

IEEE Guide for a Detailed Functional Specification and Application of Static VAR Compensators

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Abstract: General information that should be considered during procurement of a static var compensator (SVC) is provided. The information is intended to assist in the preparation of a procurement specification. Environmental data, power system characteristics, and main characteristics of the SVC are covered.

Keywords: procurement, static var compensators, substations, SVCs

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Foreword

(This foreword is not a part of IEEE Std 1031-1991, IEEE Guide for a Detailed Functional Specification and Application of Static VAR Compensators.)

This is a new guide developed to provide general information that should be considered during procurement of a static var compensator (SVC). Because SVCs consist of several types of equipment and because each system is specifically designed for an individual application, this guide has listed only the most significant topics for consideration, but not specific quantities.

This guide is not a “tutorial,” and application of its contents in preparing a specification must be done with some degree of understanding. Also, this guide does not include all topics that may be in a contract for an SVC (for example, SVC field testing).

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Introduction

This guide has been written to assist in the preparation of an equipment specification for the procurement of a static var compensator (SVC). Since each SVC is designed for a unique application, not all parts of this guide may be applicable. Also, there may be topics not included in this guide that the user and supplier may wish to discuss (e.g., additional system studies and field testing).

The following is a functional specification for an SVC.

This specification is based on a typical transmission-line application. It is intended that the user of this specification provide required parameter values. Other modifications or additions may also be made as required by the user.

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IEEE Guide for a Detailed Functional Specification and Application of Static VAR Compensators

1. Scope and Purpose

1.1 Scope

This specification is for the supply of one static var compensator (SVC) with a rating of _____ Mvar lagging to _____ Mvar leading to be installed at the _____ substation.

The SVC and associated transformer are to be connected to a _____ kV bus. A one-line diagram from the user for the proposed SVC location is attached.

1.1.1 Scope of Work of the Supplier

The user should define the equipment, material, and services to be provided by the supplier, as well as the required schedule of supply.

1.1.2 Work Not Included

The user should define the equipment, material, and services to be provided by others.

1.1.3 Applicable Standards

All equipment should comply with the latest relevant standards. Otherwise, design, manufacturer, and test procedures normally carried out on this type of equipment will be followed subject to approval by the users.¹

¹A listing of relevant standards is provided in the appendix.

1.2 Purpose

The primary purpose of the SVC at the _____ substation is to

- 1) Regulate the _____ kV transmission-line voltage by supplying lagging or leading vars within the operating range of the SVC
- 2) Reduce the overvoltages on the transmission line caused by line switching and load rejection
- 3) Provide dynamic voltage support or damping
- 4) Perform other functions as specified by the user

1.3 Types of SVCs

The following types of equipment may be supplied to perform the functions as required in this specification.

- 1) Thyristor-controlled reactor, fixed capacitor (TCR-FC)
- 2) Thyristor-controlled reactor, thyristor-switched capacitor (TCR-TSC)
- 3) Thyristor-controlled reactor, mechanically switched capacitor (TCR-MS²)
- 4) Others

2. Environmental Data

The following should be provided by the user:

- 1) Elevation above sea level
- 2) Maximum air temperature
- 3) Minimum air temperature
- 4) Humidity conditions
- 5) Ice loading conditions
- 6) Availability and temperature of cooling water
- 7) Maximum wind velocity
- 8) Seismic conditions
- 9) Isokeraunic level
- 10) Cleanliness of atmosphere, according to Sections 9.6, 9.7, 10.2, 10.4, 10.6, and 13.9 of *EPRI EHV Transmission Line Reference Book 345 kV and Above (Second Edition)* and "Application of Insulators in a Contaminated Environment" in *IEEE Power Apparatus and Systems*.
- 11) Audible noise and radio influence voltage (RIV) levels (acceptable levels should be specified for different locations in and around the compensators, such as the control room, the thyristor valve hall, near transformers, etc.)
- 12) Solar radiation level

3. Power System Characteristics

The following system characteristics exist at the _____ substation, and the SVC should be able to operate under the following conditions:

²The addition of a mechanically switched reactive element makes this combination part of a static var system.