

3.3 Wind and Typhoon Loadings

Lungmen Nuclear Power Station (NPS) plant structures which are Seismic Category I are designed for extreme wind and typhoon missile impact loadings.

3.3.1 Wind Loadings

3.3.1.1 Design Wind Velocity

Seismic Category I structures are designed to withstand a design wind velocity of 194.4 km/h with a recurrence interval of 100 years at an elevation of 9 m above grade.

3.3.1.2 Determination of Applied Forces

The design wind velocity is converted to velocity pressure in accordance with Reference 3.3-1 using the formula:

$$q_z = 4.73 \times 10^{-5} K_z (IV)^2$$

where K_z = The velocity pressure exposure coefficient which depends upon the type of exposure and height (z) above ground per Table 6 of Reference 3.3-1. Exposure Category "D" is used for calculation of K_z per Reference 3.3-1.

I = The importance factor which depends on the type of structure. The value of "I" used is 1.0 for normal and extreme wind conditions per Reference 3.3-1.

V = Design wind velocity with a recurrence interval of 100 years, in km/h, and

q_z = Velocity pressure in kPa.

The design wind pressures and forces for buildings, components and cladding, and other structures at various heights above the ground are obtained, in accordance with Table 4 of Reference 3.3-1 by multiplying the velocity pressure by the appropriate pressure coefficients and gust factors. Gust factors are in accordance with Table 8 of Reference 3.3-1. Appropriate pressure coefficients are in accordance with Figures 2, 3a, 3b, 4, and Tables 9 and 11 through 16 of Reference 3.3-1. Reference 3.3-2 is used to obtain the effective wind pressures for cases which Reference 3.3-1 does not cover. Since the Seismic Category I structures are not slender or flexible, vortex-shedding analysis is not required and the above wind loading is applied as a static load.

Applied forces for the Reactor Building, Control Building, and Auxiliary Fuel Buildings will be supplied with FSAR.

3.3.2 Typhoon Loadings

3.3.2.1 Applicable Design Parameters

The design basis typhoon wind speed of 252 km/h at 9 m above ground level is used for the design of Seismic Category I structures.

NRC Regulatory Guide 1.76 for design basis tornado load is applicable with the following exceptions:

- (1) Rotational wind speed component is not applicable.
- (2) Pressure drop component is not applicable
- (3) Typhoon generated missiles shall be as per Spectrum I of SRP, Subsection 3.5.1.4.

3.3.2.2 Determination of Forces on Structures

The procedures of transforming the typhoon loading into effective loads and the distribution across the structures are in accordance with Reference 3.3-1. The procedure for adding the typhoon-generated missile impact (See Subsection 3.5.1.4) load on structures is in accordance with Reference 3.3-3. The loading combinations of the individual typhoon loading components and the load factors are in accordance with Subsection 3.8.4.3.

3.3.2.3 Typhoon Effects on Structures, Systems or Components

All safety-related systems and components are protected within typhoon-resistant structures.

All remaining plant structures, systems, and components not designed for typhoon loads shall be analyzed for the site-specific loadings to ensure that their mode of failure will not effect the ability of the Seismic Category I Lungmen Nuclear Units 1 & 2 plant structures, systems, and components to perform their intended safety functions.

3.3.3 References

- 3.3-1 ANSI/ASCE 7, *Minimum Design Loads for Buildings and Other Structures*, November 27, 1990.
- 3.3-2 ASCE Paper No. 3269, *Wind Forces on Structures*, Transactions of the American Society of Civil Engineers, Vol. 126, Part II, 1961.
- 3.3-3 Bechtel Topical Report BC-TOP-3-A, Revision 3, *Tornado and Extreme Wind Design Criteria for Nuclear Power Plants*.