

Section 7

SPEED TOLERANCES FOR TESTING FRANGIBLE STRUCTURES

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SELECT ENGINEERING SERVICES

Recommendation

- ▶ Apply a tolerance of ± 4 kph to the current nominal impact speed of 140 kph.

Speed Tolerance

▶ ICAO

▶ “5.2.14 ...The test should be conducted at a speed of 140 km/h (75 kt).”

▶ “5.2.16 Impact speed should remain constant during impact and should be accurately and directly recorded from the moving vehicle at the time of impact.”

▶ Need to establish tolerance

▶ Achievable by test facilities

▶ Understand how force changes with speed

Speed Tolerance

- ▶ Automotive crash test industry
 - ▶ Manual for Assessing Safety Hardware (MASH) specifies a speed tolerance of ± 4 kph for all crash tests above 70 kph
 - ▶ 100 kph is max test speed required
 - ▶ MASH speed tolerance based on a survey of test facilities and their ability to hit a target nominal speed



Speed Tolerance

- ▶ Statistical predictions with ± 4 kph tolerance:
 - ▶ Aluminum poles
 - ▶ Crush depth
 - ▶ $\pm 4.8\%$ due to speed change
 - ▶ $\pm 10.8\%$ due to prediction interval
 - ▶ Increase of **$\pm 1.0\%$** in overall uncertainty
 - ▶ Impulse
 - ▶ $\pm 2.7\%$ due to speed change
 - ▶ $\pm 8.2\%$ due to prediction interval
 - ▶ Increase of **$\pm 0.4\%$** in overall uncertainty
 - ▶ FRP poles
 - ▶ Impulse
 - ▶ $\pm 1.2\%$ due to speed change
 - ▶ $\pm 8.2\%$ due to prediction interval
 - ▶ Increase of **$\pm 0.06\%$** in overall uncertainty

Recommendation

- ▶ Apply a tolerance of ± 4 kph to the current nominal impact speed of 140 kph.