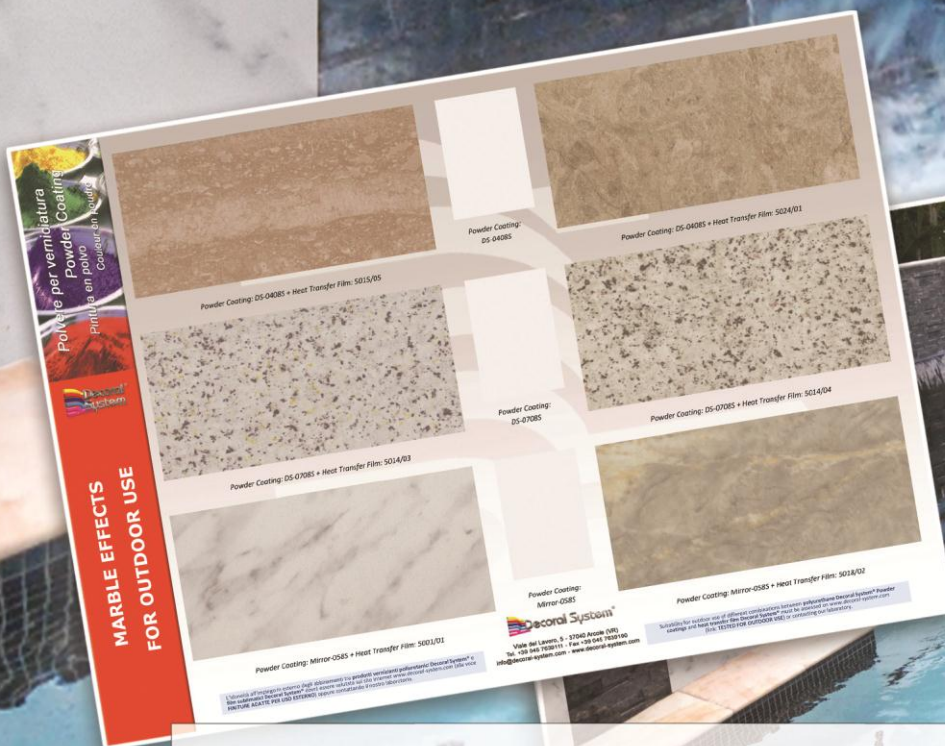


Accelerated Weathering Test



Decoral LAB
Research and Development



MARBLE EFFECTS FOR OUTDOOR USE



MRK-010-0243

TEST DI INVECCHIAMENTO ACCELERATO:

Invecchiamento accelerato

Tutti i campioni vengono sottoposti all'irraggiamento di lampade allo xenon ed a cicli umido/secco mediante speciali apparecchiature (Q-Sun, SolarBox). Tali apparecchiature vengono utilizzate in conformità agli standard internazionali imposti dalla norma ISO 11341 rispettando le seguenti impostazioni:

- intensità luminosa, $550 \pm 20 \text{ W/m}^2$ (290-800 nm)
- temperatura del pannello nero, $65 \pm 5^\circ\text{C}$
- ciclo umido 18 minuti
- ciclo secco 102 minuti

Alla fine dei test, che normalmente hanno una durata minima di 1000 ore, viene valutata la variazione di brillantezza (EN ISO 2813, con angolo di incidenza 60°) ed il cambiamento di colore ΔE (metodo CIELAB ISO 7724/3) rispetto ai valori di partenza. Questo permette di stabilire, in maniera parametrizzata, l'invecchiamento delle varie superfici testate. La corretta conduzione dei test viene verificata attraverso l'utilizzo di campioni in bianco ad invecchiamento noto.





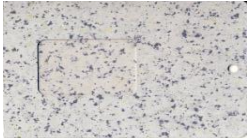



Figure: apparecchiature per l'invecchiamento accelerato.
Pictures: equipment for the Accelerated Weathering Test

Accelerated Weathering Test

All samples are exposed to radiation of Xenon lamps and to wet/dry cycles by special equipment (Q-Sun, SOLARBOX). Such equipment is used in accordance with international standards imposed by norm ISO 11341, i.e. complying with the following settings:

- light intensity, $550 \pm 20 \text{ W / m}^2$ (290-800 nm)
- black panel temperature, $65 \pm 5^\circ\text{C}$
- wet cycle 18 minutes
- dry cycle 102 minutes.

