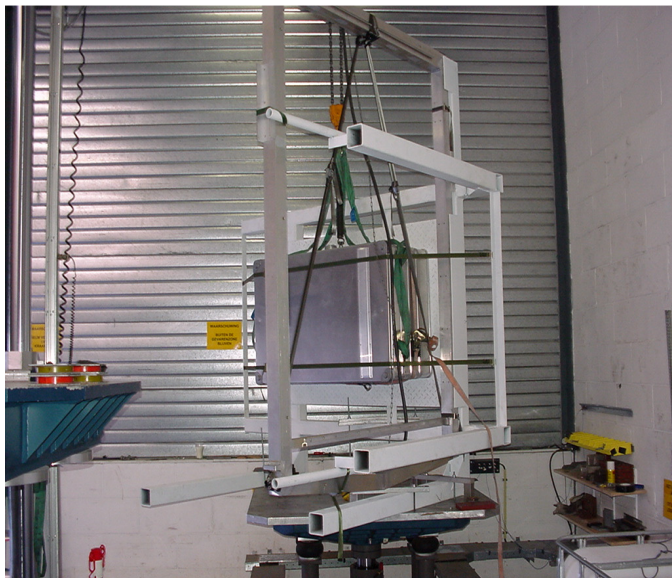




VIBRATION TESTS

Vibrations and vibration requirements

Vibration always occurs during the transportation of (packaged) products; this could be caused by environmental equipment on board of airplanes, ships, or trains, the effects of wind and similar phenomenon, or possibly by the equipment itself, e.g. diesel engines. Oftentimes, the actual excitation vibration level can be quite low. However, local vibration levels can increase significantly in the equipment or supporting structures due to a resonance amplification factor. Amplification can increase the original excitation vibration level locally by a factor of 10-20x. The packaged product or equipment can be vibrated at various frequencies and levels, including acclimatised conditions, to verify whether it meets vibration requirements such as the ASTM, ISO, IEC standards of Lloyds, DNV, Veritas and the like. Based on the test results, the product or packaging can be modified or optimised to meet these requirements.



Vibration test with a cabinet for medicines mounted against a simulated container wall of a transportable hospital.

Vibration requirements and design

Focussing on the integration of vibration requirements of the product during the engineering phase can avoid setbacks during the vibration test. S2T is at your service, backed by many years of experience in the design of vibration resistant equipment. The effort spent in the engineering phase to increase the product's vibration resistance represents only a fraction of the total engineering cost of the product.

Vibration transport simulations have amounted to considerable savings on packaging costs of products to be shipped in large quantities. Savings over 20% are possible. Moreover, transport volume and claims decrease, and hence the costs as well. A transport simulation tests the quality of a product and can reduce annual packaging costs by more than two million Euros.

Vibration tests

There are various types of vibration tests, e.g. sine, random, sine on random and the like. Vibration levels and frequency ranges differ per requirement. A sine test with a fixed frequency and amplitude is the DOT-test for the packaging of dangerous and other goods. A sweep test is a sine test over a frequency range with a given amplitude and velocity, e.g. 1 oct/min. The sine sweep test also determines the resonance frequencies of equipment or packaging. The equipment is then subjected to a long duration vibration test at these frequencies. In practice, resonance is the primary cause for damage.

Transport simulations in accordance with ASTM, IEC, ISO standards, or documented measurements can be categorised as random vibration tests. These tests simulate the vibration behaviour of trucks, trains, airplanes and the like. A wide frequency spectrum with varying vibration levels is simultaneously excited. During the test, the product, and/or the packaging are examined and possible damage is recorded chronologically. Transport simulations serve to verify materials, modifications, improvements, acceptance tests, and ensure the quality of the product.

Transport testing can take several weeks. In most cases, by increasing the vibration level, the duration of a transport test down to several hours. This depends partly on the required reliability and assurance levels. Material properties, such as vibration test system options, validation with practice results, and the like play a role as well.



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HYDRAULIC-DYNAMIC SHAKER	
Supplier	Lansmont Corporation
Type	VTS 10.000-10
Frequency range	ca. 1 tot 300 Hz
Max. amplitude	64 mm peak-peak
Max. mass product	ca. 2.725 kg
Dimensions table	1.520 x 1.520 mm
Test modes	sinus, random, sinus on random and such
Vibration direction	vertical
ELECTRO-DYNAMIC SHAKER	
Supplier	Tira
Type	59355/AIT-440
Frequency range	ca. 4 tot 3.000 Hz
Max. amplitude	63,5 mm peak-peak
Max. mass product	Vertical ca. 1.300 kg – Horizontal ca. 2.400 kg
Max. Force	55.000 N
Dimensions table	1.200 x 1.200 mm
Test modes	sinus, random, sinus on random and such
Vibration direction	vertical en horizontal
ELECTRO-DYNAMIC SHAKER COMBINE WITH TEMPERATURE TEST	
Supplier	Tira
Type	5140
Frequency range	ca. 4 tot 3.000 Hz
Max. amplitude	20 mm peak-peak
Temperature test	-40°C-180°C (climate test 10°C-95°C - RH 10-98%)
Max. mass product	ca. 128 kg
Max. Force	6.000 N
Dimensions table	Vertical Ø 250 mm en horizontal 800 x 800 mm
Test modes	sinus, random, sinus on random and such
Vibration direction	vertical en horizontal
ELECTRO-DYNAMIC SHAKER	
Supplier	Gearing & Watson
Type	GWV20
Frequency range	ca. 4 tot 20.000 Hz
Max. Amplitude	10 mm peak-peak
Max. mass product	ca. 1 kg
Max. Force	100 N
Dimensions table	Ø 50 mm
Test modes	sinus, random, sinus on random and such
Vibration direction	vertical en horizontal
ELECTRO-MECHANISCHE TRILTAFEL	
Supplier	Shape Technology
Type	LVS01
Frequency range	1 tot 100 Hz
Max. amplitude	6 mm peak-peak
Max. mass product	ca. 20 kg
Dimensions table	500x500 mm
Test modes	sinus
Vibration direction	vertical

S2T: YOUR DYNAMIC TEST CENTER FOR ALL YOUR TESTS



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