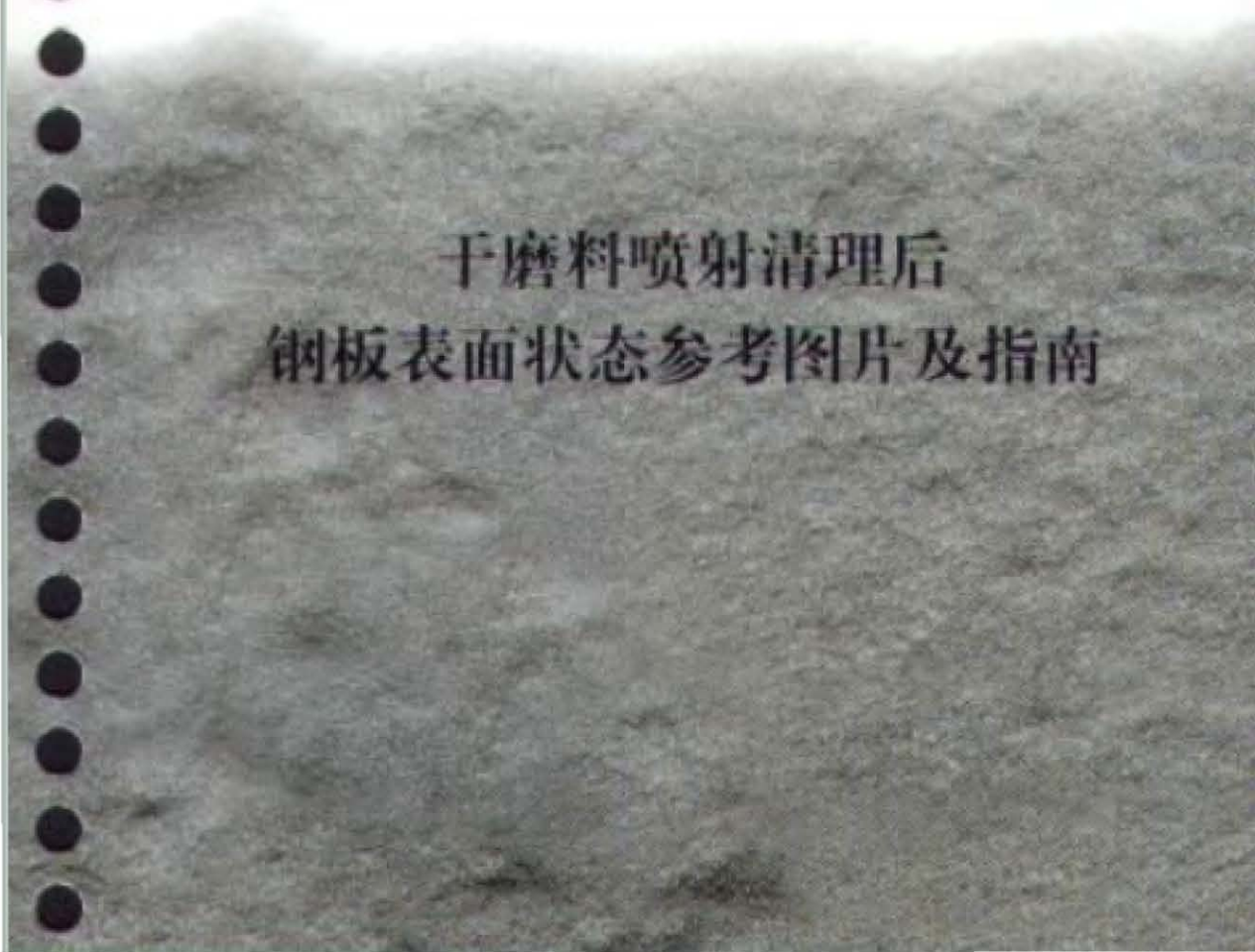




SSPC-VIS 1

**Guide and Reference Photographs
for Steel Surfaces**

**Prepared by
Dry Abrasive Blast Cleaning**



**干磨料喷射清理后
钢板表面状态参考图片及指南**

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GUIDE TO SSPC-VIS 1-01

**Guide to Reference Photographs for
Steel Surfaces Prepared by
Dry Abrasive Blast Cleaning**

1.Scope

This guide describes the use of reference photographs depicting the appearance of both previously unpainted and previously painted and partially rusted hotrolled carbon steel prior to and after abrasive blast cleaning. These photographs are intended to be used to supplement the written SSPC/NACE International blast cleaning surface preparation standards. The written standards are the primary means to determine conformance with blast cleaning requirements. The photographs shall not be used as a substitute for the written standards (see Note 7.1).

2. Description

The reference photographs consist of a series of 1:1 (actual size) color photographs that represent various conditions of unpainted and painted steel surfaces prior to and after surface preparation by abrasive blast cleaning. The photographs were taken under controlled studio lighting designed to show the maximum detail possible.

3. Referenced Standards

3.1 SSPC AND NACE INTERNATIONAL JOINT STANDARDS:

SP 5/NACE No. 1	White Metal Blast Cleaning
SP 6/NACE No. 3	Commercial Blast Cleaning
SP 7/NACE No. 4	Brush-Off Blast Cleaning
SP 10/NACE No. 2	Near-White Blast Cleaning
SP 14/NACE No. 8	Industrial Blast Cleaning

4. Conditions Depicted

4.1 These reference photographs illustrate five initial rust conditions before surface preparation, covering the range from intact mill scale to rusted and pitted steel, as well as previously painted steel.¹ The rust conditions are:

Condition A: Steel surface completely covered with adherent mill scale; little or no rust visible.

Condition B: Steel surface covered with both mill scale and rust.

¹ Conditions E and Fare described and illustrated in SSPC-vis 4/naNACE VIS 7.

- Condition C:** Steel surface completely covered with rust; little or no pitting visible
- Condition D:** Steel surface completely covered with rust; pitting visible
- Condition G:** Coating system applied over mill scale bearing steel; system thoroughly weathered, thoroughly blistered, or thoroughly stained
- Condition G₁:** In this series of photographs, extensive pinpoint rusting is present.
- Condition G₂:** In this series of photographs, moderate pitting is present
- Condition G₃:** In this series of photographs, severe pitting is present.

4.2 These reference photographs illustrate surfaces prepared by abrasive blast cleaning using silica sand with the exception of those in Appendix A (see Section 4.3).

The various degrees of cleaning represented are:

- | | |
|------------------------------|----------------------------|
| SSPC-SP 7/NACE No. 4 | Brush-Off Blast Cleaning |
| SSPC-SP 14/NACE No. 8 | Industrial Blast Cleaning |
| SSPC-SP 6/NACE No. 3 | Commercial Blast Cleaning |
| SSPC-SP 10/NACE No. 2 | Near- White Blast Cleaning |
| SSPC-SP 5/NACE No. 1 | White Metal Blast Cleaning |

4.3 **Appendix A:** Photographs illustrative of some variations in color, texture, and general appearance that can result from the choice of abrasive are provided in Appendix A (also see Note 7.2). These photographs represent Condition A (adherent mill scale) surfaces blast cleaned to SSPC-SP 5/NACE No. 1 (white metal) by mineral, slag, and metallic abrasives. The variations in appearance are depicted only for white metal; however, these same variations must be considered when assessing steel prepared to other degrees of cleaning.

