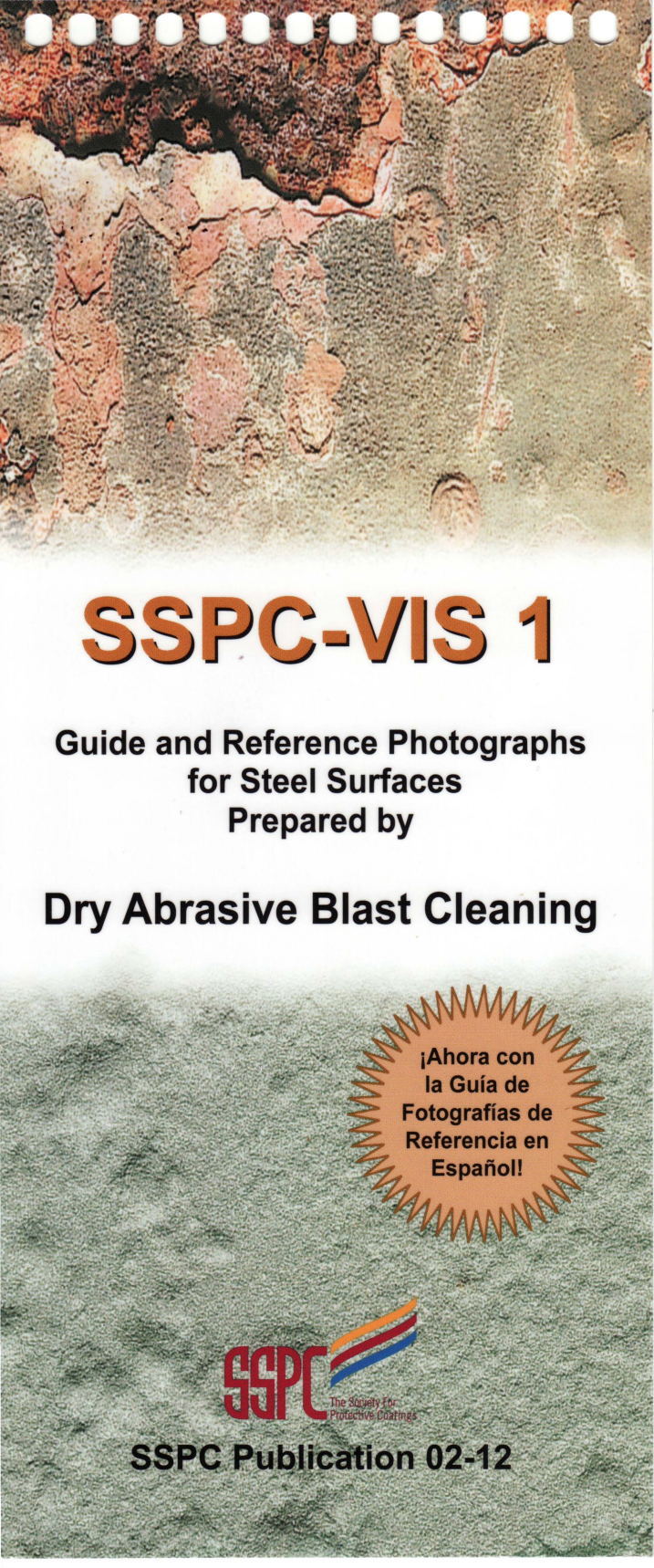




SSPC-VIS 1

**Guide and Reference Photographs
for Steel Surfaces
Prepared by**

Dry Abrasive Blast Cleaning

**¡Ahora con
la Guía de
Fotografías de
Referencia en
Español!**



SSPC Publication 02-12

SSPC-VIS 1

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

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GUIDE TO SSPC-VIS 1

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 hot-rolled 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 F are described and illustrated in SSPC-VIS 4/NACE 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 G₃ SP 5 surfaces with a profile height of 4 mils (100 μm). For comparison, a single photo of the same surface condition with a profile height of 1 mil (25 μm) 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 (100 μm) 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, G₁, 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

This version of these standard reference photographs was produced by the SSPC Surface Preparation Steering Committee under Chair Kenneth A. Trimber. Other members of the SSPC Surface Preparation Steering Committee include:

Al Beitelman, US Army Construction Engineering
Charles Bull

Allan DeLange, Kenny Industrial Services

David Dorrow, Reed Minerals

Troy Fraebel, KTA-Tator, Inc.

Lydia Frenzel, Advisory Council

Ben Fultz, Bechtel Corporation

Fred Gelfant, Stonhard, Inc.

James D. Hansink, Garnet Services, Inc.

Curt Huber, Cives Steel

Jerry Woodson, Sherwin-Williams Company

Aimée E. Beggs, SSPC Standards Development Specialist, and Raymond E. F. Weaver, SSPC Technical Advisor, also assisted in the development of the VIS-1.