At the end of the test, whose minimum duration is 1000 hours, Residual Gloss (EN ISO 2813, with an angle of incidence 60°) and Colour Variation ΔE (CIELAB method - ISO 7724 / 3) are measured comparing pre-test values. In this way it is possible to evaluate the aging of surfaces using standard indexes. The accuracy of the test is verified through the use of samples in white, whose aging behaviour is known.

| ID Test Report | PROD. VERNIC | COD. FILM | PROG. N° | IMMAGINI |
|----------------|--------------|-----------|----------|--|
| TR-IA-348-2012 | DS-0408S | 5015/05 | 348 |  |
| TR-IA-339-2012 | DS-0408S | 5024/01 | 339 |  |
| TR-IA-84-2012 | DS-0708S | 5014/03 | 84 |  |
| TR-IA-81-2012 | DS-0708S | 5014/04 | 81 |  |
| TR-IA-222-2012 | Mirror-058S | 5001/01 | 222 |  |
| TR-IA-269-2012 | Mirror-058S | 5018/02 | 269 |  |



Laboratory
Test

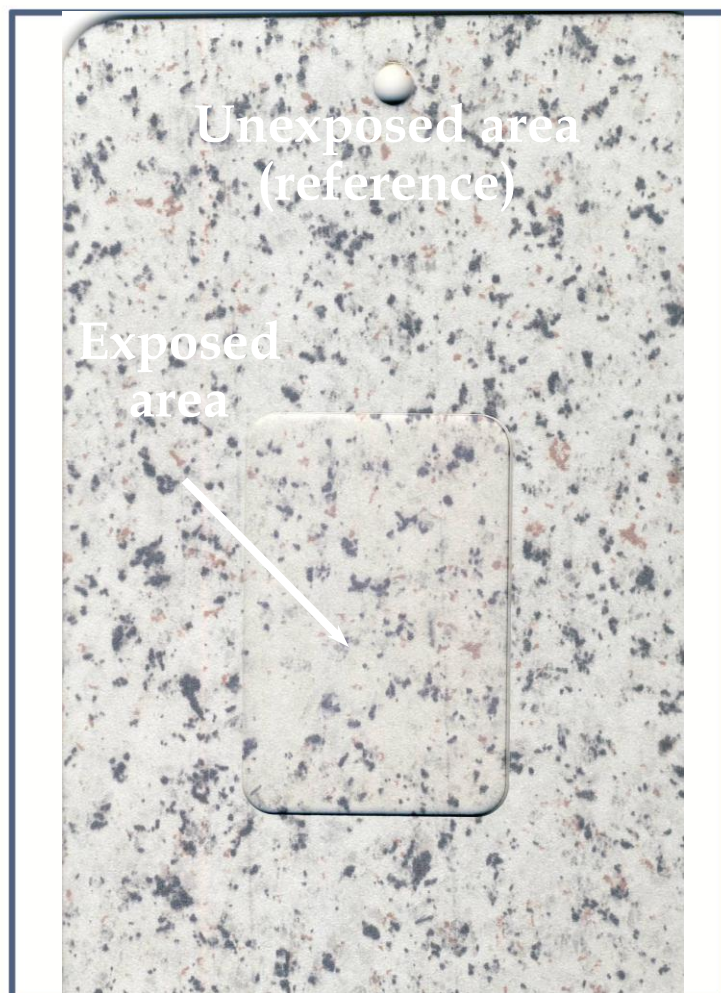
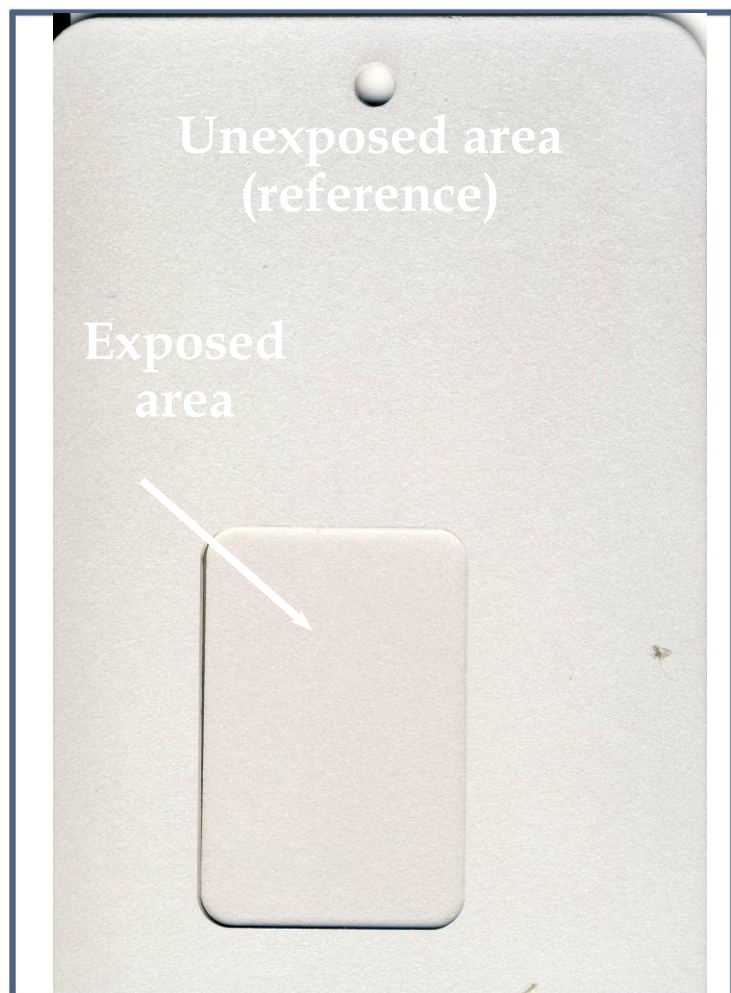
No. 287