4.4 **Appendix B:** These photographs illustrate how variations in surface profile, view angle, and lighting can affect the appearance of G₁, and G₃ surfaces blast cleaned to SSPC-SP 5/NACE No. 1.

4.4.1 **Profile Variations:** The photographs labeled "P" show G₁ SP 5 and G₃SP 5 surfaces with a profile height of 4 mils (100 μ m). For comparison, a single photo of the same surface condition with a profile height of 1 mil (25- μ m) is also shown. The lighting conditions were the same as those used in the G₁ and G₃ series.

4.4.2 **Angle of View:** The photographs labeled "H", "L" and "D" show variations in appearance of the 4-mil (25- μ m) G₁ SP 5 P and G₃ SP 5 P specimens caused by differences in the angle at which the surface is viewed. Photographs labeled "H" were taken at a high (i.e., nearly

perpendicular) camera angle. Photographs labeled "L" were taken at a lower (more acute) camera angle.

4.4.3 Diffusion of Light: The photographs labeled "D" were taken using diffused lighting, as may occur on a completely overcast day. Due to the diffused light, no strong shadows appear on the surface, regardless of the angle of view. However, these photographs show that diffused light may result in an overall color cast to the surface.

5. Procedure

5.1 Select the photograph of the condition (A, B, C, D, G, G₂, or G₃) that most closely represents the appearance of the steel to be cleaned. The steel to be cleaned may contain more than one initial condition.

5.2 Determine the degree of cleaning that is specified (SSPC-SP 7, SP 14, SP 6, SP 10, or SP 5).

5.3 Use Table 1 to determine which photograph depicts the finished surface. For example, if the initial condition is "C" and SSPC-SP 6 (commercial blast cleaning) is specified, use photograph C SP 6 (also see Note 7.3).

5.4 Compare the prepared surface with the photograph selected in Section 5.3 to evaluate the degree of cleaning.

5.5 These reference photographs shall be used only in conjunction with the written SSPC/NACE International surface preparation standards, as the reference photographs are based upon appearance only and do not address other factors necessary for compliance with the written specification. Steel surfaces show variations in texture, shade, color, tone, pitting, flaking, mill scale, etc., which should be considered when making a comparison with the reference photographs.

6. Disclaimer

6.1 While every precaution is taken to ensure that all information furnished in SSPC guides and standards is as accurate, complete, and useful as possible, SSPC cannot assume any responsibility nor incur any obligation resulting from the use of any materials or methods specified therein, or of the guides or standards themselves.

6.2 This specification does not attempt to address problems concerning safety associated with its use. The user of this specification, as well as the user of all products or practices described herein, is responsible for instituting appropriate health and safety practices and for ensuring compliance with all governmental regulations.

7. Notes

7.1 This edition of SSPC-VIS 1 contains all of the photographs contained in the 1989 edition. The written surface preparation standards, such as SSPC-SP 5, are joint standards of SSPC and NACE International and are identified as such in Section 3.3. This revised edition also contains photographs of previously painted steel that has been abrasive blast cleaned.

7.2 The photographs of nonmetallic abrasives in Appendix A illustrate the range of appearance produced by nonmetallic abrasives as a class. Among the abrasives included in this class are silica sand, olivine sand, garnet, flint shot, copper slag, coal slag, and nickel slag. The abrasive used for each photograph is not specifically identified because noticeable variations in appearance were observed among the abrasives within a given generic class (e.g., copper slag).

A similar set of photographs illustrates the range of appearance produced by metallic abrasives as a class, which includes steel shot, steel grit, and combinations and modifications of these two abrasive media.

7.3 In addition to the photographs prepared from previously painted steel shown in the Condition G series, the photographs in the Conditions A through D series prepared from unpainted steel are often found to be representative of the appearance of blast cleaned steel that was previously painted.

8. Acknowledgments

Table 1 Initial Conditions

Degree of Cleaning	Condition G ₁ Weathered Coating System Over Mill Scale With Extensive Pinpoint Rusting				Condition G ₂ Weathered Coating System Over Mill Scale With Moderate Pitting		Condition G ₃ Weathered Coating System Over Mill Scale With Severe Pitting	
	Condition A 100% Mill Scale	Condition B Mill Scale and Rust	Condition C 100% Rust	Condition D 100 % Rust With Pits				
Brush-Off Blast Cleaning (SSPC-SP 7)	See Footnote 1	BSF7	CSP7	DSF7	G ₁ SP7	G ₂ SP7	G ₃ SP7	
Industrial Blast Cleaning (SSPC-SP 14)	See Footnote 2	See Footnote 2	See Footnote 2	See Footnote 2	G ₁ SP14	G ₂ SP14	G ₃ SP14	
Commercial Blast Cleaning (SSPC-SP 6)	See Footnote 3	BSF6	CSP6	DSF6	G ₁ SP6	G ₂ SP6	G ₃ SP6	
Near-White Blast Cleaning (SSPC-SP 10)	ASP 10	BSP10	CSP10	DSP10	G ₁ SP10	G ₂ SP10	G ₃ SP10	
White Metal Blast Cleaning (SSPC-SP 5)	ASP5 ^a	BSP5	CSP5	DSP5	G ₁ SP5 G ₁ SP5P ^b G ₁ SP5H G ₁ SP5L G ₁ SP5D	G ₂ SP5	G ₃ SP5 G ₂ SP5P ^c G ₂ SP5H G ₂ SP5L G ₂ SP5D	

1. No photograph provided. The initial condition has only lightly adherent mill scale which, according to the SSPC-SP 7 definition, is not removed by brush-off blast cleaning.
2. SSPC-SP 14 can be achieved from these conditions, but photographs are not available.
3. No photograph available because this condition cannot normally be attained when removing adherent mill scale.
4. The photographs contained in Appendix A depict the appearance of previously unpainted steel surfaces after blast cleaning to white metal with alternate abrasives (see Note 7.2)
 - Alternate nonmetallic abrasives: A SP 5 N1, A SP 5 N2, A SP 5 N3
 - Alternate metallic abrasives: A SP 5 M1, A SP 5 M2, A SP 5 M3
5. The photographs contained in Appendix B illustrate the effect of variations in profile height (P_a), viewing angle (H, L) and diffusion of light (D) on the appearance of a pitted surface and a nonpitted surface.