GUÍA PARA SSPC-VIS 1

Guía de Fotografías de Referencia para Superficies de Acero Preparadas por Soplado Abrasivo Seco

1. Alcance

Esta guía describe el uso de fotografías de referencia representando la apariencia del acero al carbono laminado en caliente parcialmente oxidado, ya sea sin pintado previo y con pintado previo, antes y después del soplado abrasivo. El principal uso que se da a estas fotografías es complementar las normas escritas de SSPC/NACE International de preparación de superficies para soplado. Las normas escritas son los medios principales que determinan la conformidad de los requerimientos para el soplado. Las fotografías no se deberán usar como un sustituto para las normas escritas (ver Nota 7.1).

2. Descripción

Las fotografías de referencia consisten de una serie de fotografías a color de 1:1 (tamaño real) que representan varias condiciones de superficies de acero sin pintar y pintadas, antes y después de la preparación de la superficie por soplado abrasivo. Las fotografías fueron tomadas con iluminación de estudio controlada con el propósito de mostrar los detalles máximos posibles.

3. Normas de Referencia

3.1 NORMAS CONJUNTAS SSPC Y NACE INTERNATIONAL:

SP 5/NACE No. 1	Soplado a Metal Blanco
SP 6/NACE No. 3	Soplado Comercial
SP 7/NACE No. 4	Soplado a Cepillo
SP 10/NACE No. 2	Soplado Casi Blanco
SP 14/NACE No. 8	Soplado Industrial

4. Condiciones Representadas

4.1 Estas fotografías de referencia ilustran cinco condiciones iniciales de oxidación, antes de la preparación de la superficie, representando una variación que va desde escamas de laminado intactas hasta acero oxidado y picado, así como acero previamente pintado. Las condiciones de oxidación son:

Condición A: Superficie de acero completamente cubierta con escamas de laminado adheridas; poca o no visible oxidación

- Condición B:** Superficie de acero cubierta con escamas de laminado y oxidación
- Condición C:** Superficie de acero completamente cubierta con oxidación; poco o no visible picado
- Condición D:** Superficie de acero completamente cubierta con oxidación; picado visible
- Condición G:** Sistema de revestimiento aplicado sobre acero de cojinetes con escamas de laminado; sistema completamente protegido de la intemperie, completamente ampollado o completamente manchado
- Condición G₁** En esta serie de fotografías, la presencia de oxidación localizada es extensa
- Condición G₂** En esta serie de fotografías, existe la presencia de picado moderado
- Condición G₃** En esta serie de fotografías, existe la presencia de picado severo

4.2 Estas fotografías de referencia ilustran superficies preparadas por soplado abrasivo usando arena de sílice con excepción de aquellas indicadas en el Apéndice A (ver Sección 4.3). Los diferentes grados de limpieza representados son:

- SP 7/NACE No. 4** Soplado a Cepillo
- SP 14/NACE No. 8** Soplado Industrial
- SP 6/NACE No. 3** Soplado Comercial
- SP 10/NACE No. 2** Soplado Casi Blanco
- SP 5/NACE No. 1** Soplado a Metal Blanco

4.3 Apéndice A: Fotografías ilustrativas de algunas variaciones en color, textura y apariencia general que pueden resultar de la selección del abrasivo se muestran en el Apéndice A (también ver Nota 7.2). Estas fotografías representan la Condición A (escamas de laminado adheridas) de las superficies sopladas según la norma SSPC-SP 5/NACE No. 1 (metal blanco) por abrasivos minerales, de escoria y metálicos. Las variaciones en apariencia están representadas solamente para metal blanco; sin embargo, estas mismas variaciones se deben considerar cuando se evalúa acero preparado para otros grados de limpieza.

4.4 Apéndice B: Estas fotografías ilustran cómo las variaciones en el perfil de superficie, el ángulo de vista, e iluminación pueden afectar la apariencia de las superficies G₁ y G₃ sopladas según la norma SSPC-SP 5/NACE No. 1.

4.4.1 Variaciones del Perfil: Las fotografías identificadas con "P" muestran superficies G₁ SP 5 y G₃ SP 5 con una altura de perfil de 4 milésimas (100 µm). Para comparación, también se muestra una foto sola de la misma condición de superficie con una altura de perfil de 1 milésima (25 µm). Las condiciones de iluminación fueron las mismas que aquellas usadas en las series G₁ y G₃.



4.4.2 Ángulo de Vista: Las fotografías identificadas con “H”, “L” y “D” muestran variaciones en apariencia de 4 milésimas (100 μm) de las muestras G_1 SP 5 P y G_3 SP 5 P causadas por las diferencias en el ángulo al cual la superficie es vista. Las fotografías identificadas con “H” fueron tomadas a un ángulo alto de cámara (es decir, casi perpendicular). Las fotografías identificadas con “L” fueron tomadas a un ángulo más bajo de cámara (más agudo).

4.4.3 Difusión de la Luz: Las fotografías identificadas con “D” fueron tomadas usando iluminación difusa, como puede ocurrir en un día completamente nublado. Debido a la iluminación difusa, ninguna sombra oscura aparece sobre la superficie, a pesar del ángulo de vista. Sin embargo, estas fotografías muestran que la iluminación difusa podría resultar en un matiz de color total para la superficie.

