CIGRE Study Committee A1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP (1)

WG* N° A1.53	**Name of Convener: A. K. GUPTA (IN)** **E-mail address**: akgupta07@ntpc.co.in
Technical Issues # (2): XXXX	**Strategic Directions #(3): 2**
The WG applies to distribution networks (4): Yes	
Title of the Group: Guide on Design Requirements of Motors for Variable Speed Drive Application	

Scope, deliverables and proposed time schedule of the Group :

Background :

Environmental concerns have led industry to focus on energy saving measures and variable frequency drives (VFD) have been widely used to save energy. VFDs are used for several applications in Power Generating stations and industry like induced draft fans, cooling tower fans, condensate extraction pumps, compressors, coal conveyors, coal feeders and ventilation system equipment. As the penetration of VFDs in industry and in power stations has increased several motor failures have been reported worldwide and it has become clear that manufacturers don't have common design criteria for inverter grade motors. The variety of VFD technologies available stresses the motor insulation differently. Thyristor based drives have high harmonic levels in their output. IGBT based technology has issue related to surges and the initial turns of winding insulation are severely stressed by a train of steep front surges having a high amplitude. Some of the other issues include resonance during ramping up and fluting of bearings. The planned guide shall elaborate on the design requirement of three phase induction motors for VFD applications including a user guide for retrofitting in existing installations.

SCOPE

The scope shall cover the following topics:

a) Why VFDs are used
b) Different configurations of VFD schemes
c) Harmonic generation in VFD systems
d) How surges originate and propagate in VFD Schemes
e) Other Issues with VFDs and effects on motors
f) Types of motor windings and insulation
g) Evaluation method of strand/inter-turn/insulation laminates
h) Ground wall insulation dielectric strength – surge withstand capability
i) Inverter grade low voltage VFD motor design.
j) Inverter grade high voltage VFD motor design.
k) Retrofitting in existing installation.

Deliverables: Technical Brochure with summary in Electra

Main Tasks and Time Schedule:

Start: : October 2015 Final report: December 2017

- TOR approval – June 2015
- Form WG – September 2015
- Questionnaire Circulation – February 2016
- Draft outline (possible table of contents) of Guide – May 2016
- Preliminary sections distributed to SC-A1 members – July 2016
- Discussion and further schedule – SC Meeting - August 2016
- Draft of guide – January 2017
- Comments by members and experts – April 2017
- Final version of document – September 2017
- Document approval (Technical Guideline and summary for Electra) – December 2017

Comments from Chairmen of SC concerned :

Approval by Technical Committee Chairman : M. Wald

Date : 04/06/2015

(1) Joint Working Group (JWG) - (2) See attached table 1 – (3) See attached table 2
(4) Delete as appropriate

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (cf. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience