

DEPARTMENT FOR MATERIALS

Laboratory for Polymers

Ljubljana, 15.04.2021


TRANSLATION OF THE TEST REPORT
No. 650/20-460-1on the testing of the resistance to artificial
weathering of the samples

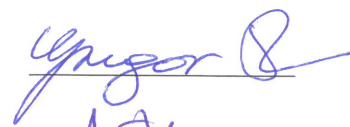
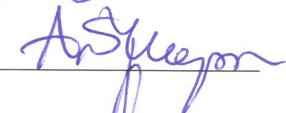
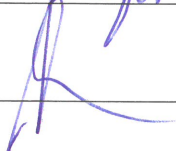
Applicant: **KOLPA d.d., Metlika**
Rosalnice 5, 8330 Metlika, Slovenia

Order/contract **2004503, dated 27.07.2020**

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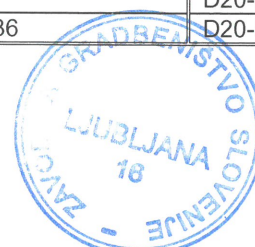
Introduction

The applicant delivered samples of its products for testing on the 19.08.2020. The dimensions of the test samples were 40 mm x 40 mm x 12 mm, for each product type 2 specimens were delivered.

The resistance of the samples to artificial weathering was determined according to the provisions of SIST EN 438-2:2016. To do so one test specimen of the pair of 2 was artificially aged in the weatherometer while the second one was left in the dark to serve as a reference specimen. Comparing both the aged and non-aged test specimen allowed us to rate colour change, expressed as change of contrast, of the samples. The data on the samples received for the testing are shown in the Table 1.

Table 1: Data on the samples received for testing.

Commercial sample designation	ZAG sample designation	Commercial sample designation	ZAG sample designation
UNI 100 arctic white	D20-58-1	GRANIT 9011 hedenbergit	D20-58-48
UNI 101 polar white	D20-58-2	GRANIT 9081 kyanite	D20-58-49
UNI 108 snow white	D20-58-3	GRANIT 9082 leucite	D20-58-50
UNI 109 white acrylic	D20-58-4	GRANIT 9095 molibdenite	D20-58-51
UNI 117 dusty white	D20-58-5	GRANIT 9099 onyx	D20-58-52
UNI 118 pearl white	D20-58-6	GRANIT 9199 manganite	D20-58-53
UNI 213 pineapple	D20-58-7	TERRAZZO 1050 quartz	D20-58-54
UNI 214 mustard	D20-58-8	TERRAZZO 1052 aragonite	D20-58-55
UNI 400 cherry	D20-58-9	TERRAZZO 1055 granulite	D20-58-56
UNI 426 salmon	D20-58-10	TERRAZZO 1157 sunrise terrazzo	D20-58-57
UNI 427 crismon	D20-58-11	TERRAZZO 1158 azzure terrazzo	D20-58-58
UNI 428 powder pink	D20-58-12	TERRAZZO 5053 calcite	D20-58-59
UNI 500 vanilla	D20-58-13	TERRAZZO 5061 albit	D20-58-60
UNI 501 french vanilla	D20-58-14	TERRAZZO 5064 semolina	D20-58-61
UNI 502 bone	D20-58-15	TERRAZZO 9050 obsidian	D20-58-62
UNI 503 bisque	D20-58-16	TERRAZZO 9198 light concrete	D20-58-63
UNI 506 cream	D20-58-17	TERRAZZO 9200 asphalt	D20-58-64
UNI 509 brown cream	D20-58-18	MARBLE M1060 diaspor	D20-58-65
UNI 512 desert rose	D20-58-19	MARBLE M1156 alabaster	D20-58-66
UNI 513 gray quartzite	D20-58-20	MARBLE M5079 barite	D20-58-67
UNI 514 sandstone	D20-58-21	MARBLE M5155 staurolite	D20-58-68
UNI 605 lime	D20-58-22	MARBLE M9078 gabbro	D20-58-69
UNI 633 shamrock	D20-58-23	MARBLE M9197	D20-58-70
UNI 728 oxygen blue	D20-58-24	METALLIC 1071 platinum	D20-58-71
UNI 729 adriatic blue	D20-58-25	METALLIC 1194 white glitter	D20-58-72
UNI 730 dark navy	D20-58-26	METALLIC 5170 cocoa glitter	D20-58-73
UNI 900 misty gray	D20-58-27	METALLIC 9017 stardust	D20-58-74
UNI 901 ash gray	D20-58-28	METALLIC 9070 graphite	D20-58-75
UNI 909 black	D20-58-29	LUMINACO 8101 strontianite	D20-58-76
UNI 921 gypsum	D20-58-30	LUMINACO 8102 luxite	D20-58-77
UNI 922 water stone	D20-58-31	LUMINACO 8501 colemanite	D20-58-78
UNI 923 charcoal	D20-58-32	LUMINACO 8502 coral sand	D20-58-79
UNI 924 beigeing	D20-58-33	LUMINACO 8503 arkose	D20-58-80
UNI 930 storm cloud	D20-58-34	LUMINACO 8901 opal brown	D20-58-81
GRANIT 1076 wollastone	D20-58-35	LUMINO 011 white	D20-58-82
GRANIT 1087 dolomite grain	D20-58-36	LUMINO 021 yellow	D20-58-83
GRANIT 1090 iceland	D20-58-37	LUMINO 041 pink	D20-58-84
GRANIT 1091 salt and pepper	D20-58-38	LUMINO 071 blue	D20-58-85
GRANIT 1092 hematite	D20-58-39	MIDNIGHT BLACK 990 nero	D20-58-86
GRANIT 1093 pyrite	D20-58-40	MIDNIGHT BLACK 9955 lavastone	D20-58-87
GRANIT 1099 tourmaline	D20-58-41	MIDNIGHT BLACK 9956 cosmic	D20-58-88
GRANIT 1193 apenino	D20-58-42	EASY SHAPING ES 112	D20-58-89
GRANIT 5075 phenakite	D20-58-43	KERROCK MF 178	D20-58-90
GRANIT 5080 desert gold	D20-58-44	BUFFALO M 123	D20-58-91
GRANIT 5083 giadelite	D20-58-45	HOWLITE M 124	D20-58-92
GRANIT 5194 basalt	D20-58-46	IVORY BROWN M 536	D20-58-93
GRANIT 5196 cryolite	D20-58-47		



Course of the testing

One test specimen of the pair of 2 was exposed to the conditions in the weathering chamber Q-LAB Xe-3 He. The parameters of the weathering program were as follows:

- continuous irradiance at the test specimen surface 57 W/m^2 (wavelength range 300 – 400 nm),
- black body temperature 68°C ,
- relative humidity 65 %,
- continuous cycle length of 2 hours (18 min wet, 102 min dry).

The test specimens were weathered in the testing chamber until 650 MJ/m^2 radiant exposure was achieved. The colour changes induced by the artificial weathering, expressed as the contrast between the test specimen and the control specimen were assessed according to the provisions of ISO 105-A02:1993 using a grey scale. The test specimen and the control specimen were examined at a distance of approximately 50 cm, they were adequately illuminated by daylight and the light was incident upon the surfaces at approximately 45° .

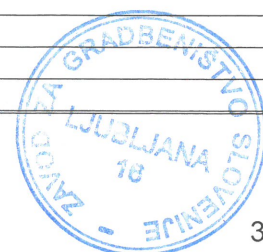
The artificial weathering in the test chamber was performed between 01.10.2020 and 10.03.2021 and lasted for 132 days. In the remaining time scheduled (lamp change, sensor calibrations) as well as unscheduled maintenance was performed in the machine and the machine was stopped in the end-of-year period.

Results

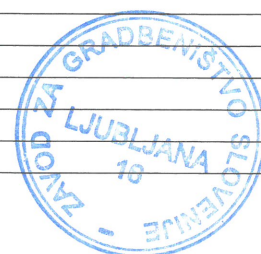
The results of testing i.e. the fastness grades according to ISO 105-A02:1993 are gathered in the Table 2 below. The photos of the test specimen pairs are shown in the Annex 1.

Table 2: Results of the testing, the fastness grades of the test samples.

Sample	Fastness grade of the samples according to the provisions of ISO 105-A02:1993
UNI 100 arctic white	4-5
UNI 101 polar white	4
UNI 108 snow white	4-5
UNI 109 white acrylic	4-5
UNI 117 dusty white	5
UNI 118 pearl white	5
UNI 213 pineapple	2
UNI 214 mustard	3-4
UNI 400 cherry	4
UNI 426 salmon	3
UNI 427 crimson	2-3
UNI 428 powder pink	2-3
UNI 500 vanilla	4-5
UNI 501 french vanilla	4
UNI 502 bone	4-5
UNI 503 bisque	4
UNI 506 cream	3-4
UNI 509 brown cream	4
UNI 512 desert rose	4
UNI 513 gray quartzite	4-5
UNI 514 sandstone	5
UNI 605 lime	2-3
UNI 633 shamrock	4-5
UNI 728 oxygen blue	4-5
UNI 729 adriatic blue	3
UNI 730 dark navy	3
UNI 900 misty gray	4-5

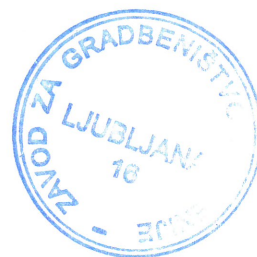


Sample	Fastness grade of the samples according to the provisions of ISO 105-A02:1993
UNI 901 ash gray	5
UNI 909 black	4-5
UNI 921 gypsum	4-5
UNI 922 water stone	3
UNI 923 charcoal	2-3
UNI 924 beigeing	4-5
UNI 930 storm cloud	3
GRANIT 1076 wollastone	4
GRANIT 1087 dolomite grain	4-5
GRANIT 1090 iceland	4-5
GRANIT 1091 salt and pepper	3-4
GRANIT 1092 hematite	4-5
GRANIT 1093 pyrite	3-4
GRANIT 1099 tourmaline	4-5
GRANIT 1193 apenino	3-4
GRANIT 5075 phenakite	5
GRANIT 5080 desert gold	3-4
GRANIT 5083 giadelite	4-5
GRANIT 5194 basalt	4
GRANIT 5196 cryolite	4-5
GRANIT 9011 hedenbergit	4
GRANIT 9081 kyanite	3
GRANIT 9082 leucite	3
GRANIT 9095 molibdenite	4-5
GRANIT 9099 onyx	3-4
GRANIT 9199 manganite	3-4
TERRAZZO 1050 quartz	4
TERRAZZO 1052 aragonite	3-4
TERRAZZO 1055 granulite	5
TERRAZZO 1157 sunrise terrazzo	4-5
TERRAZZO 1158 azzure terrazzo	4-5
TERRAZZO 5053 calcite	3
TERRAZZO 5061 albit	3-4
TERRAZZO 5064 semolina	4
TERRAZZO 9050 obsidian	2
TERRAZZO 9198 light concrete	4
TERRAZZO 9200 asphalt	2
MARBLE M1060 diaspore	4
MARBLE M1156 alabaster	4
MARBLE M5079 barite	5
MARBLE M5155 staurolite	4-5
MARBLE M9078 gabbro	3
MARBLE M9197	3-4
METALLIC 1071 platinum	3-4
METALLIC 1194 white glitter	3-4
METALLIC 5170 cocoa glitter	3-4
METALLIC 9017 stardust	3
METALLIC 9070 graphite	3-4
LUMINACO 8101 strontianite	3
LUMINACO 8102 luxite	3
LUMINACO 8501 colemantite	3-4
LUMINACO 8502 coral sand	2
LUMINACO 8503 arkose	3-4
LUMINACO 8901 opal brown	4
LUMINO 011 white	4
LUMINO 021 yellow	2



Sample	Fastness grade of the samples according to the provisions of ISO 105-A02:1993
LUMINO 041 pink	2
LUMINO 071 blue	2
MIDNIGHT BLACK 990 nero	4-5
MIDNIGHT BLACK 9955 lavastone	4
MIDNIGHT BLACK 9956 cosmic	4-5
EASY SHAPING ES 112	5
KERROCK MF 178	5
BUFFALO M 123	3-4
HOWLITE M 124	3-4
IVORY BROWN M 536	4

Test report prepared by: Gregor Strmljan, MSc



Annex 1: Photo documentation

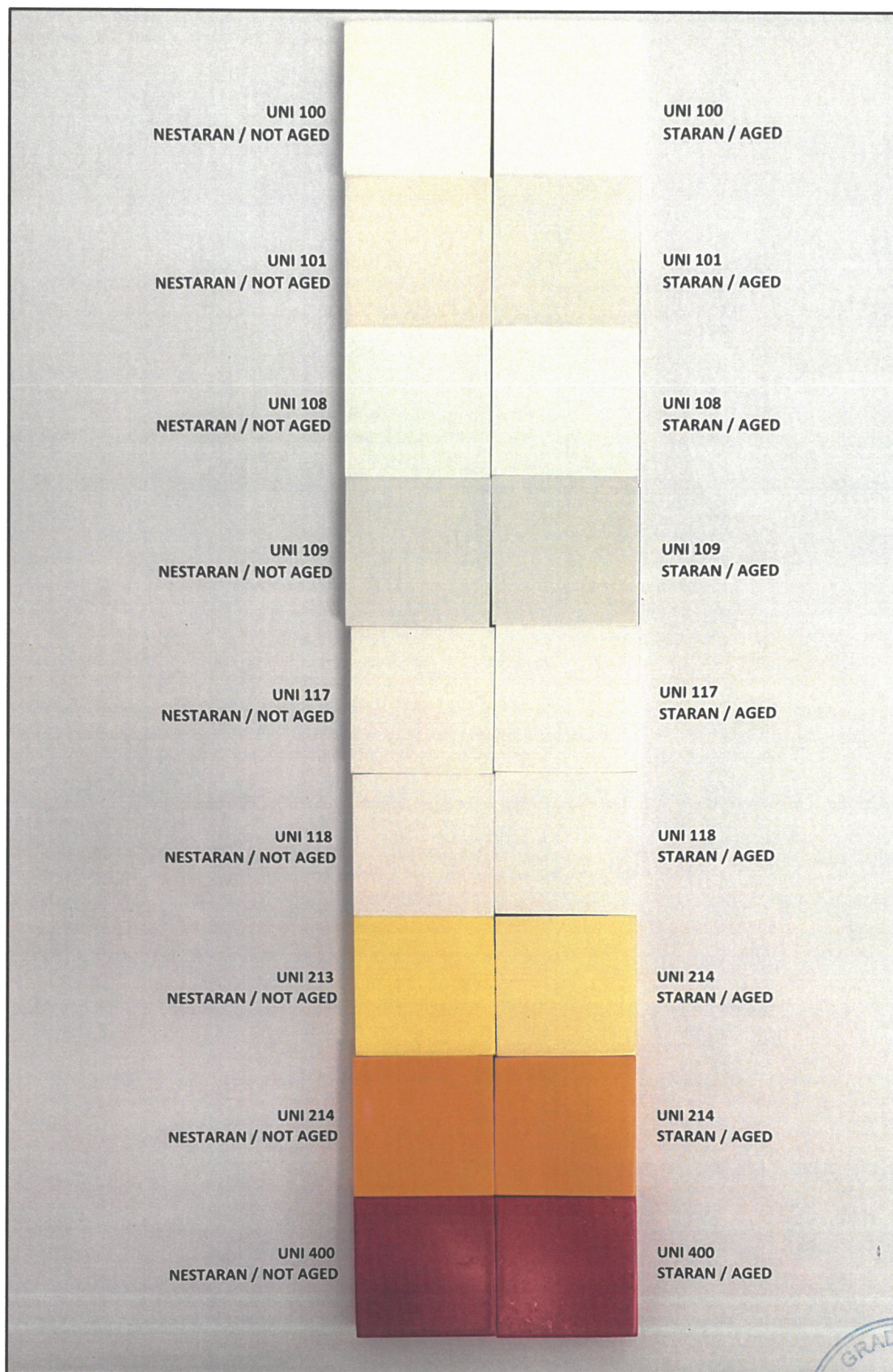


Photo 1: Color changes between the aged and non-aged samples of the UNI series. The photo is saved in the ZAG archive under a designation 042637d-04.

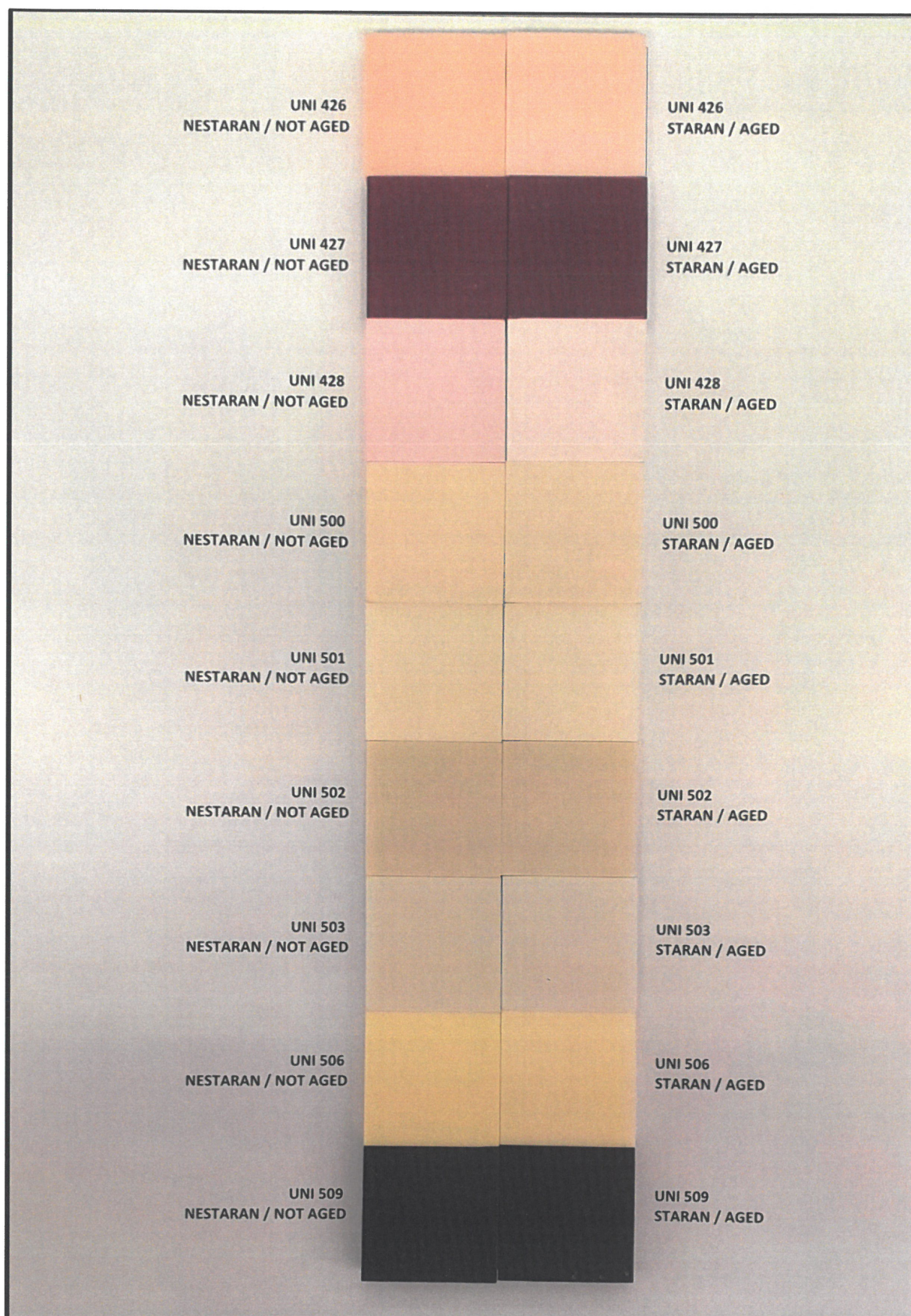


Photo 2: Color changes between the aged and non-aged samples of the UNI series. The photo is saved in the ZAG archive under a designation 042637d-05.

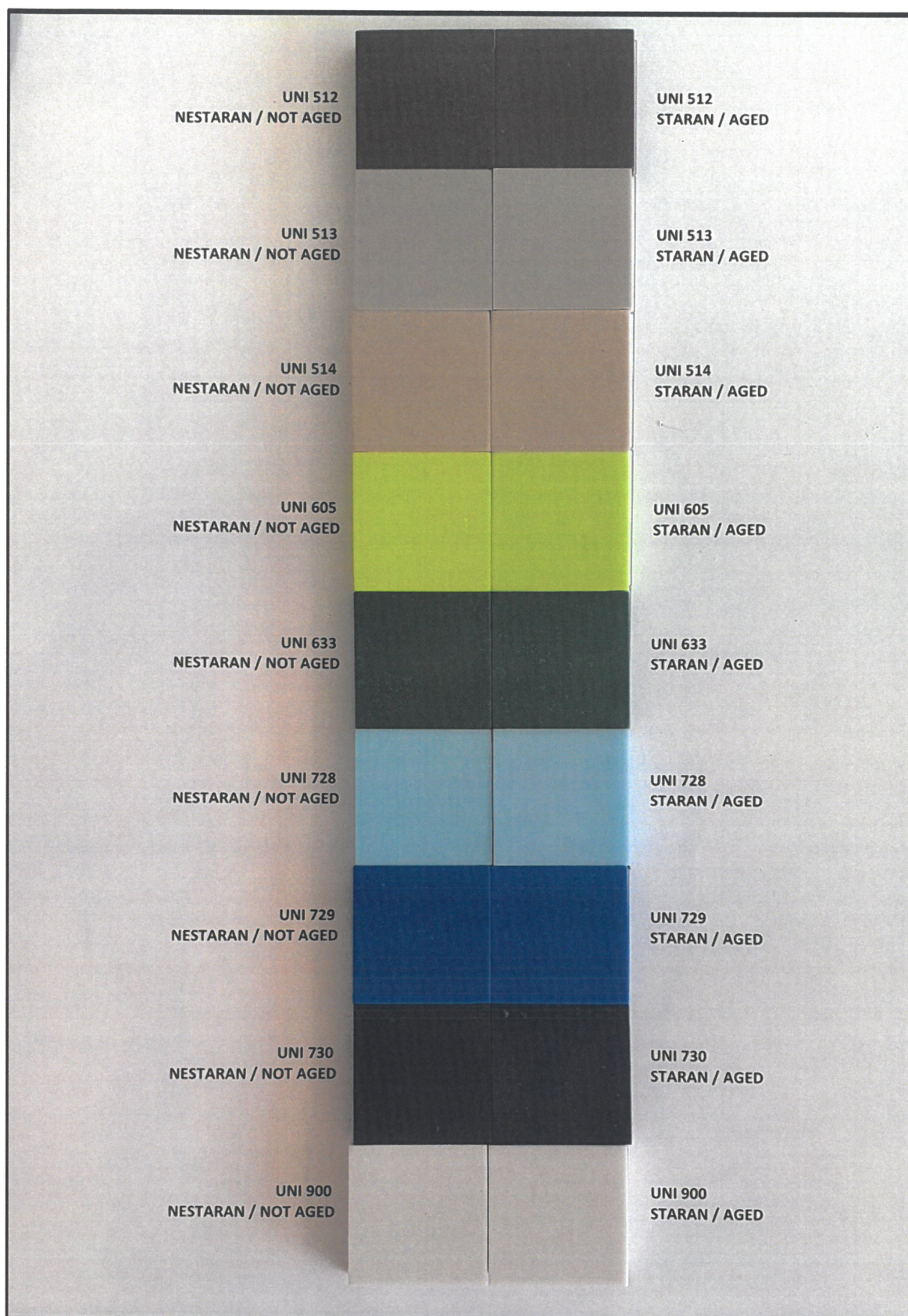


Photo 3 Color changes between the aged and non-aged samples of the UNI series. The photo is saved in the ZAG archive under a designation 042637d-02.

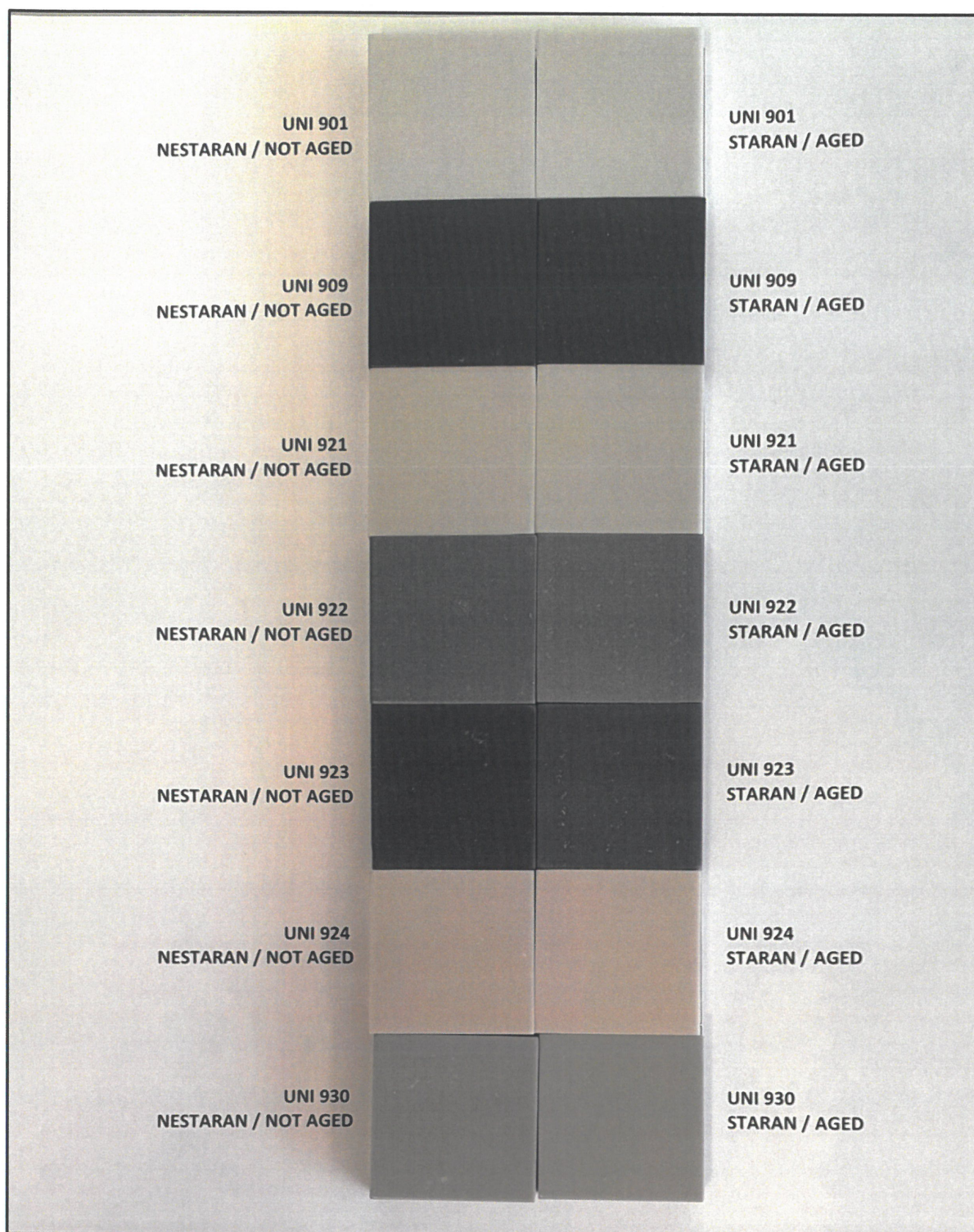


Photo 4: Color changes between the aged and non-aged samples of the UNI series. The photo is saved in the ZAG archive under a designation 042637d-03.