5.Procedimiento

5.1 Seleccionar la fotografía de la condición (A, B, C, D, G_1 , G_2 o G_3) que representa en forma más exacta la apariencia del acero que se va a limpiar. El acero a ser limpiado puede contener más de una condición inicial.

5.2 Determinar el grado de limpieza que está especificado (SSPC-SP 7, SP 14, SP 6, SP 10, o SP 5).

5.3 Usar la Tabla 1 para determinar cuál fotografía representa la superficie acabada. Por ejemplo, si la condición inicial es “C” y la norma SSPC-SP 6 (soplado comercial) está especificada, usar la fotografía C SP 6 (también ver Nota 7.3).

5.4 Comparar la superficie preparada con la fotografía seleccionada en la Sección 5.3 para evaluar el grado de limpieza.

5.5 Estas fotografías de referencia se deben usar solamente en conjunto con las normas escritas de SSPC/NACE International de preparación de superficies, ya que las fotografías de referencia están basadas solamente en la apariencia y no indican otros factores necesarios de conformidad con las normas escritas. Las superficies de acero muestran variaciones en textura, sombreado, color, tono, picadura, escamado, escamas de laminado, etc., que se deben considerar cuando se hace una comparación con las fotografías de referencia.

6.Limitación de Responsabilidad

6.1 Aunque se toma toda precaución para asegurar que toda la información brindada en las guías y normas de SSPC sea tan exacta, completa y útil como fuera posible, SSPC no puede asumir toda responsabilidad ni incurrir en obligaciones

que resulten del uso de algunos de los materiales o métodos especificados en este documento, o de las guías y normas mismas.

6.2 Esta especificación no tiene como propósito indicar problemas concernientes a la seguridad asociada con su uso. El usuario de esta especificación, así como el usuario de todos los productos o prácticas descritos aquí, es responsable por instituir prácticas apropiadas de salud y seguridad y por mantener conformidad con todas las regulaciones del gobierno.

7. Notas

7.1 Esta edición de SSPC-VIS 1 contiene todas las fotografías contenidas en la edición de 1989. Las normas escritas de preparación de superficies, tales como SSPC-SP 5, son normas conjuntas de SSPC y NACE International y están identificadas como tales en la Sección 3.3. Esta edición revisada también contiene fotografías de acero previamente pintado que ha sido limpiado con soplado abrasivo.

7.2 Las fotografías de abrasivos no metálicos en el Apéndice A ilustran la variación de apariencia producida por abrasivos no metálicos como una clase. Entre los abrasivos incluidos en esta clase están: arena de sílice, arena de olivino, granate, pedernal, escoria de cobre, residuos de carbón y escoria de níquel. El abrasivo usado para cada fotografía no se identifica específicamente debido a las variaciones notables en apariencia que fueron observadas entre los abrasivos de una clase genérica determinada (por ejemplo: escoria de cobre).

Un juego similar de fotografías ilustra la variación de apariencia producida por abrasivos metálicos como una clase, incluyendo granalla de acero, limaduras de acero y combinaciones y modificaciones de estos dos medios abrasivos.

7.3 Además de las fotografías preparadas de acero con pintado previo mostradas en las series de la Condición G, se encuentra con frecuencia que las fotografías en las series preparadas de acero sin pintar de las Condiciones A hasta D son representativas de la apariencia del acero soplado que fue previamente pintado.



Table 1 Initial Conditions

Degree of Cleaning	Condition A 100% Mill Scale	Condition B Mill Scale and Rust	Condition C 100% Rust	Condition D 100% Rust With Pits	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
Brush-Off Blast Cleaning (SSPC-SP 7)	See Footnote 1	B SP 7	C SP 7	D SP 7	G ₁ SP 7	G ₂ SP 7	G ₃ SP 7
Industrial Blast Cleaning (SSPC-SP 14)	See Footnote 2	See Footnote 2	See Footnote 2	See Footnote 2	G ₁ SP 14	G ₂ SP 14	G ₃ SP 14
Commercial Blast Cleaning (SSPC-SP 6)	See Footnote 3	B SP 6	C SP 6	D SP 6	G ₁ SP 6	G ₂ SP 6	G ₃ SP 6
Near-White Blast Cleaning (SSPC-SP 10)	A SP 10	B SP 10	C SP 10	D SP 10	G ₁ SP 10	G ₂ SP 10	G ₃ SP 10
White Metal Blast Cleaning (SSPC-SP 5)	A SP 5 ⁴	B SP 5	C SP 5	D SP 5	G ₁ SP 5 G ₁ SP 5 P ⁵ G ₁ SP 5 H G ₁ SP 5 L G ₁ SP 5 D	G ₂ SP 5	G ₃ SP 5 G ₃ SP 5 P ⁵ G ₃ SP 5 H G ₃ SP 5 L G ₃ SP 5 D

¹ No photograph provided. The initial condition has only tightly 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 provided. The effort required to remove mill scale on Condition A steel typically results in less staining than the maximum 33% allowed by SP 6, approaching the photograph provided for A SP 10.