Rust Grade A



Rust Grade B



Rust Grade C



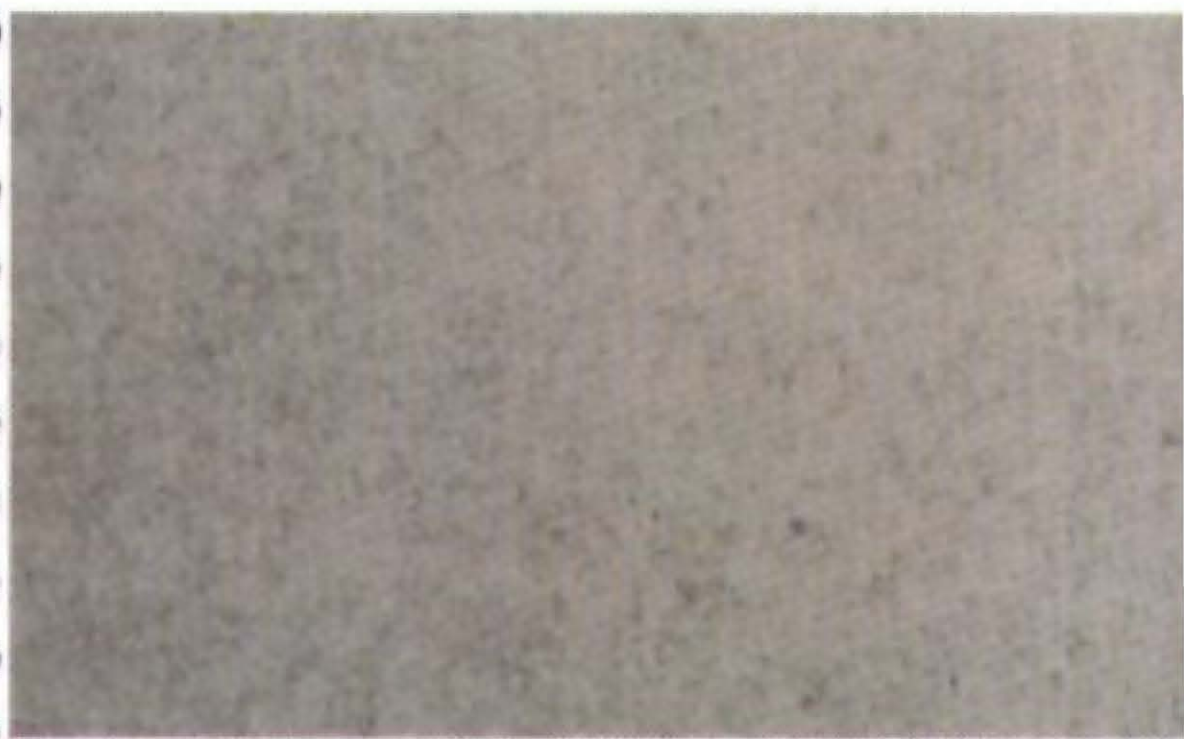
Rust Grade D



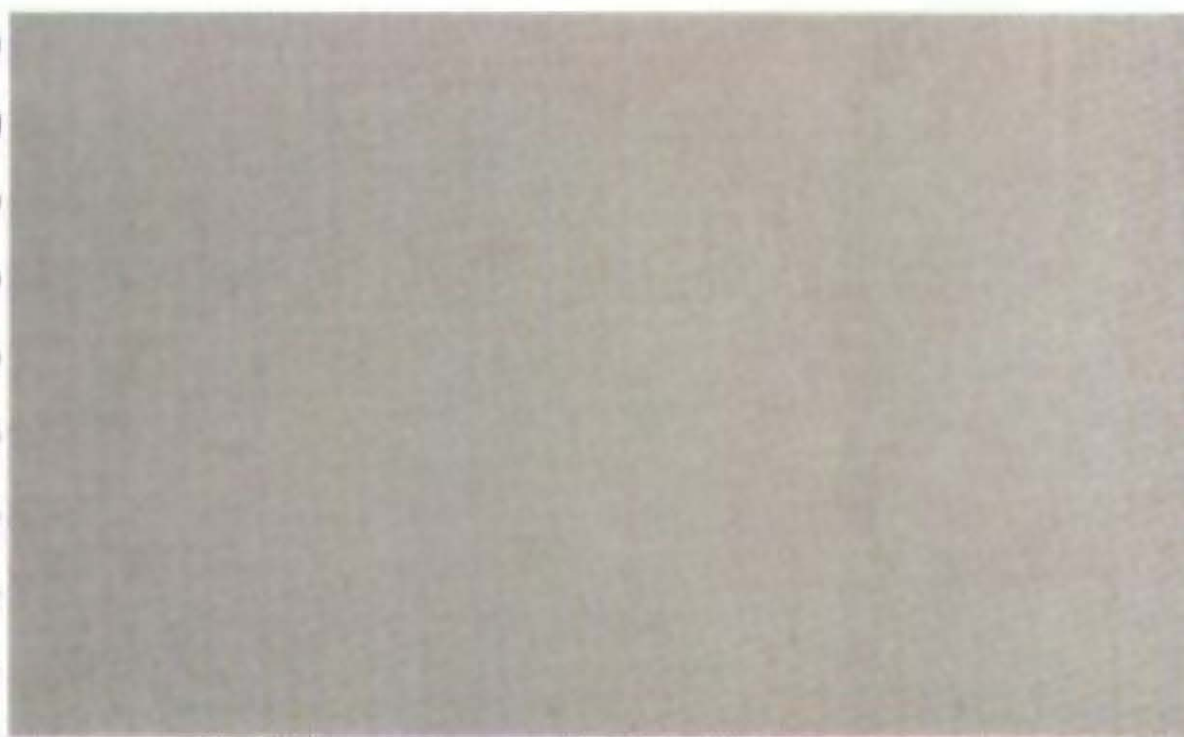
Rust Grade A



A SP-10



A SP-5



Rust Grade B



B SP-7





B SP-6



B SP-10

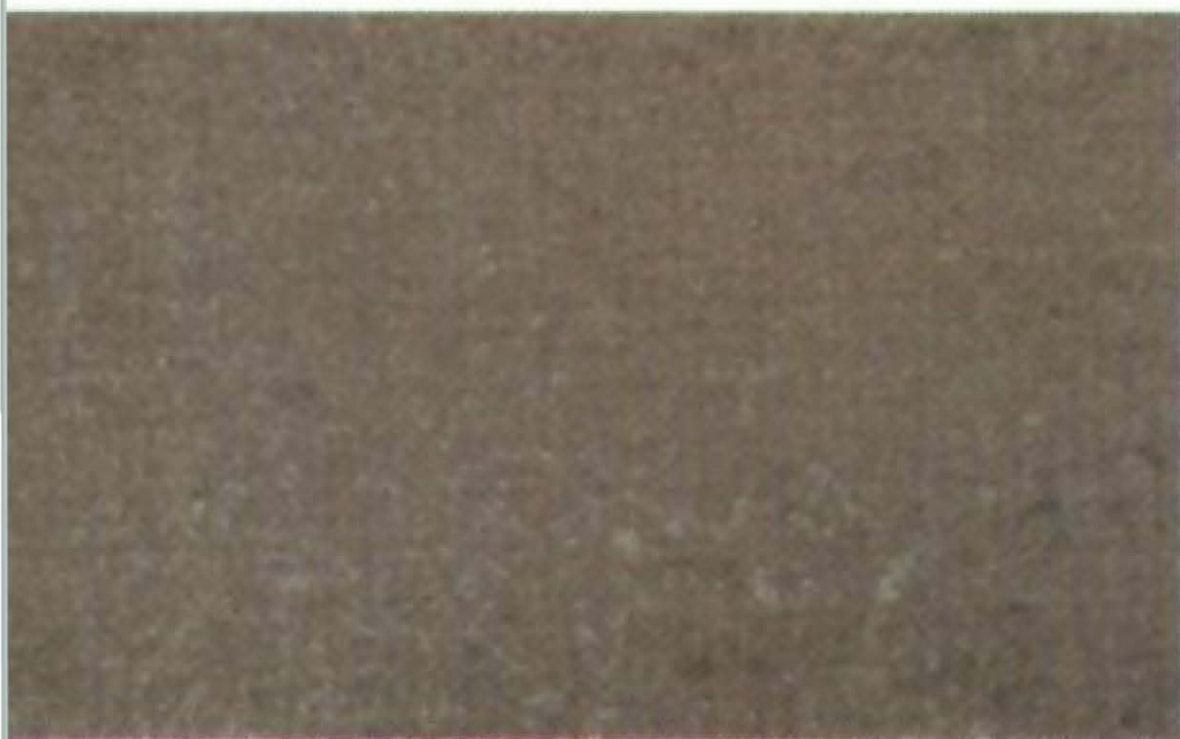


B SP-5

Rust Grade C



C SP-7



C SP-6

C SP-10

C SP-5

Rust Grade D



