

Excerpted from NexTek, Inc. Article "Selecting Coaxial Lightning Protection," published in AGL magazine 2006, by George Kauffman BSME.

ref: <http://nexteklightning.com/resources/articles/SelectingCoaxialLightningProtectors.pdf>

## Transient Ratings for Popular Coaxial Connector Types

The connector types most commonly used for coaxial communication systems include the N, 7-16 DIN, TNC and the SMA connector. In addition, the 75 Ohm F connector is popular in video/cable applications. Each connector brings a specific geometry of both the inner conductor and outer conductor; in most connectors the outer conductor has a significantly greater current capacity than the center pin. This is beneficial because the outer shield is usually connected to the grounding system and can take a substantial portion of the lightning current. In addition, the transient current capacity limitation of the center pin should also be considered. The current rating of most center pins is rated as the survivability of ten 8x20μs ampere pulses, shown in the table below.

		Connector type						
Pulse Life (in kA, 10x rating using 8x20us waveform)	Connector	7-16 DIN	UHF	N	TNC	BNC	SMA	F(75Ω)
	Pin Diam.	0.276"/7mm	0.19"/4.8mm	0.12"/3.1	0.08"/2.1mm	0.05"/1.3mm	~.04"/1mm	
	Quality							
	Higher	100kA	50kA	30kA	20kA	20kA	5kA	15kA
	Lower	50kA	10kA	10kA	5kA	5kA	2.5kA	3kA

TABLE: Pulse Lifetime of Various Connector Types (in kA, 10x rating using 8x20us waveform)

The largest differentiator between high and low quality protectors is the quality of the center contact material and the lack of gold plated contacts for lower end connectors. The center contacts for smaller format connectors, particularly of N and TNC or BNC configurations, must be a hardened copper alloy for maximum durability. Low quality protectors use soft bronze or even softer brass female sockets, which can easily be bent or loosened during assembly or mating, and are further weakened with the heating caused by high lightning currents, and otherwise make lower force and higher resistance contact. In order to maximize the lifetime of the exposed coaxial system, the center pins and sockets must be made from the appropriate high quality material for all the connectors used "upstream" on the exposed side of the lightning protector.

NexTek uses specialized contacts for long pulse lifetime including hardened copper alloy pins with gold finish for female contact in all N and TNC/BNC and SMA protectors, and optimize each connector type for long-life.



Here is a helpful way to quantify the quality of a given connector (POSSIBLE DESTRUCTIVE TEST): Find a paper clip, or pin, that will just fit into the connector socket. Insert the pin into the female socket and angle the pin about 20°-30° from the pin centerline to bend open a socket spring finger. Return the pin to the center and withdraw the pin from the socket. If spring finger of the pin returns to its original position, you have a high quality contact. Under severe bending, a high quality pin will break off, as opposed to staying bent. If the spring finger stays bent, the center pin material quality is sub-par and this connector should not be used in applications with high surge risk.