Device:
QSun 3000



Total duration:
990h



LAB. ID NUMBER: 24166
POWDER COATING: DS-0708S
HEAT TRANSFER FILM: --
colour variation (ΔE): **0,17**
residual gloss: **95%**

LAB. ID NUMBER: 24167
POWDER COATING: DS-0708S
HEAT TRANSFER FILM: 5014/04
colour variation (ΔE): **1,34**
residual gloss: **98%**

Technical Remarks

Excellent residual gloss and very low colour variation (ΔE), after 990 hours.

Technical Opinion:

**Suitable for
OUTDOOR USE**

Test was carried on samples prepared according to technical specifications supplied by raw materials manufacturers. However, the resistance against accelerated weathering test is only one of the conditions necessary for the evaluation of the resistance of the finished product. For a final assessment see further analysis on natural exposure in Florida.



Laboratory
Test

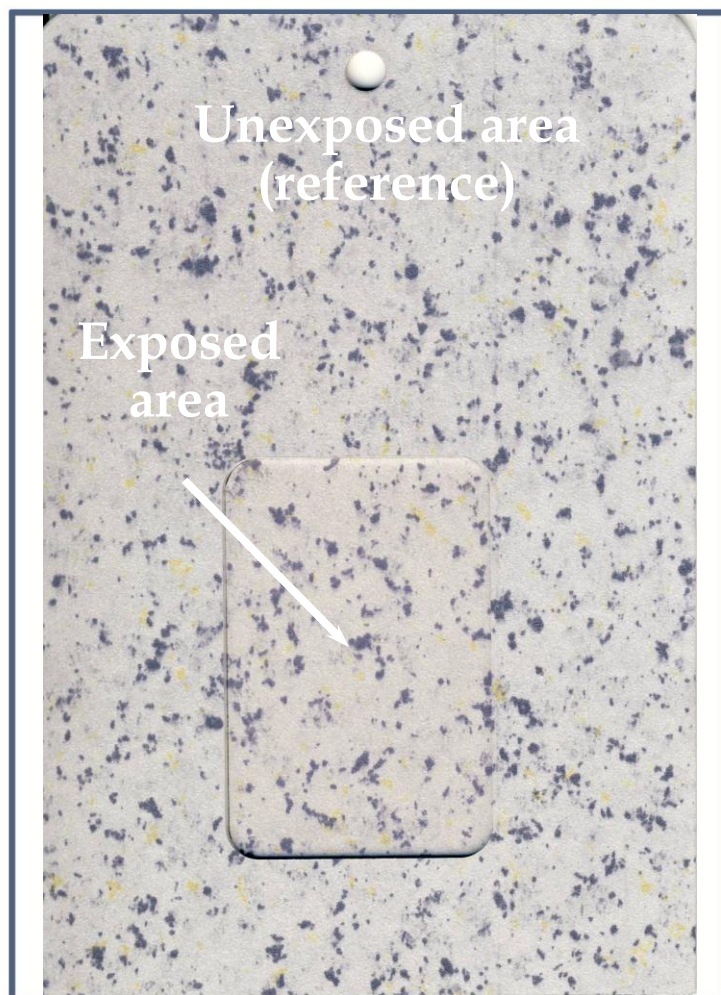
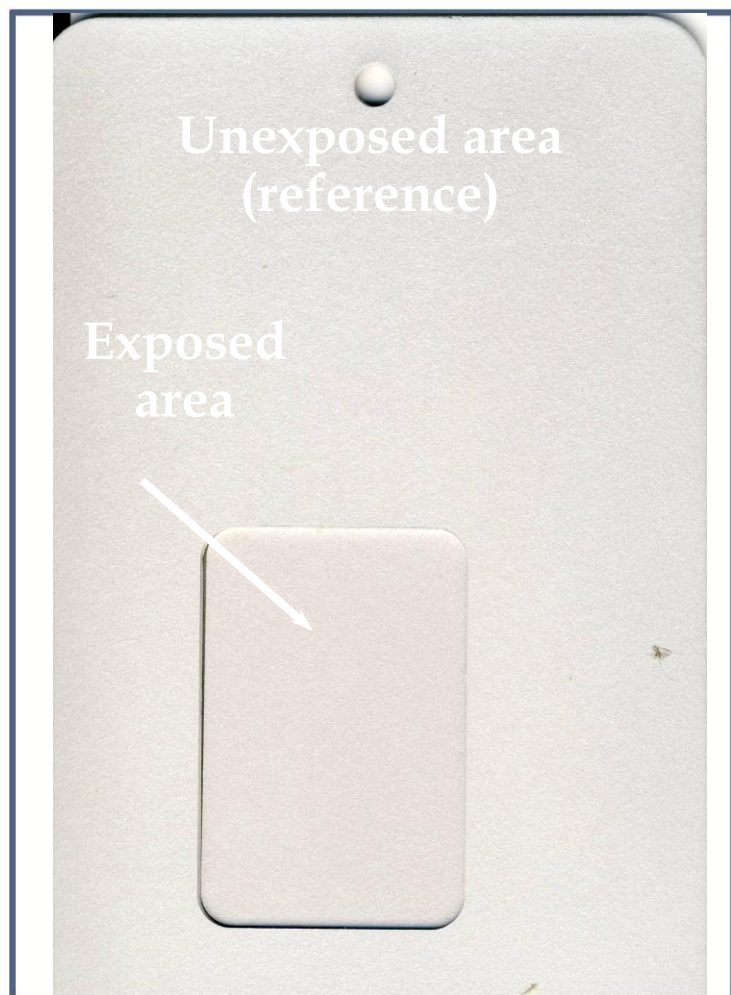
No. 287



Device:
QSun 3000



Total duration:
990h



LAB. ID NUMBER: 24166
POWDER COATING: DS-0708S
HEAT TRANSFER FILM: --
colour variation (ΔE): **0,17**
residual gloss: **95%**

LAB. ID NUMBER: 24168
POWDER COATING: DS-0708S
HEAT TRANSFER FILM: 5014/03
colour variation (ΔE): **0,77**
residual gloss: **94%**

Technical Remarks

Excellent residual gloss and very low colour variation (ΔE), after 990 hours.