D SP-7





D SP-6



D SP-10



D SP-5

A SP 5-N1

A SP 5-N2

A SP 5-N3



A SP 5-M1

A SP 5-M2

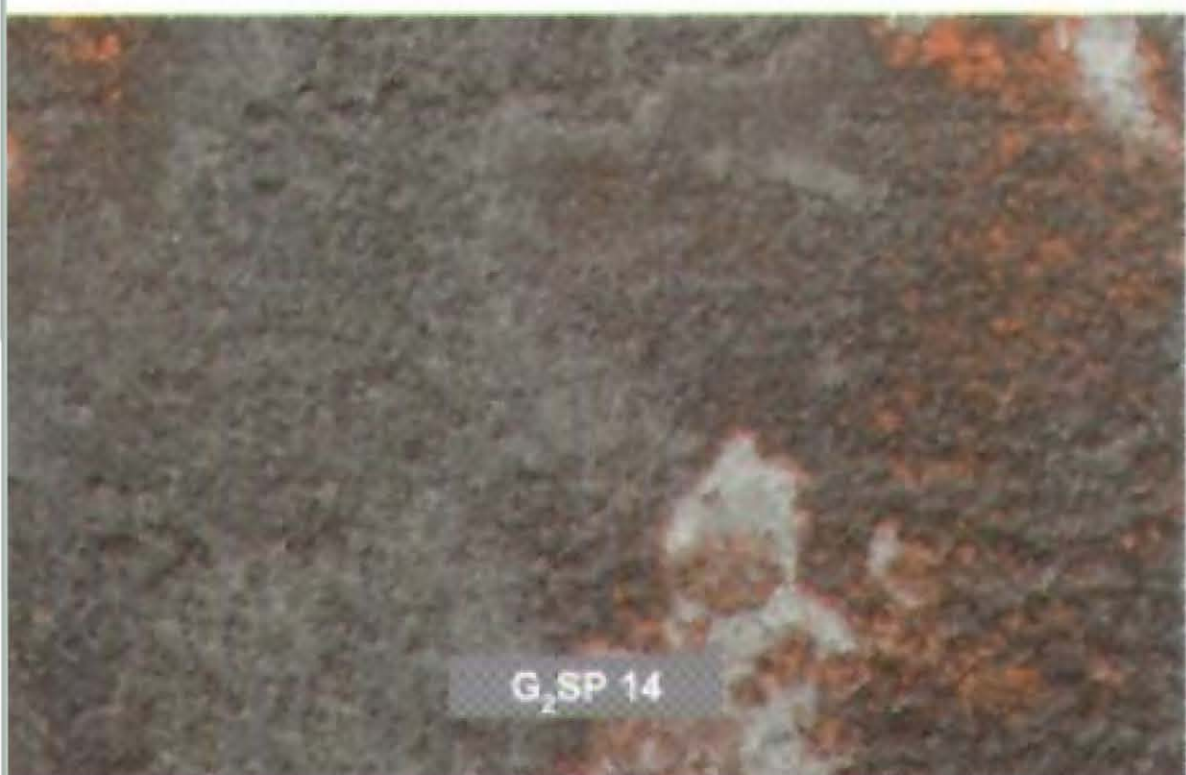
A SP 5-M3



G₁SP 6

G₁SP 10

G₁SP 5

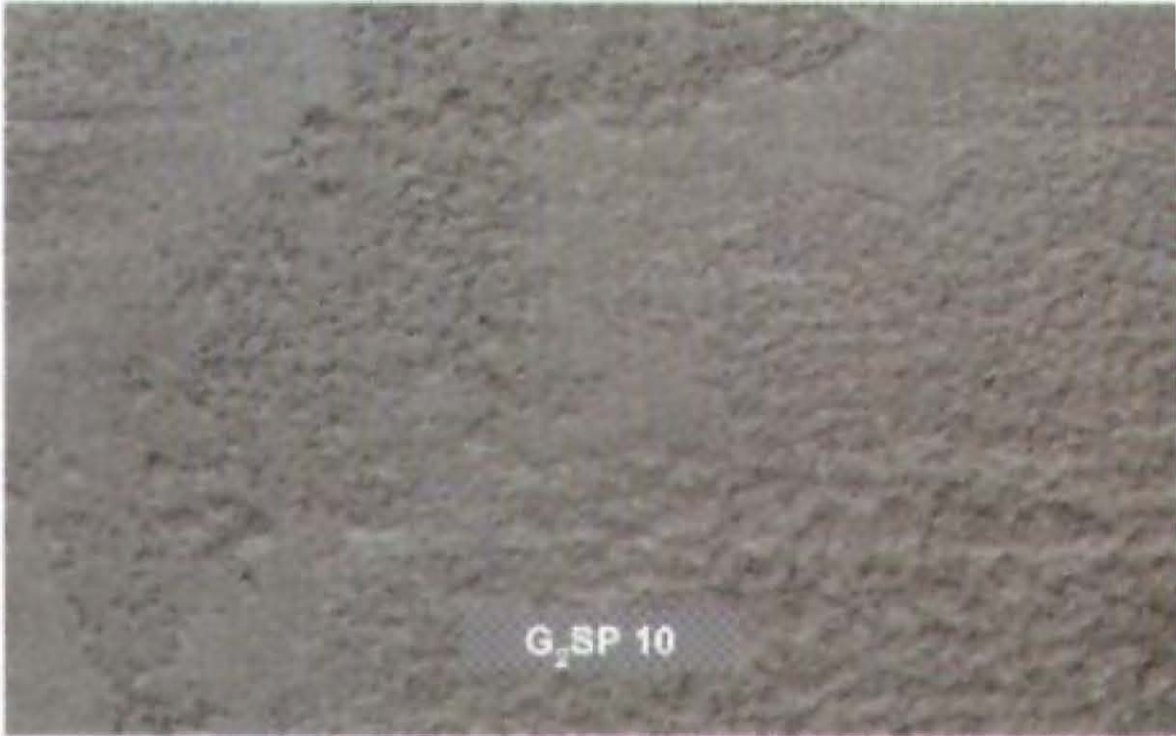


² The previously painted specimens used for series G₂ and G₃ are narrower than those used for series A, B, C, and D.



