SECTION 16460

SECONDARY TRANSFORMERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes general provisions, products, and methods of execution relating to transformers approved for use at ANC. Type, size, ratings, etc., shall be as required by the application and in accordance with UL and NEMA standards.

B. Section includes all power and control transformers through 600 volts in this and other Divisions, including items such as: Control, communications systems, lighting and power, distribution and signal systems transformers, whether furnished as an integral component of an item of equipment or separately provided.

1.2 QUALITY ASSURANCE

A. Transformers shall be of the latest approved design as manufactured by Square D Company to match equipment provided in the C Concourse Phase 2 Building Completion Package. Transformers shall be listed by Underwriters' Laboratory and bear the UL label.

PART 2 - PRODUCTS

2.1 TRANSFORMERS

A. All transformers shall be dry-type.

B. Single phase transformers shall be 480 volt primary and 120/240 volt secondary. Three phase transformers shall be 480 volt delta primary and 208 wye volt secondary. Transformers 25 KVA and larger shall have a minimum of four 2-1/2 percent full capacity primary taps (two above normal and two below).

C. Transformers 15 KVA and larger shall be 115 degrees C temperature rise above 40 degrees C ambient. All insulating materials to be in accordance with NEMA ST20-1972 standards for a 220 degrees C UL component recognized insulation system.

D. Transformer coils shall be of continuous wound construction and shall be impregnated with non-hygroscopic, thermo-setting varnish.

E. All cores shall be constructed of high grade, non-aging silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. The core laminations shall be clamped together with structural steel angles. The complete core and coil shall then be bolted to the base of the enclosure but isolated therefrom by means of rubber, vibration-absorbing mounts. There shall be no metal-to-metal contact between the core and coil and the enclosure. On transformers 500 KVA and smaller, the vibration isolating system shall be designed to provide a permanent fastening of the core and coil to the enclosure. Sound isolating systems requiring the complete removal of all fastening devices are not acceptable.

F. Transformers shall have a "K" factor if required to permit them to withstand harmonics. Distribution panels that feed branch circuit panels with a large proportion of non-linear loads shall be fed from transformers with a minimum “K” factor of 4 (typically transformers 112.5 kVA and larger). Branch circuit panels with a large proportion of non-linear loads that are fed directly by a transformer shall be fed from transformers with a minimum “K” factor of 13 (typically transformers 75 kVA or smaller). Transformers with a “K” rating of 13 shall be equipped with 200% rated neutrals and neutral lugs.

G. Transformers 15 KVA and larger shall be in a heavy gauge, sheet steel, ventilated enclosure. The ventilating openings shall be designed to prevent accidental access to live parts in accordance with UL, NEMA, and National Electrical Code standards for ventilated enclosures. Single phase transformers 15 KVA through 167 KVA, and three phase transformers through 112.5 KVA shall be designed so they can be either floor or wall mounted. Larger transformers shall be designed only for floor mounting.

H. The entire transformer enclosure shall be degreased, cleaned, phosphatized, primed, and finished with gray, baked enamel.

I. The maximum temperature of the top of the enclosure shall not exceed 50 degrees C rise above a 40 degrees C ambient.

J. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.

K. The transformer shall be listed by Underwriters' Laboratory for the specified temperature rise.

2.2 SOUND RATINGS

A. Sound levels shall be guaranteed by the manufacturer not to exceed the following:

1. 15 to 50 KVA: 45dB
2. 51 TO 150 KVA: 50dB
3. 151 TO 300 KVA: 55dB
4. 301 TO 500 KVA: 60dB

2.3 TRANSIENT INRUSH CURRENT

A. Primary overcurrent protection for dry type step down transformers shall be sized to allow for transient inrush current.

2.4 TRANSFORMER SHIELDS

A. All transformers with a "K" rating shall be supplied with a quality, full width electrostatic shield resulting in a maximum effective coupling capacitance between primary and secondary of 33 picofarads. With transformers connected under normal, loaded operating conditions, the attenuation of line noise and transients shall equal or exceed the following limits:

Common Mode: 0 to 1.5Hz - 120db; 1.5 to 10kHz - 90db; 10 to 100kHz - 65db; 100kHz to 40db.

Transverse Mode: 1.5 to 10kHz - 52db; 10 to 100kHz - 30db.

PART 3 - EXECUTION

3.1 MOUNTING

A. Provide all required structural provisions including floor, wall brackets, or trapeze suspended from structural members, or as approved by ANC.

B. Transformers up to 100 kVA: Mount transformers on double-deflection neoprene-in-shear isolators (no harder than 50 durometer) sized for the following static deflections:

1. 0.2” static deflection for slab on grade installations.

2. 0.75” static deflection for other than slab on grade installations.

3. Mason Industries or as approved.

C. Transformers over 100 kVA: Mount transformers on floor mounted spring isolators with seismic snubbers sized for the following static deflections:

1. 0.5” static deflection for slab on grade installations.

2. 0.75” static deflection for other than slab on grade installations.

3. Mason SSLF with Z-1011 seismic snubbers, Mason SLR with integral snubbers, or as approved.

D. Ceiling mounted transformers: Mount transformers on spring hangers with 0.5” static deflection. Mason HS type or as approved.

3.2 ADJUSTMENT

A. Adjust transformer taps to provide rated voltage at the secondary bus with all connected loads "on", except the no-load secondary line-to-neutral voltage shall not exceed 125 volts on nominal 120 volt phases. Submit log of final voltage and current readings at no load and full load to ANC electrical department.

3.3 ELECTRICAL CONNECTIONS

A. Liquid-tight flexible metal conduit with supplemental ground jumper shall be used for all transformer connections. The flexible conduit shall be installed in a slack, shallow "U" form and shall prevent rigid contact between the transformer components and the nearby structure, conduits, etc. The ground jumper in flexible conduits shall be within the conduit.

3.4 GROUNDING AND BONDING

A. Transformer wye secondaries shall be grounded as separately derived systems. Transformers and conduits shall be bonded per NEC requirements.

3.5 NEUTRAL CONDUCTORS ON K-13 RATED TRANSFORMERS

A. Provide 200 percent rated secondary neutral conductors on K-13 rated transformers.

END OF SECTION