Technical Opinion:

**Suitable for
OUTDOOR USE**

Test was carried on samples prepared according to technical specifications supplied by raw materials manufacturers. However, the resistance against accelerated weathering test is only one of the conditions necessary for the evaluation of the resistance of the finished product. For a final assessment see further analysis on natural exposure in Florida.



Laboratory
Test

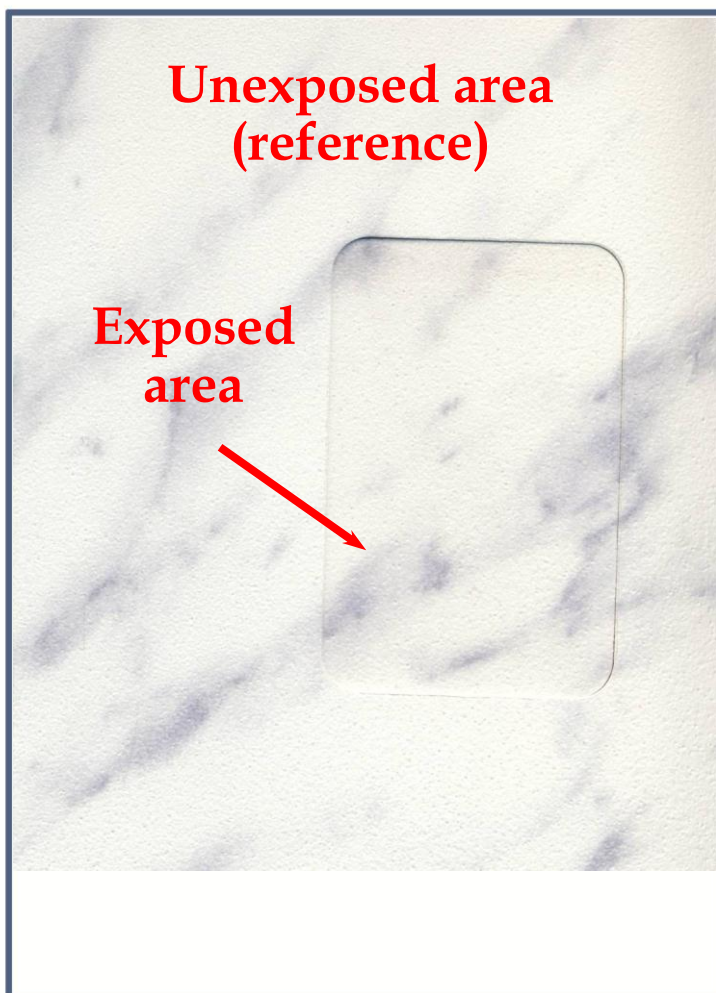
No. 209



Device:
QSun 3000



Total duration:
995h



LAB. ID NUMBER: 22115
POWDER COATING: Mirror-058S
HEAT TRANSFER FILM: 5001/01
colour variation (ΔE): 0,4
residual gloss: 98%

Technical Remarks

Excellent residual gloss and very low colour variation (ΔE), after 995 hours on decorated sample.

Technical Opinion:

**Suitable for
OUTDOOR USE**

Test was carried on samples prepared according to technical specifications supplied by raw materials manufacturers. However, the resistance against accelerated weathering test is only one of the conditions necessary for the evaluation of the resistance of the finished product. For a final assessment see further analysis on natural exposure in Florida.



