LASRA TECHNICAL REPORT

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description : Four footbed samples

Four samples of footbeds were received for assessment of their energy absorption characteristics in the as received condition and after ageing treatments.

The samples were identified as follows:-

LASRA identification	markings on sample
PU I	Interpod (new)
PU II	Interpod (old)
EVA I	Formthotics Ultimate Foot Comfort
EVA II	Vasyli Custom Heat mouldable orthotics for customised prescription

The samples were assessed for their energy absorption properties at the seat region using clause 5.10 of AS/NZS 2210.2. This method can be applied to **all** footwear.

The test applies increasing load and measures energy absorbed during load increase.

This test was carried out as follows:-

a. as received
b. after compression set testing
c. after 7 days over water at 50°C to assess hydrolysis degradation
d. after a further compression set test on hydrolysis treated samples

The atmosphere inside a shoe can be detrimental to some materials, and this along with compression can result in degradation of energy absorption properties. Hydrolysis treatment was used to assess microclimate degradation of energy absorption properties, along with the affect of compression in the long term.

The results were as follows:-

Sample	Energy absorption at the seat region (Joules)			
	as received samples (untreated)	**compression set tested samples**	**hydrolysis treated samples (7 days over water, 50°C)**	**hydrolysis and compression set tested samples**
PU I	9.1	7.3	8.7	6.5
PU II	10.4	7.1	8.8	7.5
EVA I	8.4	4.2	7.6	5.1
EVA II	5.9	4.7	7.6	4.4
Control odour control only	2.7	-	-	-
no footbed	0.2	-	-	-
AS/NZS 2210.2 requirement for whole footwear	20 min			

The results showed that in the untreated as received tests the PU II system absorbed more energy than the PU I system, although the PU I system resisted hydrolysis better. However, hydrolysis **and** compression working in combination were better defended by the PU II system. Compression was a more damaging factor than hydrolysis for the PU or EVA.

In general, the PU systems performed better in all tests than either of the EVA alternatives or the control material. The EVA samples suffered significant loss of energy absorption after compression. EVA I lost almost half of its energy absorption properties after compression set tests, EVA II lost up to a third of its energy absorption properties after compression set.

The PU I and PU II samples lost less energy absorption due to compression although the PU I system suffered more under the combined hydrolysis and compression than the PU II.

The energy absorption test is a dynamic test under increasing energy input, while compression set testing involves a long term constant static loading and measures loss of thickness due to loading in wear over a longer period.

Compression set PM64 (% thickness loss)			
Sample	**New**	**After hydrolysis**	**Guideline**
PU I	2.2	9.2	30 max
PU II	9.0	5.8	
EVA I	13.5	9.0	
EVA II	4.5	3.2	

The PU systems both performed better than EVA I, while EVA II did very well in this testing. Both PU systems lost more thickness due to compression than EVA II after hydrolysis treatment. As received, the PU I system was better at withstanding static long term compression than the PU II system, however this was reversed after hydrolysis.

Peel strength of fabric cover	**BS 5131 : 1.2 (N/mm)**	**Guideline**
PU I	0.8	0.5 min
PU II	0.8	
EVA II	2.1	

EVA I had no cover fabric, and EVA II was of better peel strength than the PU samples.

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