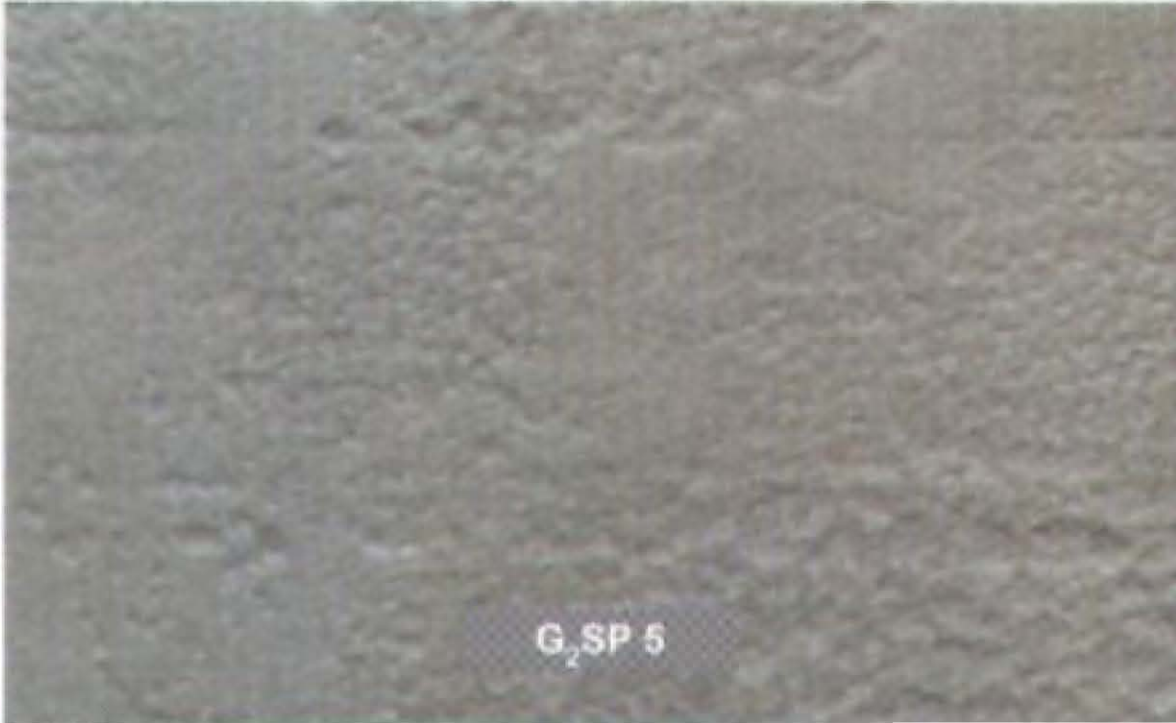
A grayscale micrograph showing a highly textured, granular surface. The texture consists of numerous small, rounded particles or grains. A small, dark, rectangular label is positioned in the lower center of the image.

G₂SP 6



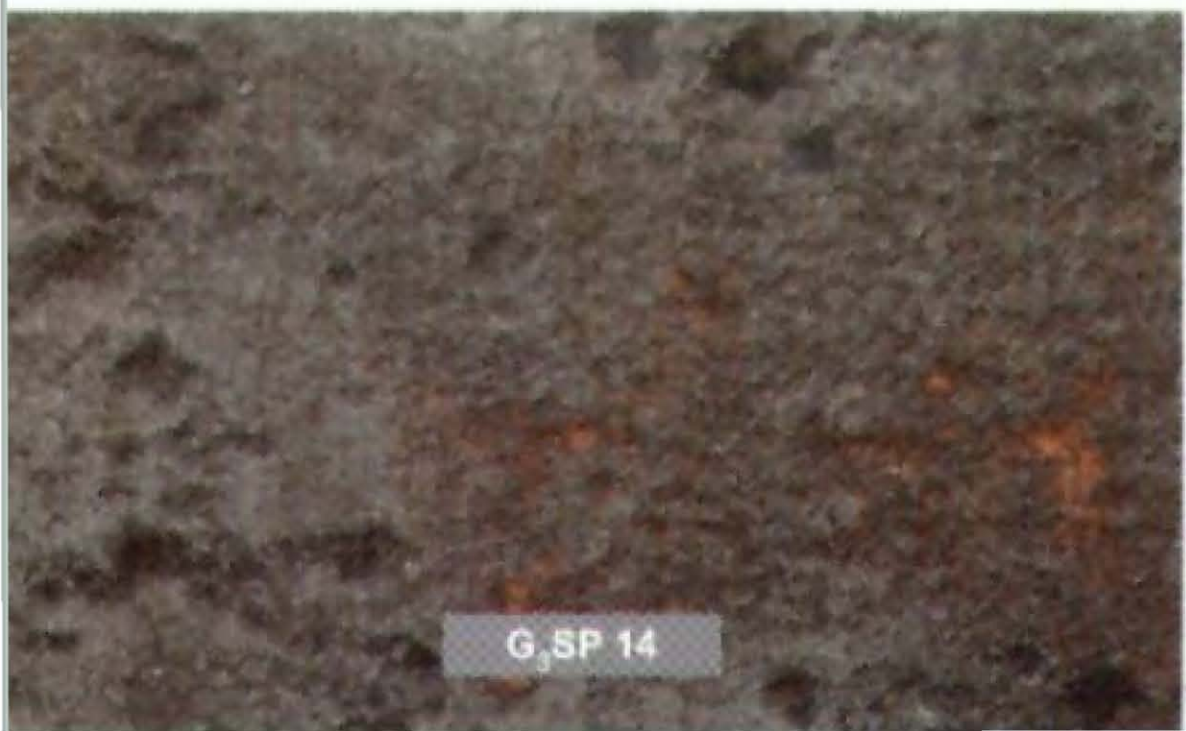
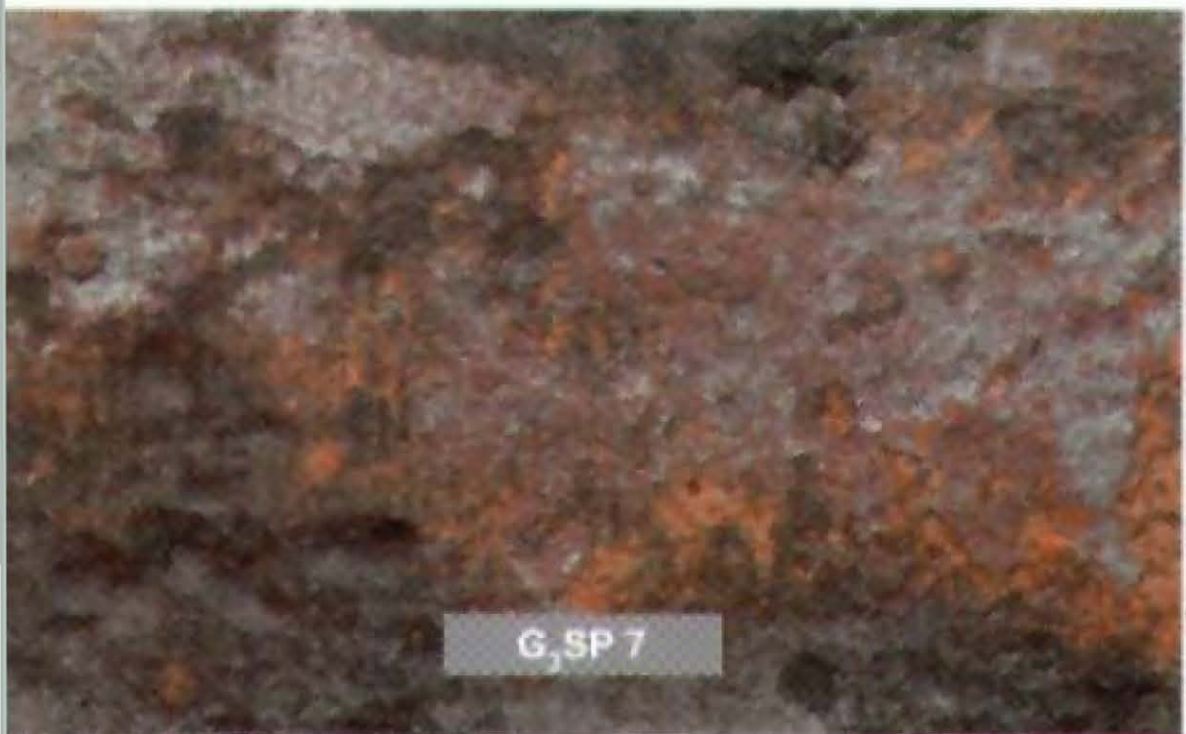
A grayscale micrograph showing a highly textured, granular surface, similar to the one above. The texture is composed of small, irregular grains. A small, dark, rectangular label is positioned in the lower center of the image.