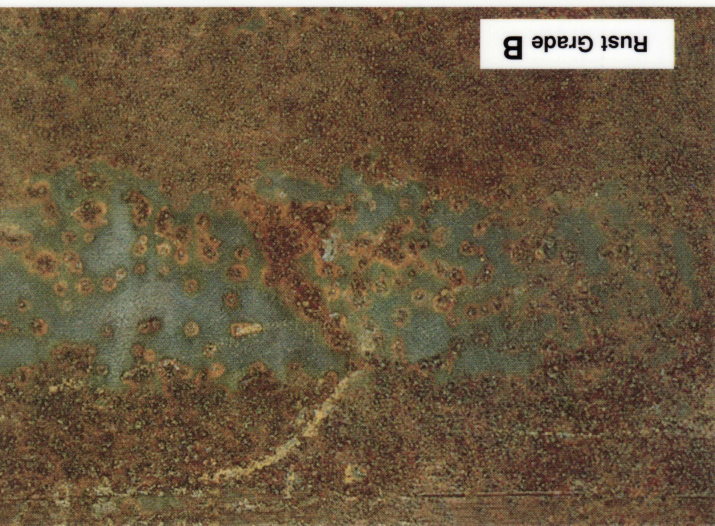
⁴ The photographs contained in Appendix A depict the appearance of previously unpainted steel surfaces after blast cleaning to white metal with alternate abrasives (see Note 7.2).

•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

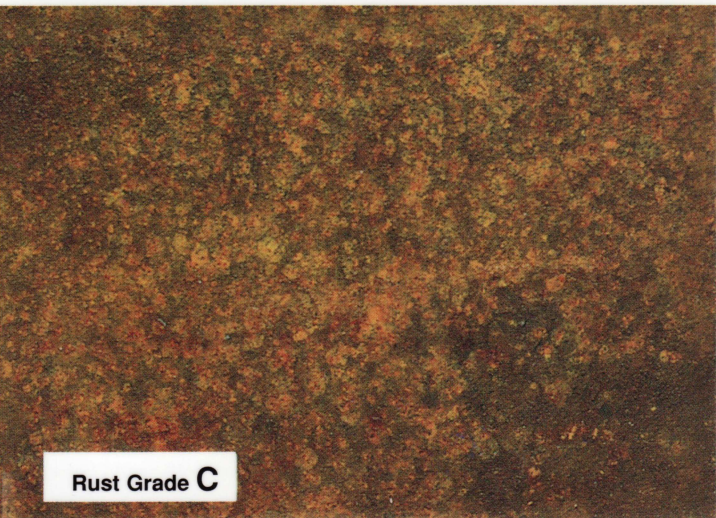
⁵ The photographs contained in Appendix B illustrate the effect of variations in profile height (P), viewing angle (H, L) and diffusion of light (D) on the appearance of a pitted surface and a nonpitted surface.