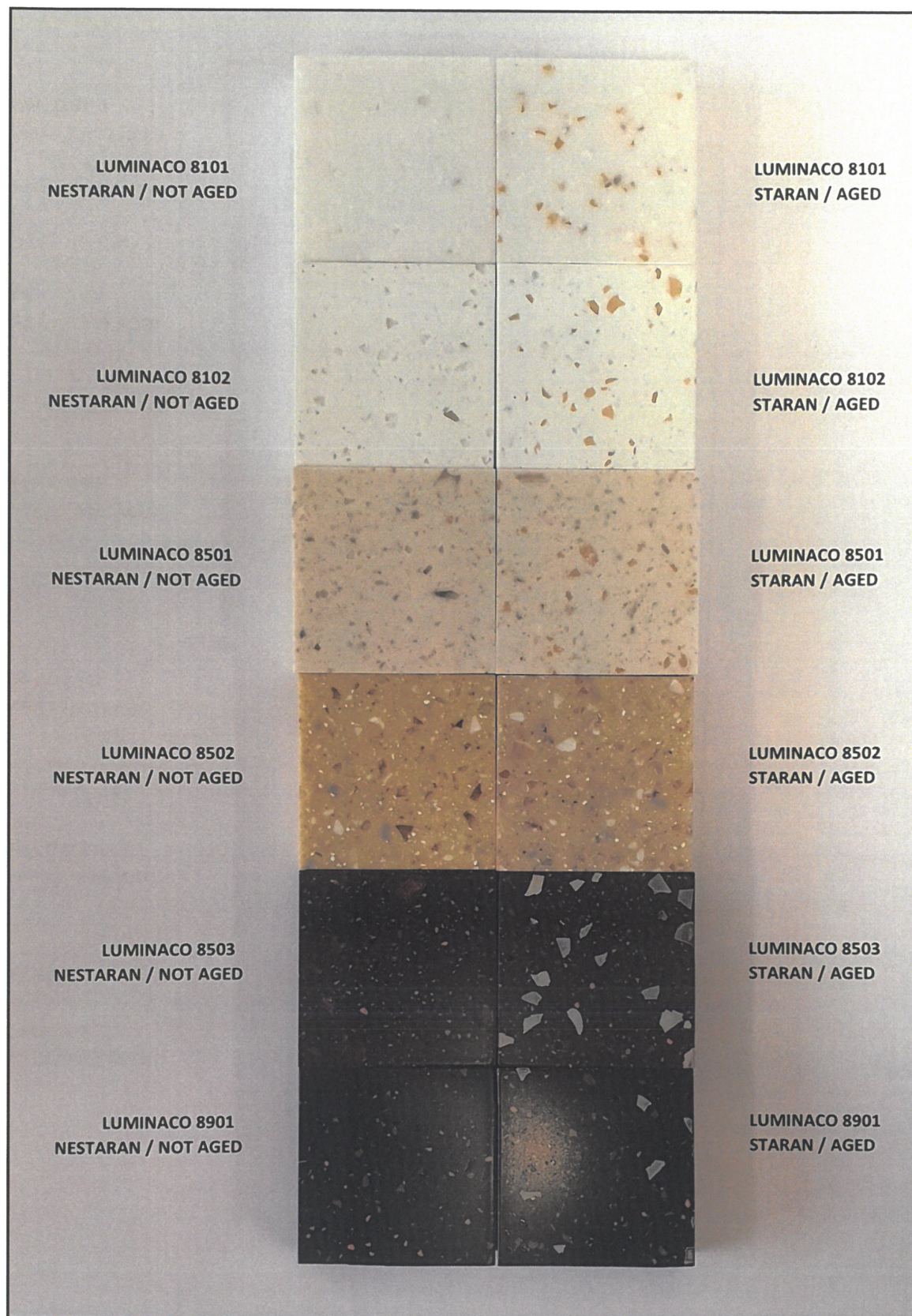


Photo 5: Color changes between the aged and non-aged samples of the LUMINACO series. The photo is saved in the ZAG archive under a designation 042637d-01.

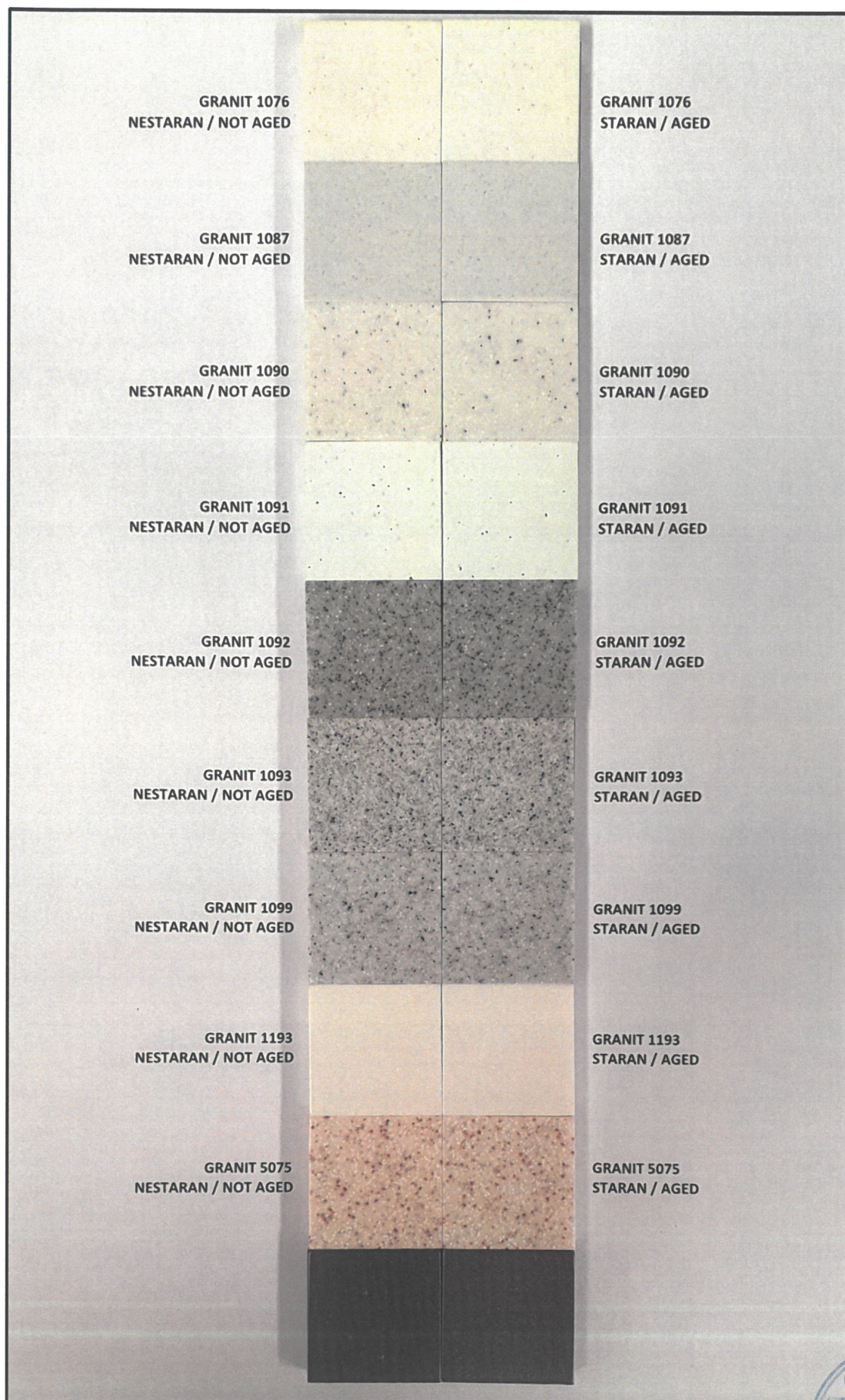


Photo 6: Color changes between the aged and non-aged samples of the GRANIT series. The last pair is GRANIT 5195. The photo is saved in the ZAG archive under a designation 042637d-06.

