVDC) systems have specific requirements that need to be addressed separately as compared to conventional High Voltage Alternating Current (HVAC) power transmission due to underlying differences in technology.

HVDC systems are a well proven technology employed for bulk power transmission all over the world, mainly because of its superior controllability of transmitted power. It can be utilized for various applications such as stabilization of the connected Alternating Current (AC) network, dynamic control of frequency and modulation of active and reactive powers. In addition, HVDC is more economical for long distance transmission of bulk power and applicable for interconnecting asynchronous AC networks.

An international standard defining key elements of asset management framework for HVDC installations is therefore crucial to provide ample foundation for best practices to be implemented to achieve high efficiency, availability and reliable long-term operation.

At present the activities with respect to asset management are standardized as International Standard in the ISO 55000 series. The general principles are given in ISO 55000 with further details in ISO 55001:2014, Asset management – Management systems – Requirements and ISO 55002:2014, Asset management – Management systems – Guidelines for the application of ISO 55001. These standards are developed from the British Standard Institute (PAS-55:2008), which recommends a general asset management framework for physical assets. The PAS 55-1:2008 document was referred to in the initial development of this technical report.

In the absence of a credible standard reference on asset management of HVDC, utilities all over the world presently practice HVDC asset management based on their own interpretation and experience gathered through the years, which may not be in line with the best and prudent practices. This IEC Technical Report on the guidelines of asset management for HVDC installations is the first step, moving forward, in providing a standard framework and reference point for operators and owners of an HVDC installation based on best industry practices.

## HVDC INSTALLATIONS – GUIDELINES ON ASSET MANAGEMENT

### 1 Scope

This document gives guidelines on the current asset management perspectives for HVDC installations based on best practices of asset owners, operators, users, original equipment manufacturers and regulators within the power industry.

Asset management is a set of systematic and coordinated activities and practices through which an organization optimally and sustainably manages its asset and asset systems, their associated performance, risks and expenditures over their life cycles for the purpose of achieving its organizational strategic plan.

An asset management system is the embodiment of the asset life cycle starting from asset planning, creation, utilization, operation, maintenance, and to the extent of, the retirement and disposal of the asset. It consists of the organization's asset management policy, asset management strategy, asset management objectives, asset management plans and the activities, processes and organizational structures necessary for their development, implementation and continual improvement.

The scope is limited to the DC plant/equipment side of the HVDC system including related AC components of the HVDC converter station. This document covers all equipment of HVDC converter station and electrode station but does not include DC lines and cables.

This document covers HVDC systems with Line-Commutated Converters (LCC) and can be generally applied to Voltage Sourced Converters (VSC), not including specific equipment or sub-equipment required under VSC.

This document on asset management covers:

- a) policy and strategy;
- b) training;
- c) information management;
- d) change management;
- e) life-cycle costing;
- f) tools;
- g) performance monitoring and measurement;
- h) documentation, operation and maintenance; and
- i) risk management.

This document provides base guidelines on fundamental aspects and prudent practices to be considered by stake holders in managing HVDC assets. Compliance to additional requirements and recommendations stipulated in this document by the supplier or OEM are non-obligatory, unless explicitly specified by the customer.

The guideline was prepared based on the following references to establish best practices:

- published documents from other related organizations e.g. CIGRE;
- an international survey on current practices of HVDC installations conducted by IEC TC 115 (see Annex B);
- regional and international forum on management of HVDC assets;



- HVDC user working group; and
- asset management practitioners.

The international survey document and results on the asset management practices are available with the Secretariat of IEC TC 115.

The main objective of this document is to highlight an asset management standard framework for HVDC installations based on best known industry practices. This guideline can be beneficial as reference document in the management of HVDC assets.

## **2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60633:1998, *Terminology for high-voltage direct current (HVDC) transmission*  
IEC 60633:1998/AMD1:2009  
IEC 60633:1998/AMD2:2015