G₂SP 10



A grayscale micrograph showing a highly textured, granular surface, similar to the ones above. The texture is composed of small, irregular grains. A small, dark, rectangular label is positioned in the lower center of the image.

G₂SP 5

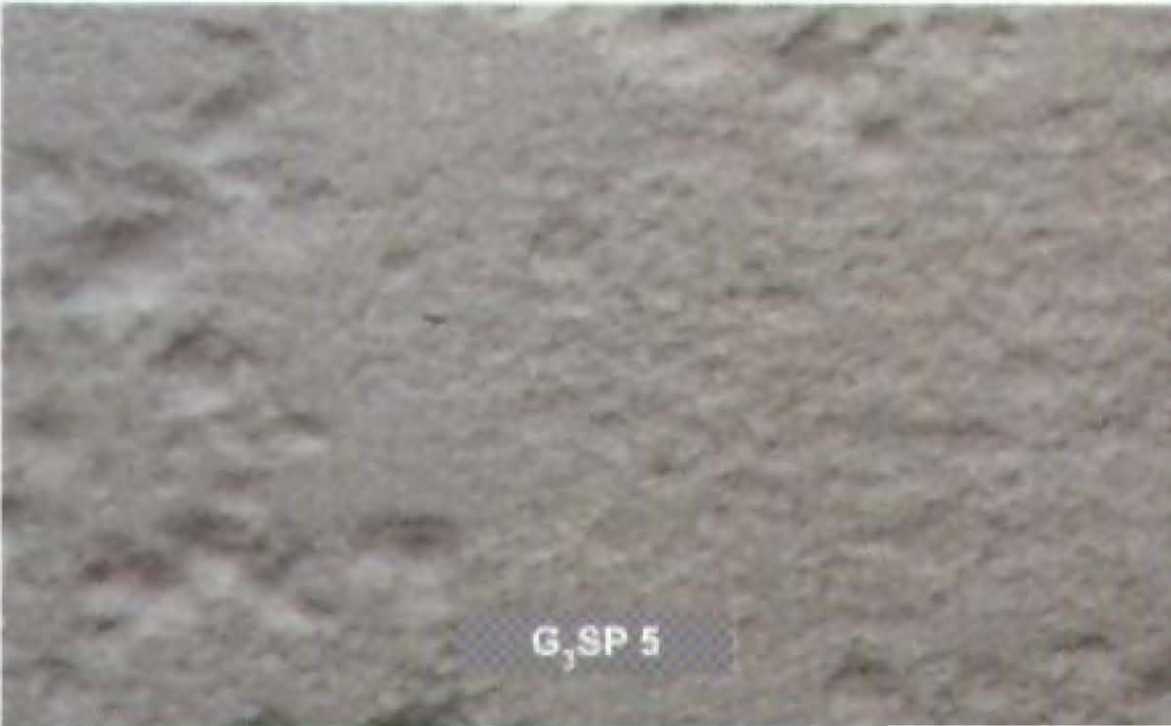