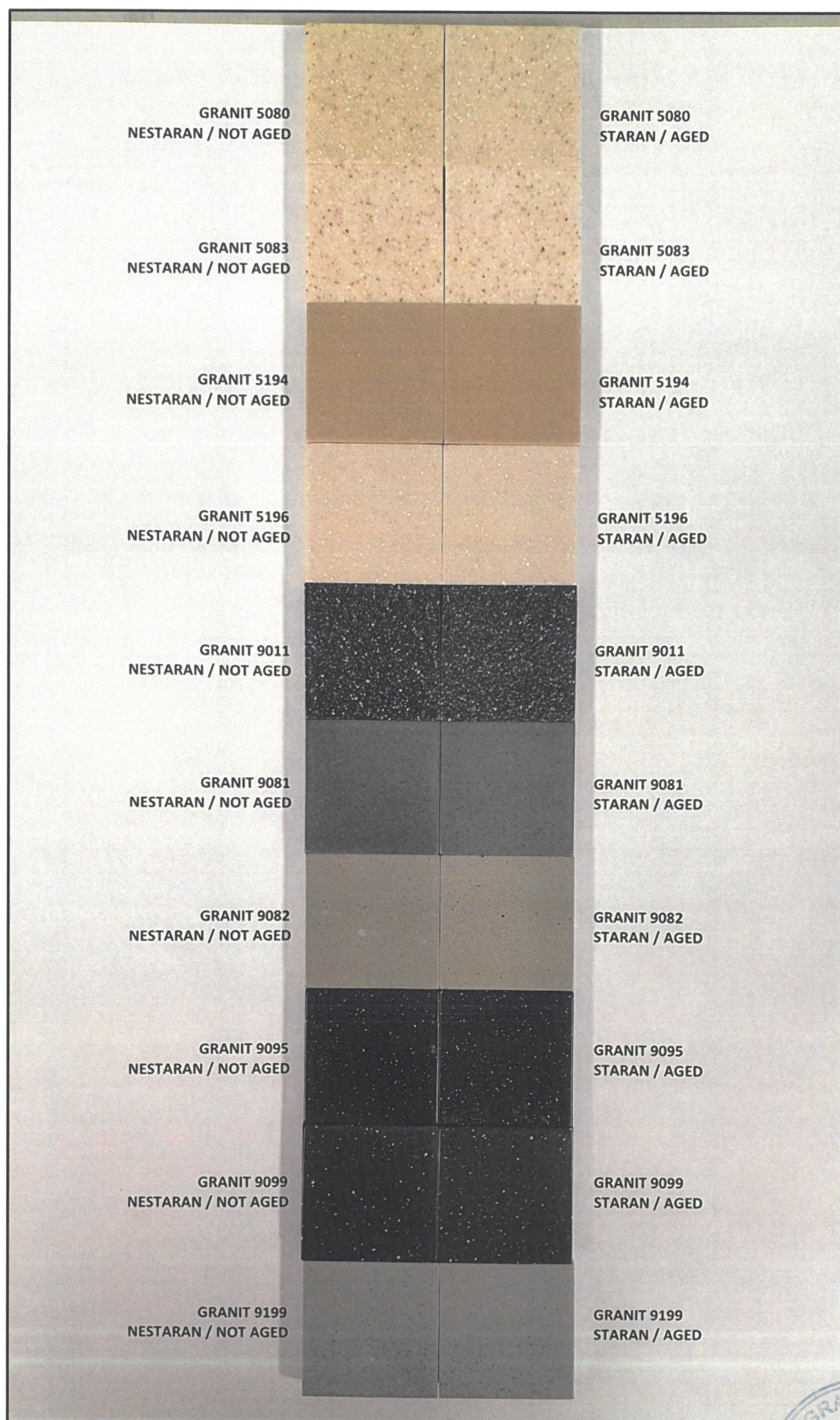


Photo 7: Color changes between the aged and non-aged samples of the GRANIT series. The photo is saved in the ZAG archive under a designation 042637d-07.

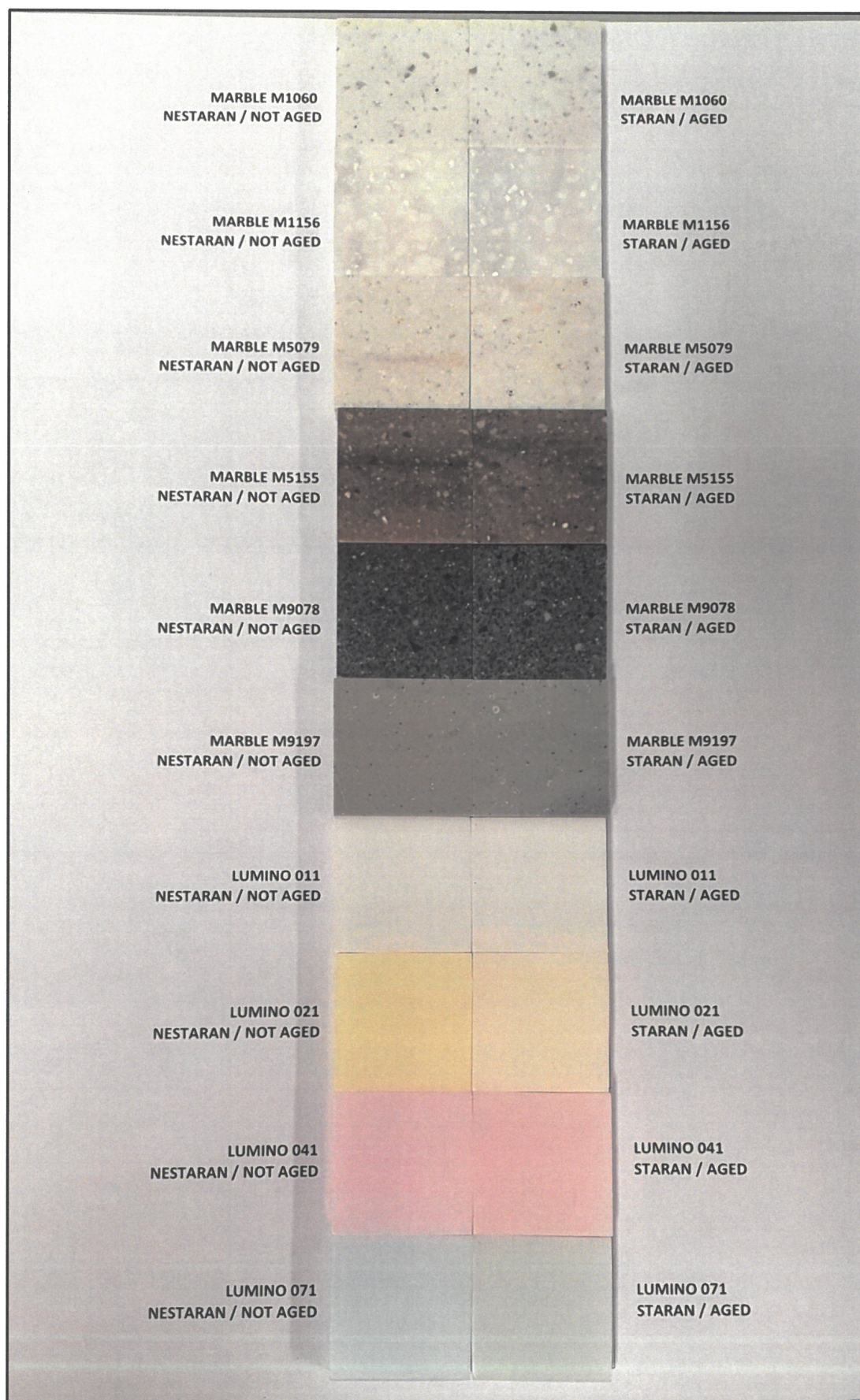


Photo 8: Color changes between the aged and non-aged samples of the MARBLE and LUMINO series. The photo is saved in the ZAG archive under a designation 042637d-10.