Rust Grade B

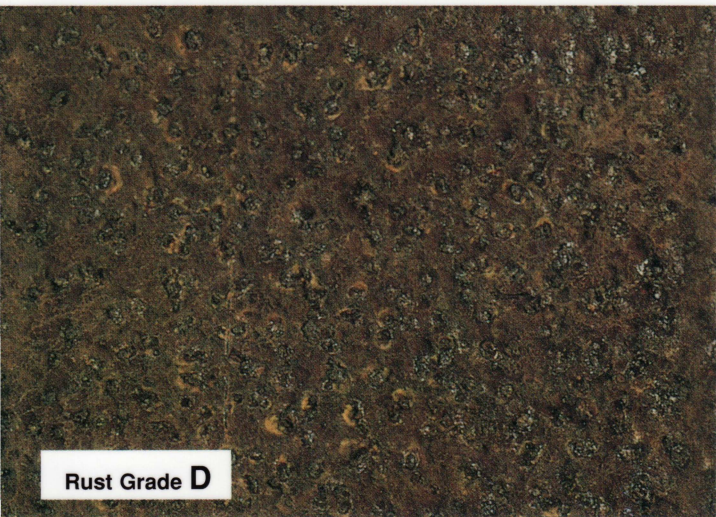


Rust Grade A





Rust Grade C

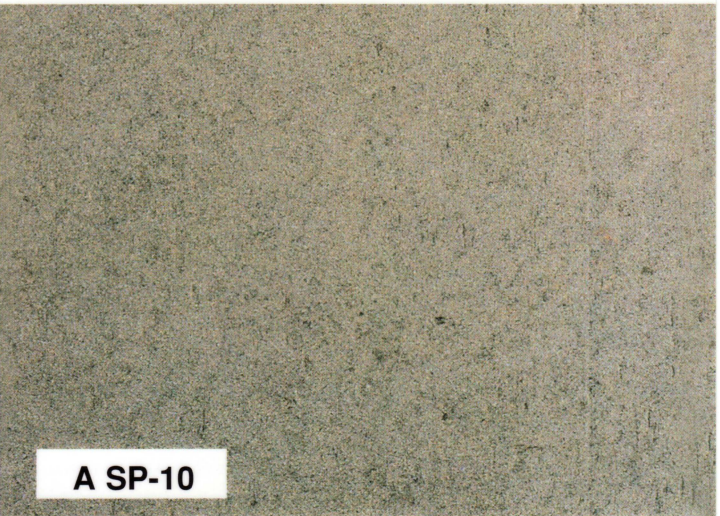


Rust Grade D

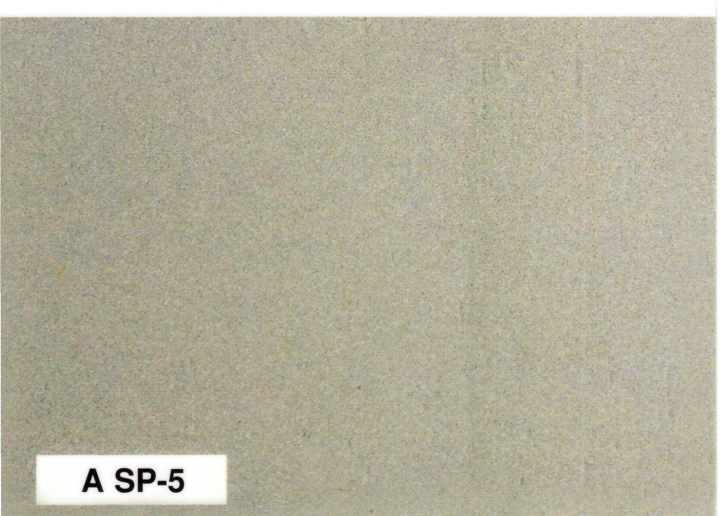
Rust Grade **A**

A SP-6

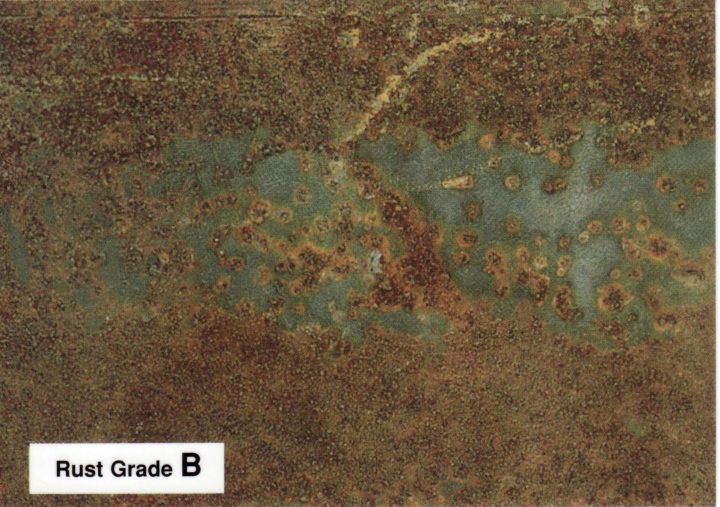
No photograph provided. The effort required to remove mill scale on Condition A steel typically results in less staining than the maximum 33% allowed by SP 6, approaching the photograph provided for A SP 10.



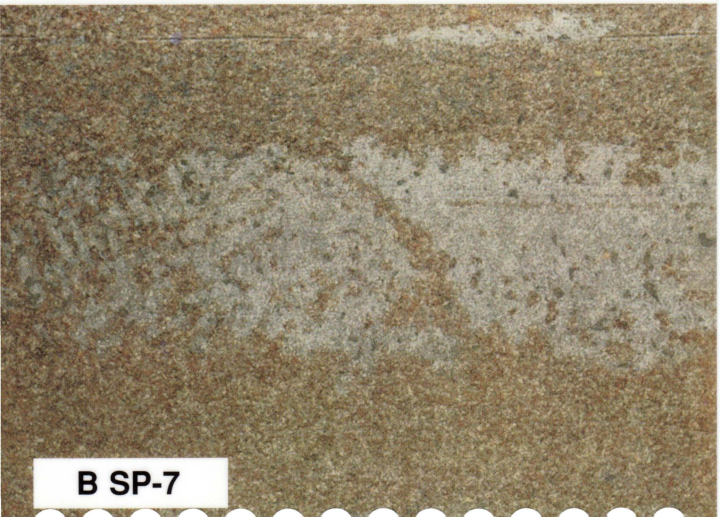
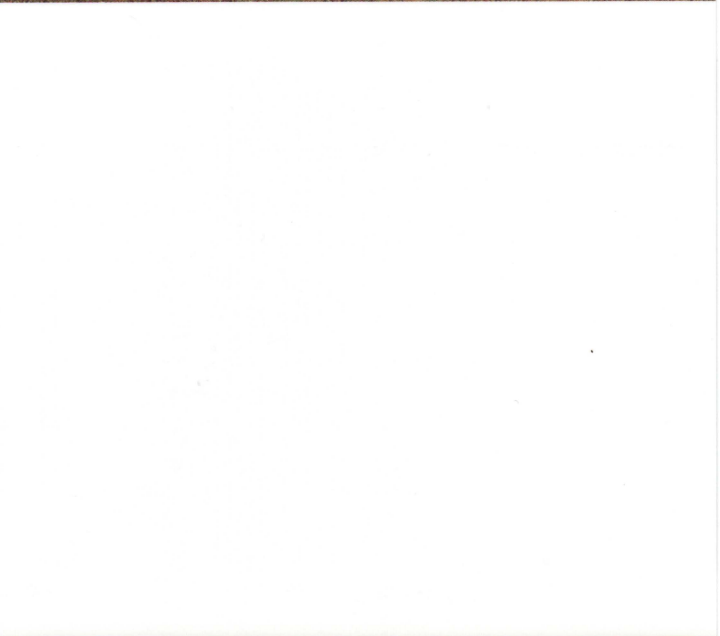
A SP-10