Laboratory
Test

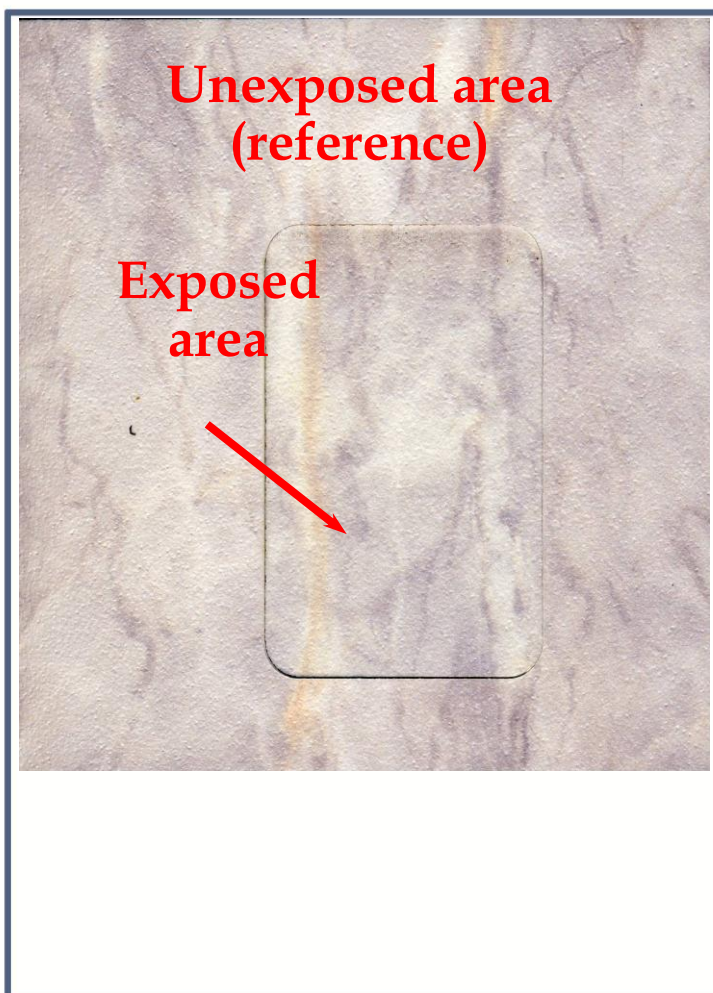
No. 209



Device:
QSun 3000



Total duration:
995h



LAB. ID NUMBER: 22120
POWDER COATING: Mirror-058S
HEAT TRANSFER FILM: 5018/02
colour variation (ΔE): 2,4
residual gloss: 98%

Technical Remarks

Excellent residual gloss and very low colour variation (ΔE), after 995 hours on decorated sample.

Technical Opinion:

**Suitable for
OUTDOOR USE**

Test was carried on samples prepared according to technical specifications supplied by raw materials manufacturers. However, the resistance against accelerated weathering test is only one of the conditions necessary for the evaluation of the resistance of the finished product. For a final assessment see further analysis on natural exposure in Florida.