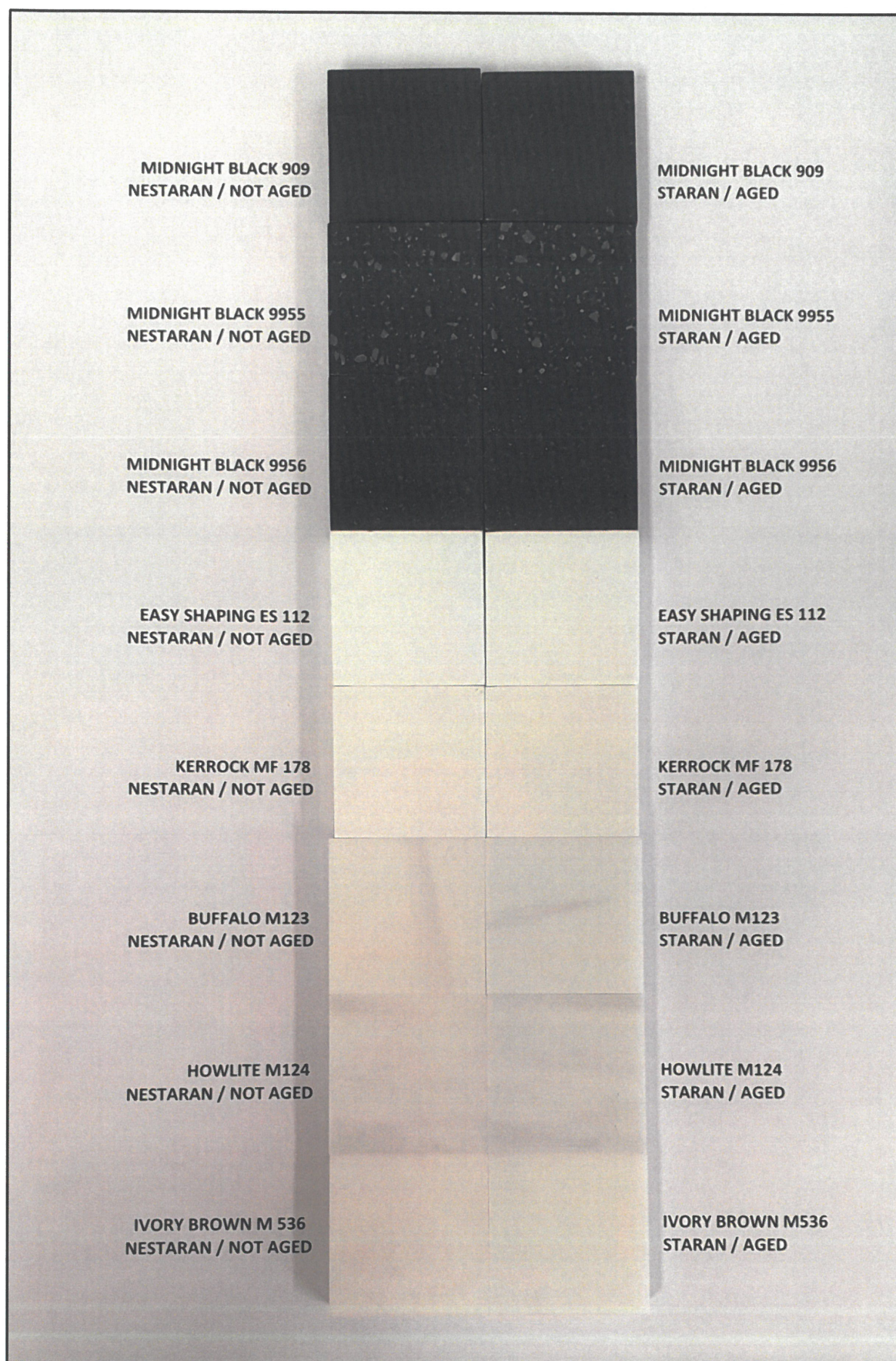


Photo 9: Color changes between the aged and non-aged samples of the MIDNIGHT BLACK, BUFFALO M123, HOWLITE M124 and IVORY BROWN M 536 . The photo is saved in the ZAG archive under a designation 042637d-11.

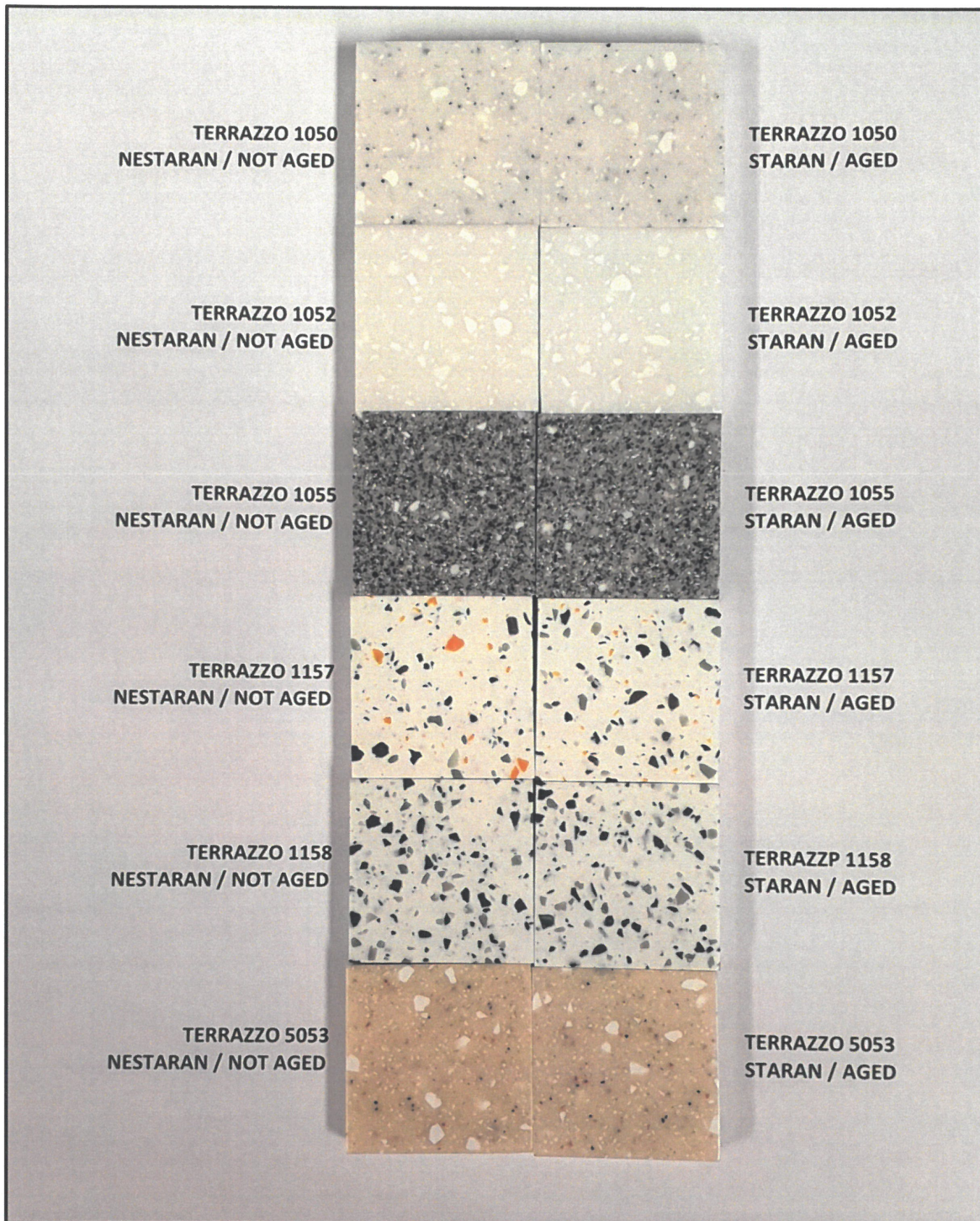


Photo 10. Color changes between the aged and non-aged samples of the TERRAZZO series. The photo is saved in the ZAG archive under a designation 042637d-08.



