

1 Q. Please provide the estimated reliability, in terms of failure to start or other  
2 appropriate measure, of each of the 8 diesel generators that form part of the black  
3 start system.

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6 A. The estimated reliability, for each of the eight diesel generators that form part of  
7 the blackstart system, in terms of Operational Availability, is 99.7409685 percent.  
8 This figure is taken from the *493-2007 - IEEE Recommended Practice for the Design*  
9 *of Reliable Industrial and Commercial Power Systems, Annex Q<sup>1</sup> - Survey of*  
10 *Reliability and Availability Information for Power Distribution, Power Generation,*  
11 *and HVAC Components for Commercial, Industrial, and Utility Installations, page*  
12 *673, Item 98: Diesel Engine Generator, Packaged, 250 kW – 1.5 MW, Standby.*

13

14 Operational Availability considers downtime as a result of maintenance and failure.

15

16 Operational Availability is defined as  $A_o = \text{MTBF} / (\text{MTBF} + \text{MDT})$  where:

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18 MTBF = Mean Time Between Failures is average time calculated between  
19 failure occurrences; and

20 MDT = Mean Down Time is the average downtime caused by scheduled and  
21 unscheduled maintenance, including any logistics time.

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<sup>1</sup> <https://standards.ieee.org/downloads/493/493-2007/493-2007.AnnexQ.pdf>.