G₃SP 6



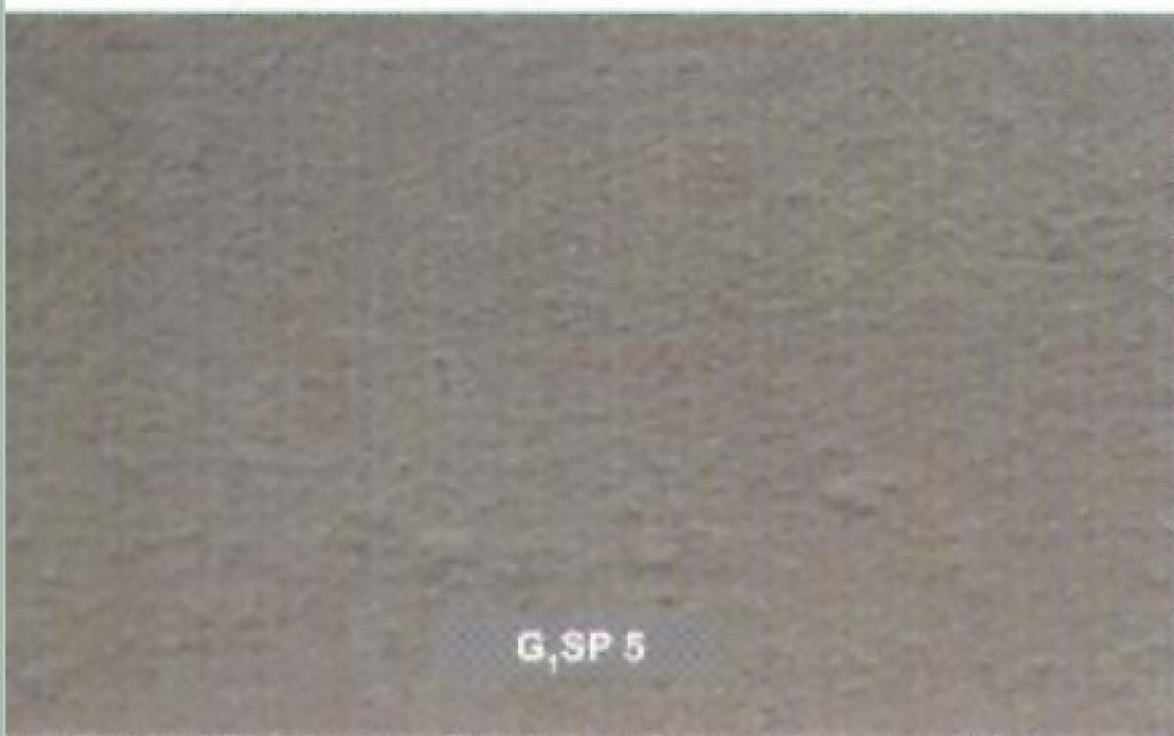
G₃SP 10



G₃SP 5

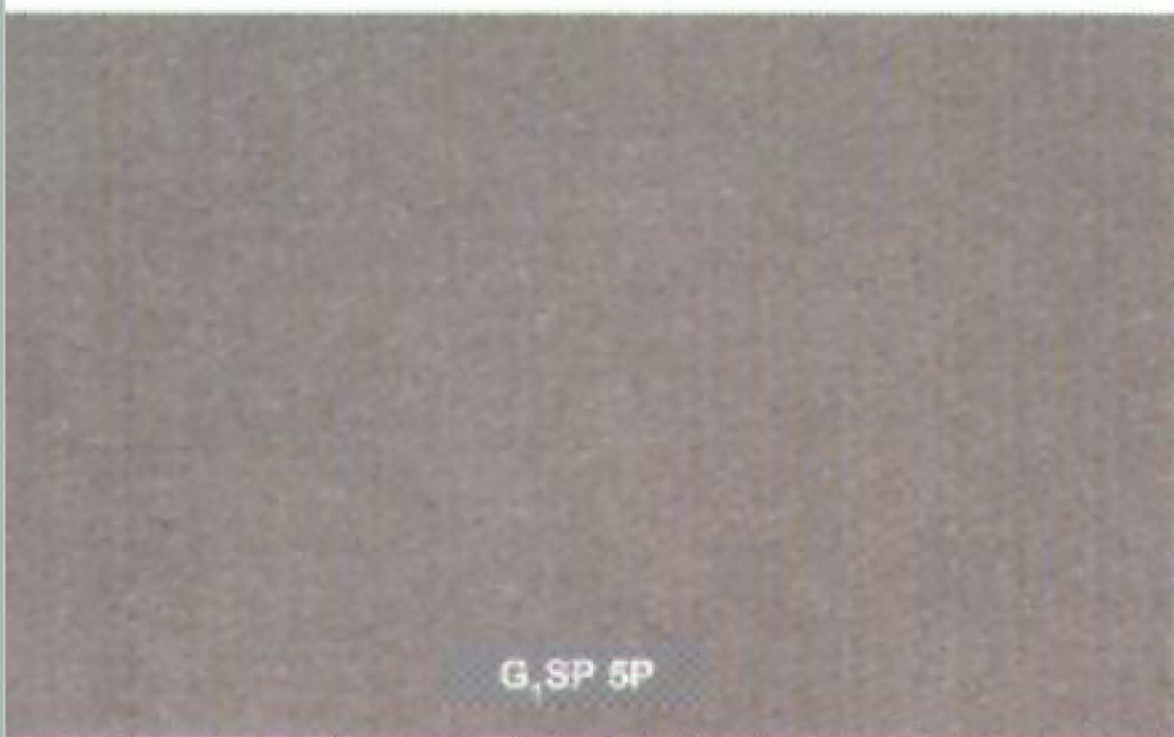
Appendix B

SP 5 Surfaces Showing Effects of Variations in Profile and Lighting Angle



G₁SP 5

1 mil(25 μ m) profile



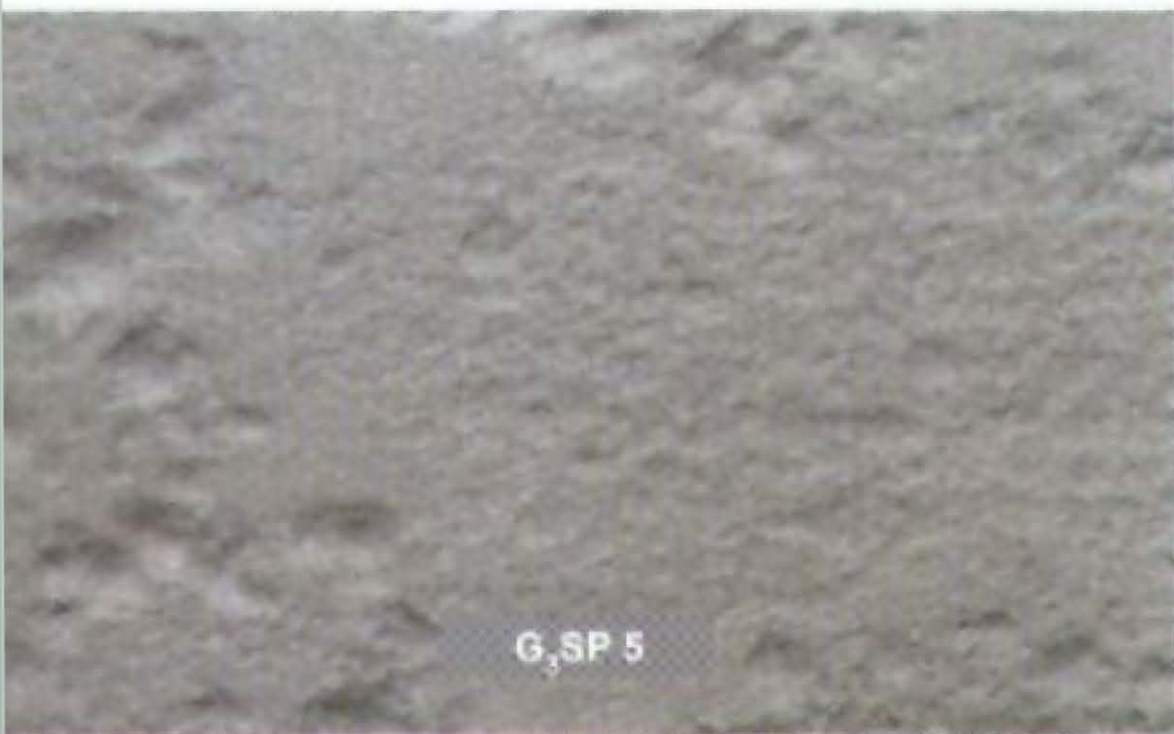