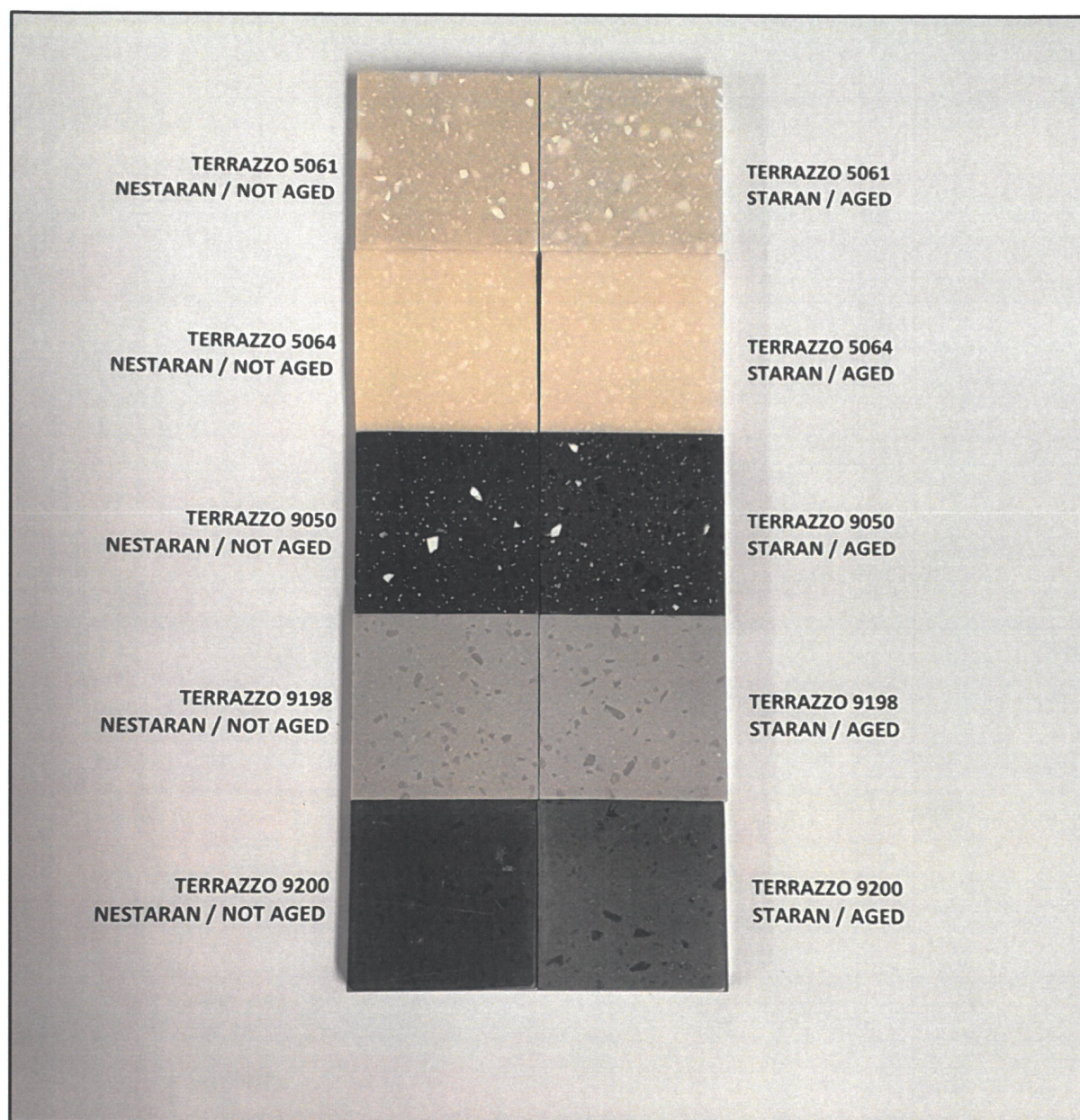


Photo 11: Color changes between the aged and non-aged samples of the TERRAZZO series. The photo is saved in the ZAG archive under a designation 042637d-09.



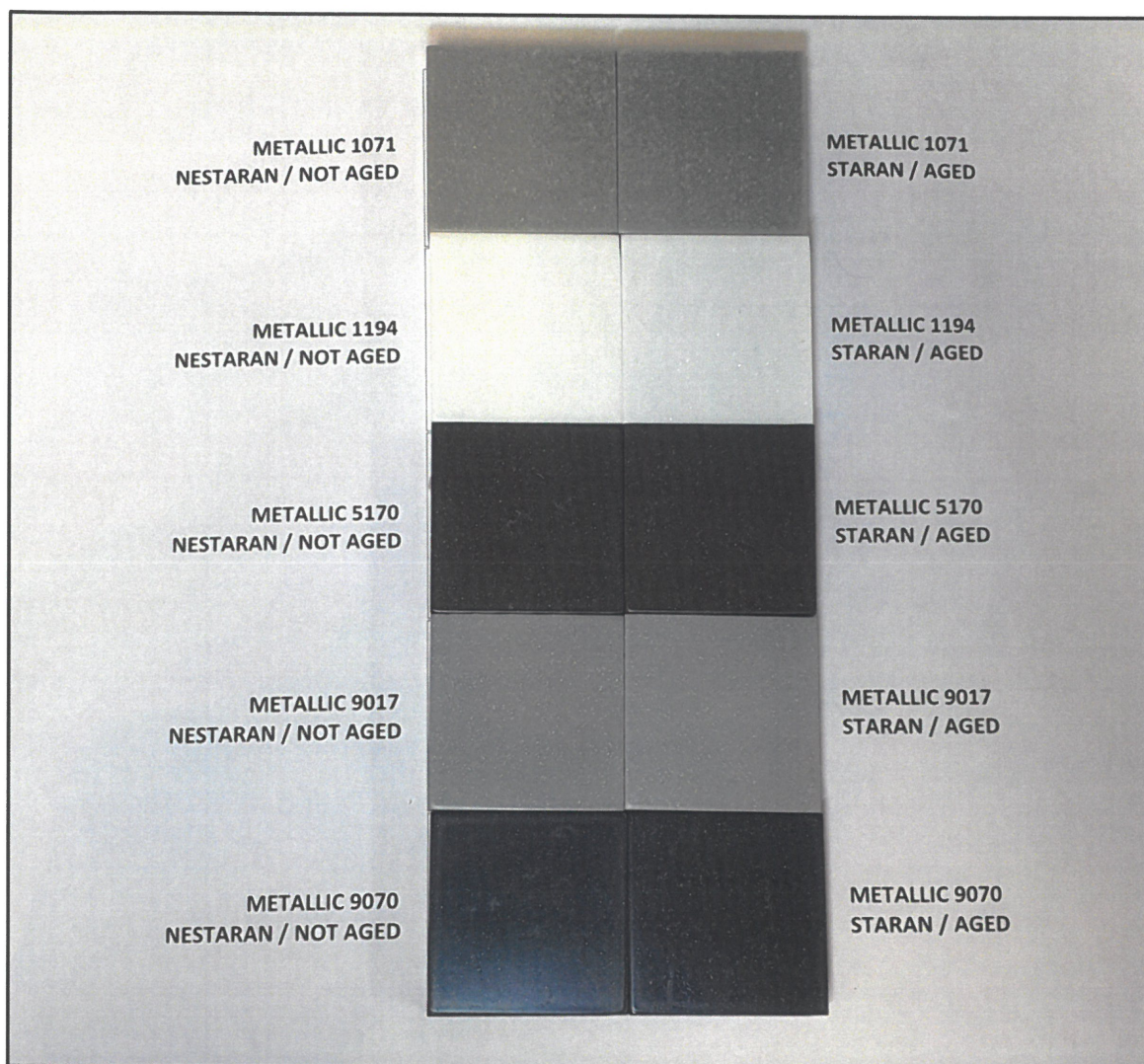


Photo 12: Color changes between the aged and non-aged samples of the METALLIC series. The photo is saved in the ZAG archive under a designation 042637d-12.

