

DEP SPECIFICATION

DESIGN AND FABRICATION OF LV SWITCHGEAR FOR NORTH AMERICAN APPLICATIONS

DEP 33.67.01.32-Gen.

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DESIGN AND ENGINEERING PRACTICE



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PART I INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for the design and fabrication of metal enclosed low voltage switchgear rated up to and including 1000V, including instruments and control, for use in North American applications.

Parts I and II include introductory and general information applicable to all (US and Canadian) LV switchgear.

Part III covers requirements for LV switchgear for US facilities and is written as amendments and supplements to IEEE Standard C37.20.1-2002. Unless modified by Part III, the requirements of IEEE C37.20.1 apply.

Part IV covers requirements for all LV switchgear in Canadian facilities and is written in the form of supplemental requirements to be applied in addition to CSA Std. C22.2 No. 31-10:2010.

Part V covers documentation requirements for all LV switchgear.

Part VI covers supplemental non-technical requirements for all LV switchgear.

Part VII covers references associated with this standard for all LV switchgear.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorised access to DEPs does not for that reason constitute an authorization to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to oil and gas production, gas handling, oil refining, chemical processing, gasification, distribution and supply/marketing. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process should be implemented; this is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements may be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regard to the safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal (or Electrical Technical Authority) may undertake all or part of the duties of the Contractor. The contractor may also be referred to as purchaser or buyer.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for it. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The **Principal's Electrical Technical Authority** is the discipline engineer appointed by the Principal and is responsible for all technical decisions associated with the work. The Principal's Electrical Technical Authority is responsible for technical integrity.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Term	Definition
Arc resistant accessibility Type 1:	Equipment with arc-resistant designs or features at the freely accessible front of the equipment only.
Arc resistant accessibility Type 2:	Equipment with arc-resistant designs or features at the freely accessible exterior (front, back, and sides) of the equipment only.
Arc resistant accessibility Type 2B:	Equipment with arc-resistant designs or features at the freely accessible exterior (front, back, and sides) of the equipment only, plus the additional requirements of ANSI C37.20.7 Annex A. . The equipment is arc resistant even with the instrument or control compartment doors open.
Arc resistant equipment:	Equipment designed to withstand the effects of an internal arcing fault, as indicated by meeting test requirements of ANSI C37.20.7.
Internal arcing fault:	An unintentional discharge of electrical energy in air within the confines of an electrical equipment enclosure.
Observed	The word Observed means that the Principal and Contractor shall be notified of the timing of the inspection or test; however, the inspection or test shall be performed as scheduled, and if the Principal or Contractor is not present, the Manufacturer/Supplier shall proceed to the next step
Witnessed	The word Witnessed means that a hold shall be applied to the production schedule and that the inspection or test shall be carried out with the Principal or Contractor in attendance.

1.3.3 Abbreviations

Term	Definition
ACO	Accredited Certification Organization
DEP	Design and Engineering Practice
LV	Low Voltage (less than or equal to 1000V)
NRTL	Nationally Recognized Testing Laboratory
NETA	International Electrical Testing Association

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section number is shown in brackets (). Other documents referenced by this DEP are listed in (Part VII).

1.5 COMMENTS ON THIS DEP

Comments on this DEP may be sent to the DEP Administrator at standards@shell.com using the DEP Feedback Form. The DEP Feedback Form can be found on the main page

of "DEPs on the Web", available through the Global Technical Standards web portal <http://www.shell.com/standards> and on the main page of the DEPs DVD-ROM.

1.6 DUAL UNITS

This DEP contains both the International System (SI) units, as well as the corresponding US Customary (USC) units, which are given following the SI units in brackets. When agreed by the Principal, the indicated USC values/units may be used.

1.7 DATA SHEETS

The applicable data sheet sections shall be completed and returned by the Manufacturer as part of the quotation:

- Use data sheet DEP 33.67.01.90-Gen. to specify LV switchgear for US applications.
- Use data sheet DEP 33.67.01.91-Gen. to specify LV switchgear for Canadian applications.

PART II GENERAL REQUIREMENTS

1.1 LV SWITCHGEAR FOR US FACILITIES

LV Switchgear for US facilities shall comply with Part III of this DEP.

Part III of this DEP amends, supplements and replaces various clauses/paragraphs of IEEE C37.20.1:2002. Wherever reference is made to IEEE C37.20.1, it shall be understood to mean IEEE C37.20.1:2002 as amended by this DEP.

For ease of reference, the section and clause numbering of IEEE C37.20.1 is used in Part III of this DEP.