A SP-5



Rust Grade B

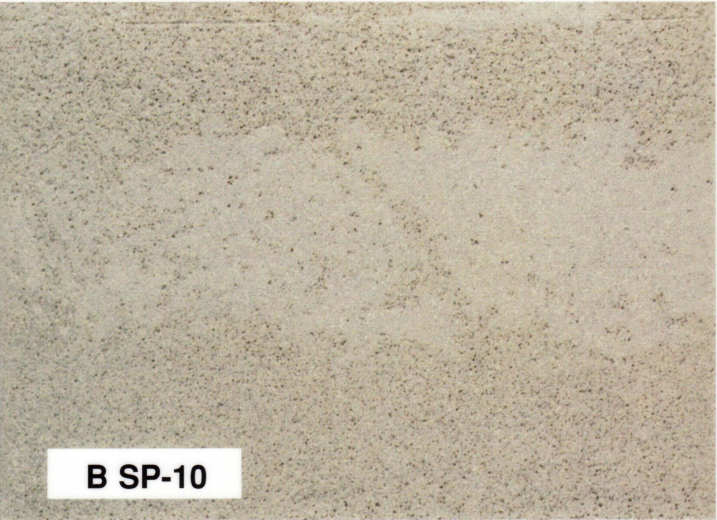


B SP-7





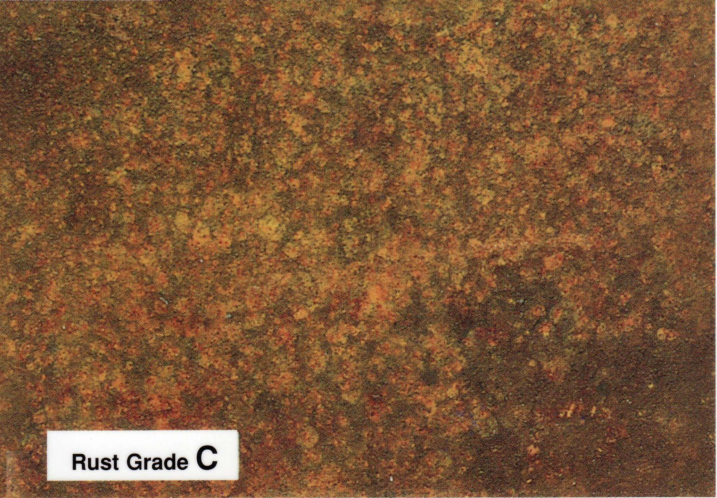
B SP-6



B SP-10



B SP-5

A close-up photograph of a metal surface covered in a dense, irregular layer of rust. The rust has a mottled appearance with various shades of brown, orange, and dark red. A small white label is positioned in the lower-left corner of this section.

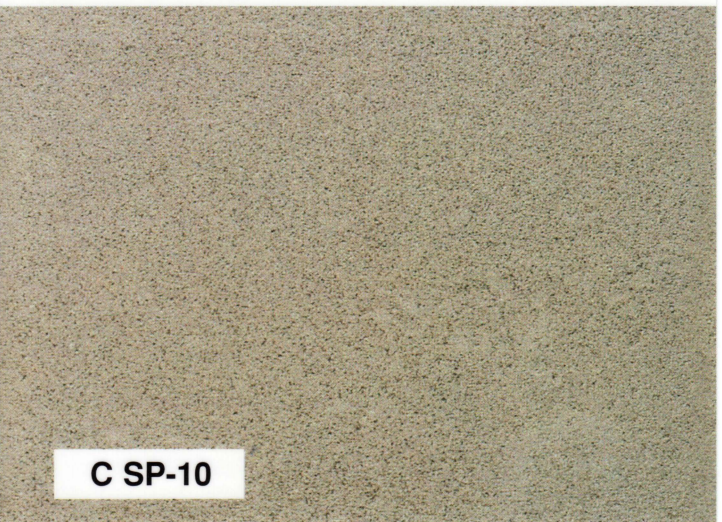
Rust Grade **C**

A photograph of a metal surface with a dark, uniform brown color. The texture appears slightly grainy. A white label is located in the bottom-left corner, and a row of white circular punch holes is visible along the very bottom edge of the image.

