From the thin film oven test, it was found the following results:

Container No.	Original Pen No. (from penetration test)	Weight before heating (gm)	Weight after heating (gm)
1	131 dmm	50.3	48.8
2		49.7	48.2

Find the loss in weight due to the effect of heat and air and determine the retained penetration if the penetration value of residue after thin film oven test was 112 dmm. Then compare the results with standards (Specification limits (EN 12607-1): Change of mass, ± 0.8% and retained penetration ≥ 43%.

Solution:

1- Find the average weight before and after heating as shown in the following table:

W1: Average weight before heating (gm)	W2: Average weight after heating (gm)
?	?

2- Find the loss in weight of residue after thin film oven test is reported as the percentage by mass of the original sample $= \frac{W1-W2}{W1} * 100 =$ **? sample has an overall mass ? (loss or gain)**

? (> or<or=) 0.8% (the max limit of EN standard).

3- Retained penetration ? (> or<or=) 43% (the limit of EN standard).

Table 5.1 Specifications for paving grade bitumens with penetrations from 20 × 0.1 mm to 220 × 0.1 mm: Tables 1A and 1B of EN 12591 combined, including examples of specific regional requirements (BSI, 2009a)

Property	Test method	Unit	20/30	30/45	35/50	40/60	50/70	70/100	100/150	160/220
Penetration at 25°C	EN 1426	0.1 mm	20–30	30–45	35–50	40–60	50–70	70–100	100–150	160–220
Softening point	EN 1427	°C	55–63	52–60	50–58	48–56	46–54	43–51	39–47	35–43
Resistance to hardening at 163°C	EN 12607-1									
Retained penetration		%	≥55	≥53	≥53	≥50	≥50	≥46	≥43	≥37
Change of mass (absolute value)		%	≤0.5	≤0.5	≤0.5	≤0.5	≤0.5	≤0.8	≤0.8	≤1.0
Increase in softening point – severity 1		°C	≤8	≤8	≤8	≤9	≤9	≤9	≤10	≤11
or			or	or	or	or	or	or	or	or
Increase in softening point – severity 2 a		°C	≤10	≤11	≤11	≤11	≤11	≤11	≤12	≤12
Flash point	EN ISO 2592	°C	≥240	≥240	≥240	≥230	≥230	≥230	≥230	≥220
Solubility	EN 12592	%	≥99.0	≥99.0	≥99.0	≥99.0	≥99.0	≥99.0	≥99.0	≥99.0
Penetration index	Annex A b	–	←				−1.5 to +0.7			→
Dynamic viscosity at 60°C	EN 12596	Pa·s	≥440	≥260	≥225	≥175	≥145	≥90	≥55	≥30
Breaking point (Fraass)	EN 12593			≤−5	≤−5	≤−7	≤−8	≤−10	≤−12	≤−15
Kinematic viscosity at 135°C	EN 12595	mm^2/s	≥530	≥400	≥370	≥325	≥295	≥230	≥175	≥135
	France		×		×		×	×		×
	Belgium		×		×		×	×		×
	The Netherlands		×			×		×	×	×
	Germany		×	×			×	×		×
	UK		×	×	×	×	×	×	×	×
	Switzerland				×		×	×	×	×
	Czech Republic		×	×	×		×	×	×	×
	Poland		×		×		×	×		×