Laboratory
Test

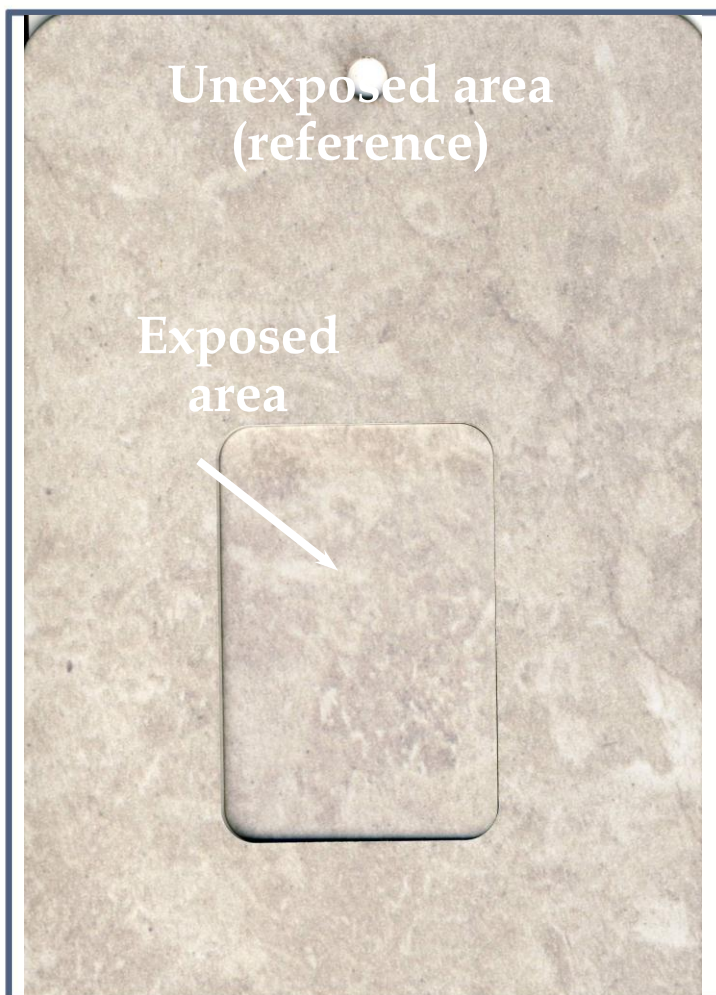
No. 352



Device:
Solar 3000RHN



Total duration:
1270h



LAB. ID NUMBER: 28157
POWDER COATING: DS-0408S
HEAT TRANSFER FILM: 5024/01
Colour variation: **2,05**
residual gloss: **93%**

Technical Remarks

Excellent residual gloss and very low colour variation , after 1270 hours on decorated sample.

Technical Opinion:

**Suitable for
OUTDOOR USE**

Test was carried on samples prepared according to technical specifications supplied by raw materials manufacturers. However, the resistance against accelerated weathering test is only one of the conditions necessary for the evaluation of the resistance of the finished product. For a final assessment see further analysis on natural exposure in Florida.



Laboratory
Test

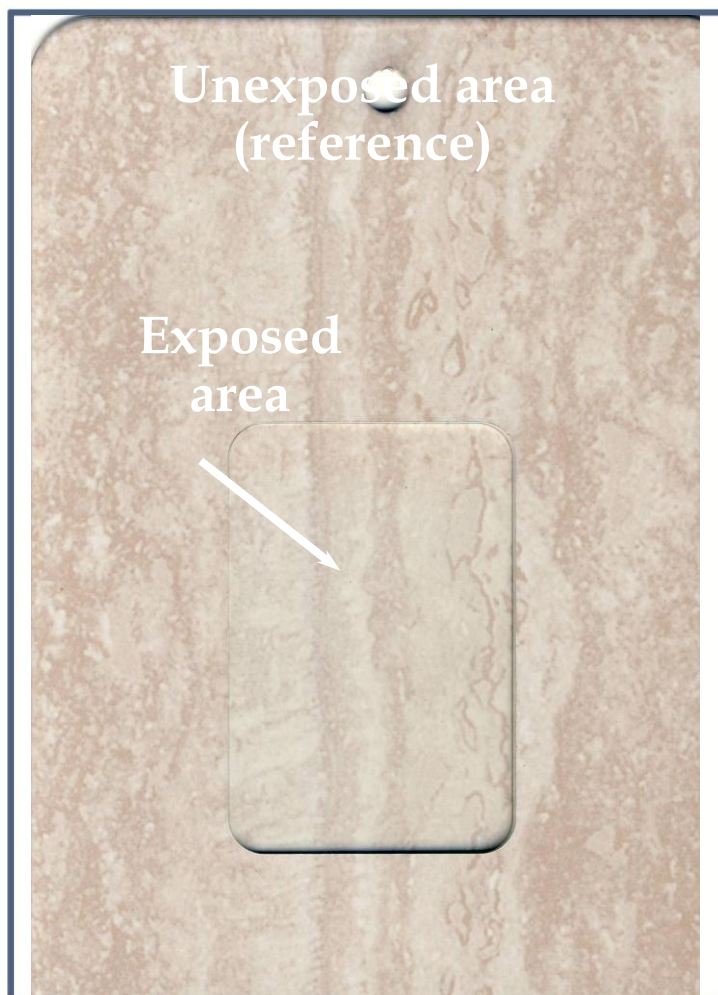
No. 354



Device:
QSun 3000



Total duration:
1016h



LAB. ID NUMBER: 28180
POWDER COATING: DS-0408S
HEAT TRANSFER FILM: 5015/05
Colour variation: **2,69**
residual gloss: **103%**

Technical Remarks

Excellent residual gloss and very low colour variation , after 1016 hours on decorated sample.

Technical Opinion:

**Suitable for
OUTDOOR USE**

Test was carried on samples prepared according to technical specifications supplied by raw materials manufacturers. However, the resistance against accelerated weathering test is only one of the conditions necessary for the evaluation of the resistance of the finished product. For a final assessment see further analysis on natural exposure in Florida.