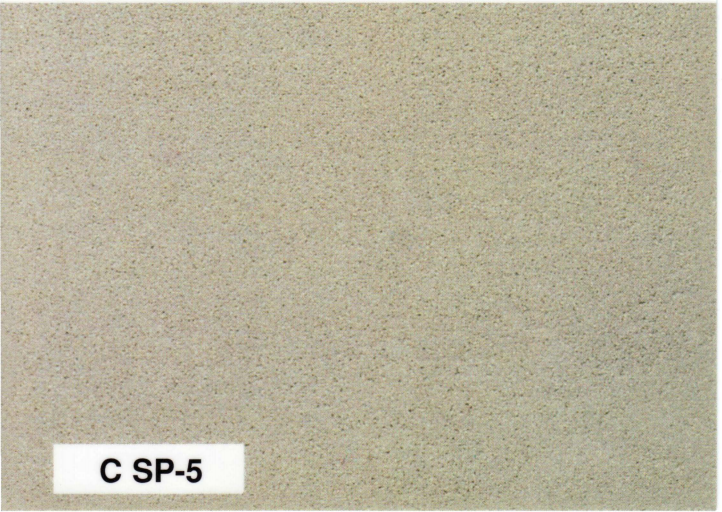
C SP-7

A dark brown, heavily textured surface, possibly a book cover or endpaper, with a white, scalloped-edge binding strip at the top.

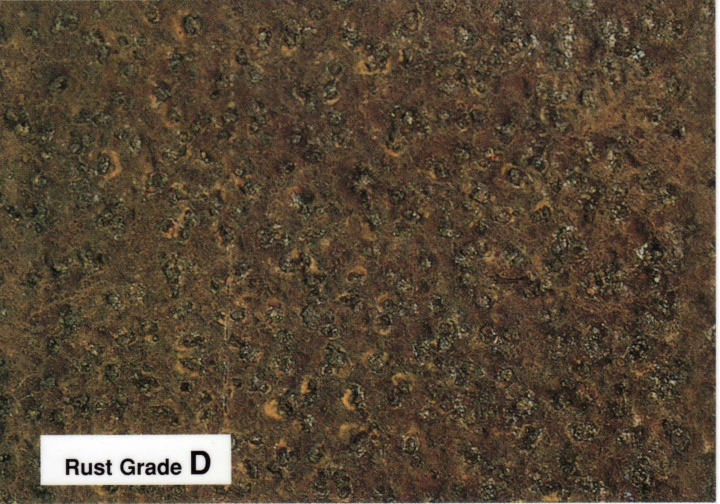
C SP-6

A medium brown, heavily textured surface, similar to the one above but with a slightly different grain.

C SP-10

A light brown, heavily textured surface, similar to the others but with a lighter tone.

C SP-5

A close-up photograph of a metal surface exhibiting severe rust. The surface is covered in a dense, irregular layer of dark brown and black rust, with some lighter brown patches visible. The texture is rough and pitted.

Rust Grade D

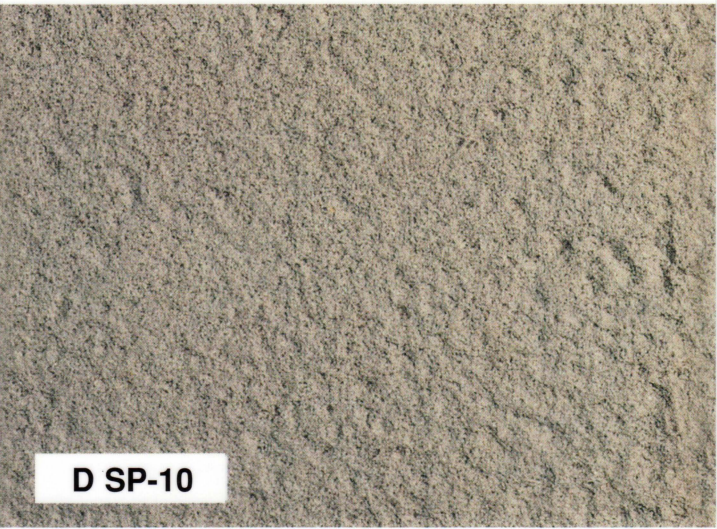
A close-up photograph of a metal surface showing a uniform, fine-grained rust. The color is a consistent dark brown. The surface appears slightly smoother than the one above but still has a granular texture.

D SP-7

A row of ten white, circular punch holes along the bottom edge of the page.

A close-up photograph of a dark brown, heavily textured surface, possibly a piece of fabric or paper. The texture is irregular and fibrous. A white rectangular label with the text "D SP-6" is positioned in the lower-left corner. The top edge of the image shows a series of white, semi-circular perforations.

D SP-6

A close-up photograph of a medium brown, heavily textured surface. The texture is irregular and fibrous. A white rectangular label with the text "D SP-10" is positioned in the lower-left corner.