G₁SP 5P

4 mil(100 μ m) profile

G₁SP 5 H

G₁SP 5 L

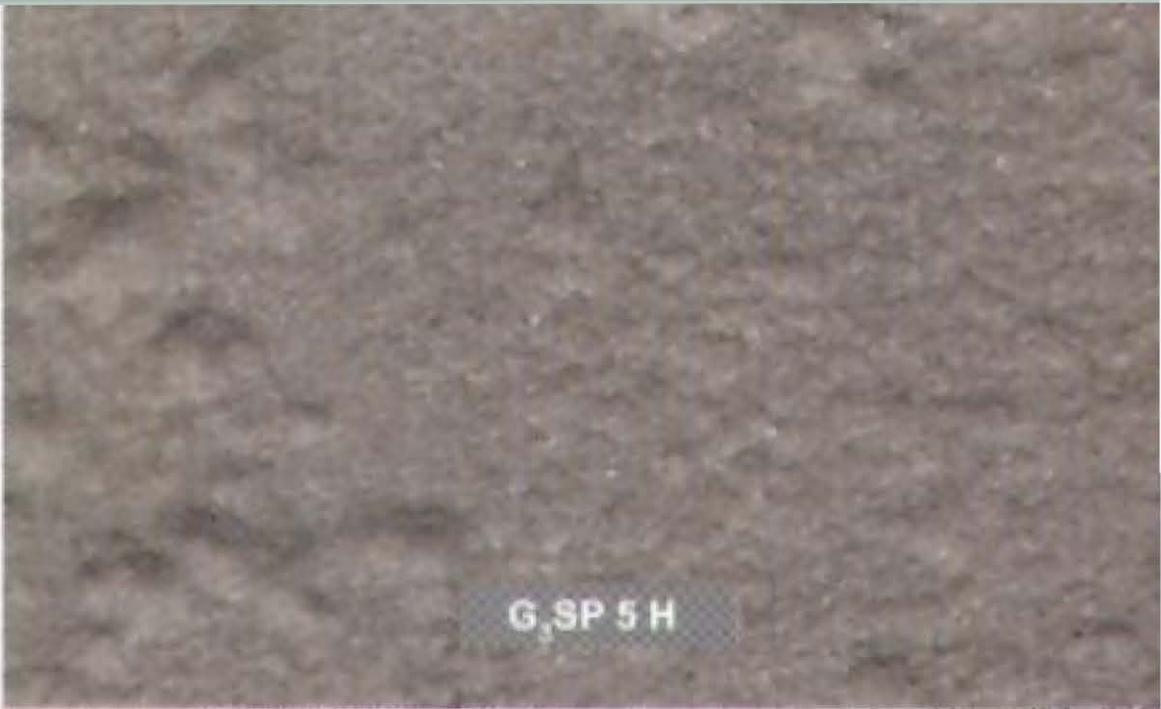
G₁SP 5 D



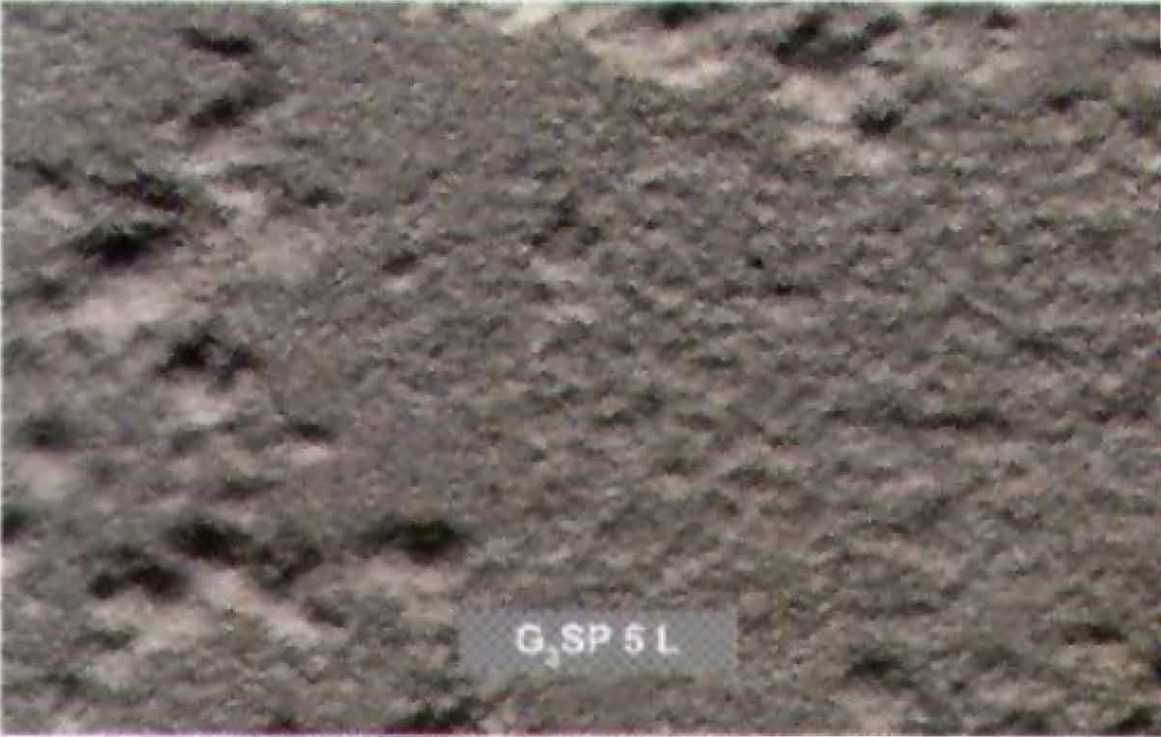
1 mil(25 μ m) profile



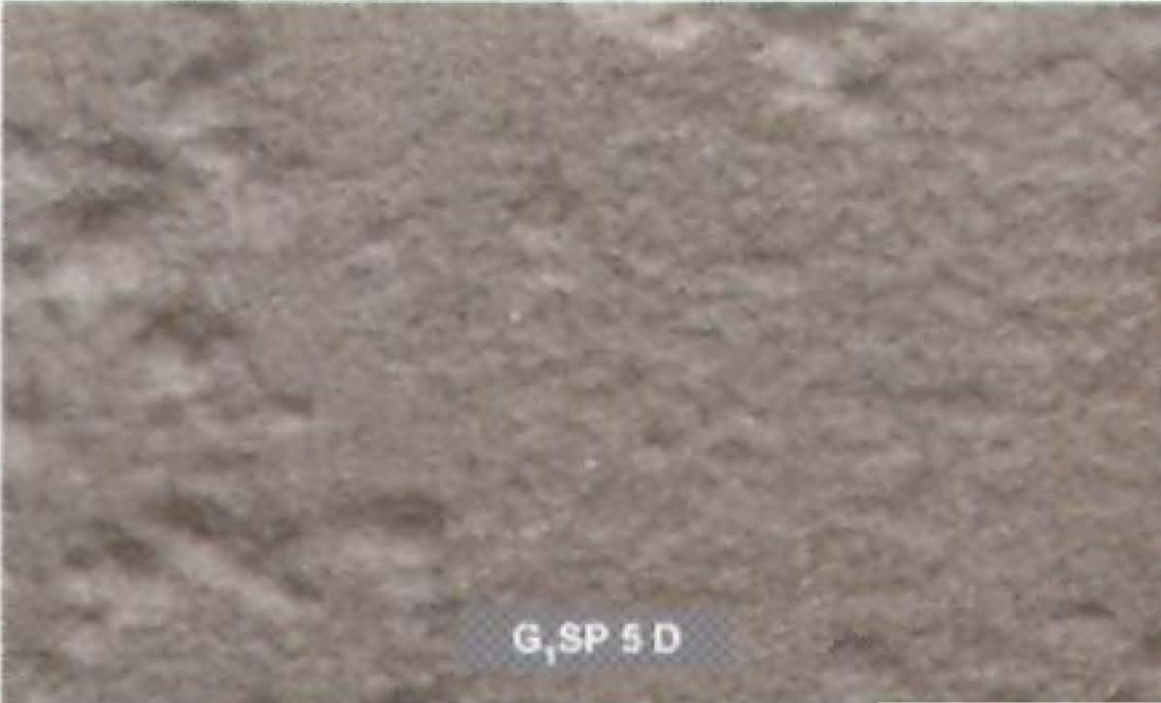
4 mil(100 μ m) profile



G, SP 5 H



G, SP 5 L



G, SP 5 D