Clauses of IEEE C37.20.1 that are not mentioned shall remain applicable as written.

1.2 LV SWITCHGEAR FOR CANADIAN FACILITIES

LV Switchgear for Canadian facilities shall comply with Part IV of this DEP.

Part IV of this DEP provides supplemental requirements that shall be applied in addition to CSA Std. C22.2 No. 31-10:2010.

1.3 CONFLICTS

In the event of conflicts between and/or among documents, the Manufacturer/Supplier shall contact the Contractor for resolution.

1.4 STATEMENT OF COMPLIANCE

The Manufacturer/Supplier of the switchgear and its ancillary equipment shall confirm that the equipment fully complies with the quotation and the whole system is properly designed, constructed and suitable for the specified duty.

All performance values established in the pre-ordering meeting or quotation (whichever is the later) shall be regarded as maximum or minimum values as applicable.

These values shall also be guaranteed by the Manufacturer/Supplier under the most arduous conditions specified in this DEP and the requisition.

Tolerances shall be in accordance with this DEP and the relevant reference publications.

All the equipment forming part of the order shall be tested individually and in combination at the Manufacturer/Supplier's works to prove their capability and compliance with this DEP and the performance data.

The Manufacturer/Supplier shall comply with regulatory requirements applicable to the equipment for the location in which it will be installed; see also (Part I, 1.2).

Whenever equipment proposed by the Manufacturer/Supplier cannot fully meet the requirements of this DEP, such exceptions shall be clearly stated in Manufacturer/Supplier's proposal with cross-references to the specific sections and subsections to which exceptions are taken. No exceptions shall be allowed unless approved by the Principal's Electrical Technical Authority in writing.

If no exceptions are taken to these specifications or drawings, a specific statement to that effect shall be included.

If any one of the components or the whole system does not comply with the specification and any agreed amendments, the Manufacturer/Supplier shall rectify and re-test the switchgear within a mutually agreed time.

1.5 LIFETIME AND RELIABILITY

The equipment (including auxiliaries) covered by this DEP shall be suitable for the specified operating conditions. Equipment shall be designed and constructed for a minimum service life and uninterrupted continuous operations as specified. It is recognized that this is a

design criterion and that uninterrupted operation for this period of time involves factors beyond the Manufacturer/Supplier's control.

1.6 PRE-ORDERING MEETING

If deemed necessary by one of the parties involved, a pre-ordering meeting shall be arranged to define clearly the overall scope of supply, individual responsibilities and test methods.

**PART III REQUIREMENTS FOR LV SWITCHGEAR FOR US APPLICATIONS
(AMENDMENTS/SUPPLEMENTS TO IEEE C37.20.1)****2.0 REFERENCES**

Add to this clause:

United States Coast Guard (USCG) Requirements, 46 CFR, Chapter 1, Subchapter J, Electrical Engineering (Offshore applications only).

5. RATINGS**5.4.4 Rated short-circuit withstand current**

Add to this clause:

The Low-voltage ac switchgear shall be rated as specified on the data sheet.

5.5 TEMPERATURE LIMITATIONS**5.5.2 Temperature limits for insulating materials**

Add to this clause:

Insulating materials shall be Class 105.

5.5.3 Temperature limits for buses and connections

Add to this clause:

Buses and connections tin-surfaced or equivalent connecting joints shall have a hot-spot temperature rise limit of 65°C and a total temperature limit of 105°C.

Connections to insulated cables tin-surfaced or equivalent shall have a hot-spot temperature rise limit of 45°C and a total temperature limit of 85°C.

6. TESTS**6.3 PRODUCTION TESTS**

Add to this clause:

The Contractor and the Principal reserves the right to inspect and observe the tests at the factory.

The entire switchgear must be electrically and mechanically assembled into one single line-up prior to final testing, inspection and shipment.

Production and conformance tests shall be conducted with all draw-out elements racked in and breakers closed.

7. CONSTRUCTION**7.1 GENERAL REQUIREMENTS**

Add to this clause:

The switchgear assembly shall be labeled in accordance with UL 1558.

The switchgear assembly height shall not exceed 2.34 m (92 inches) and the depth shall not exceed 1.52 m (60 inches).

When equipment elevation drawings are provided by contractor, manufacturer/supplier shall fabricate the line-up in accordance with the drawings unless an alternate arrangement is approved by the contractor.

For offshore applications where USCG compliance is specified on the data sheet, equipment shall meet requirements outlined in USCG 46 CFR, Chapter 1, Subchapter J, Electrical Engineering.