D SP-10

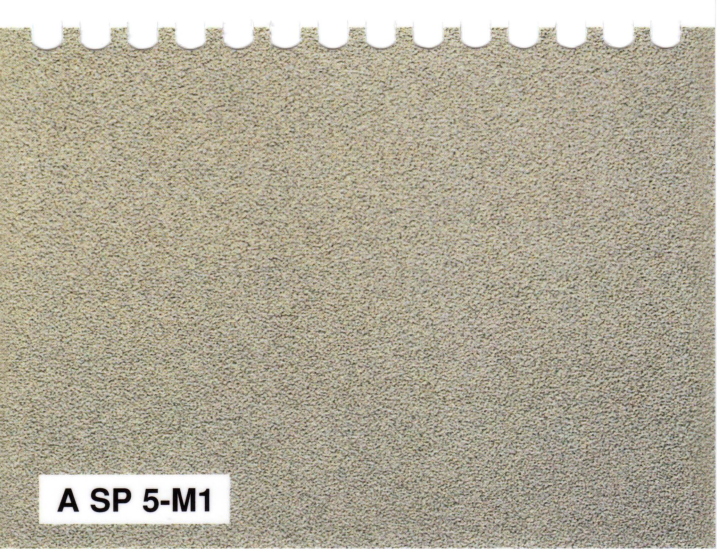
A close-up photograph of a light beige, heavily textured surface. The texture is irregular and fibrous. A white rectangular label with the text "D SP-5" is positioned in the lower-left corner.

D SP-5

A SP 5-N1

A SP 5-N2

A SP 5-N3



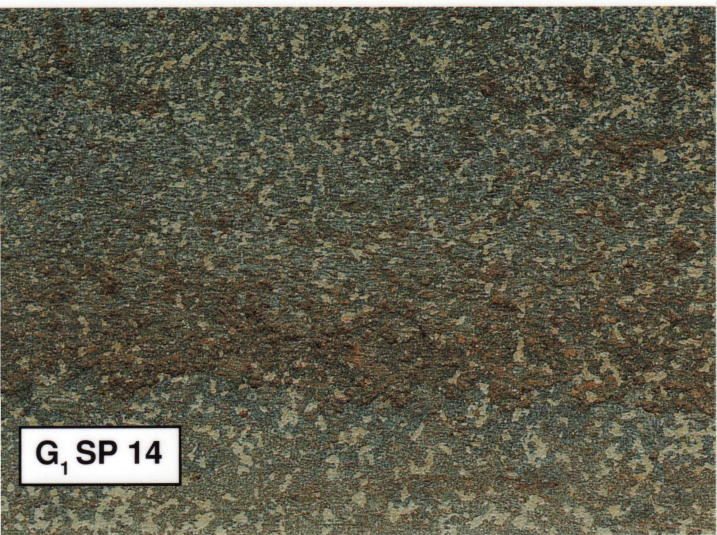
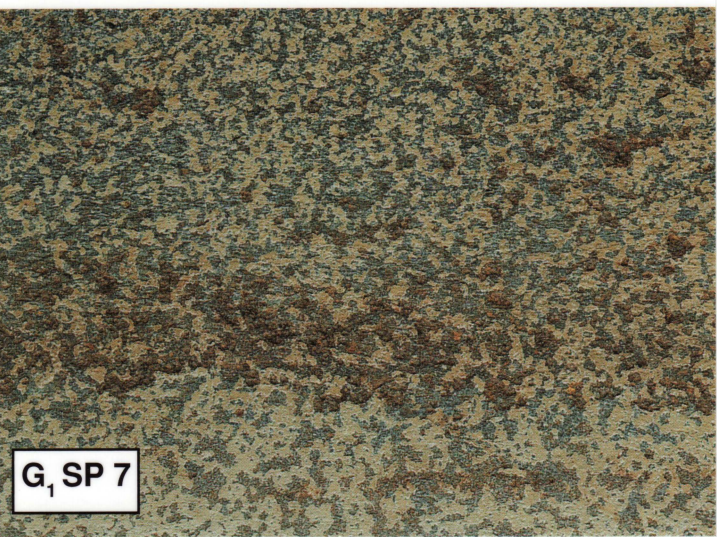
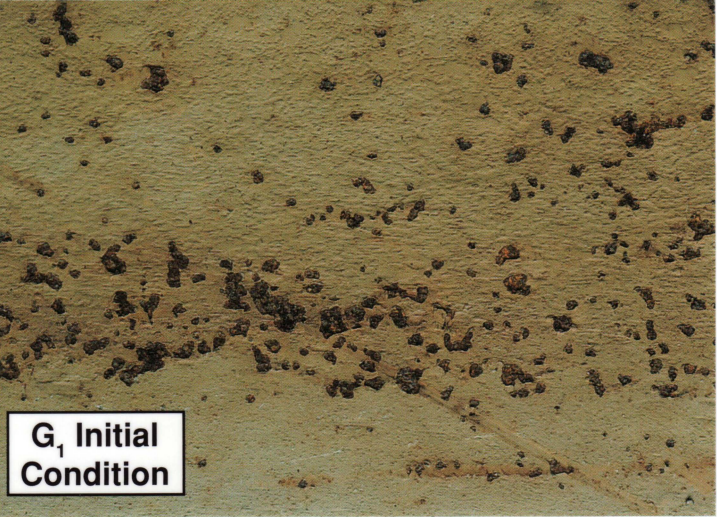
A SP 5-M1

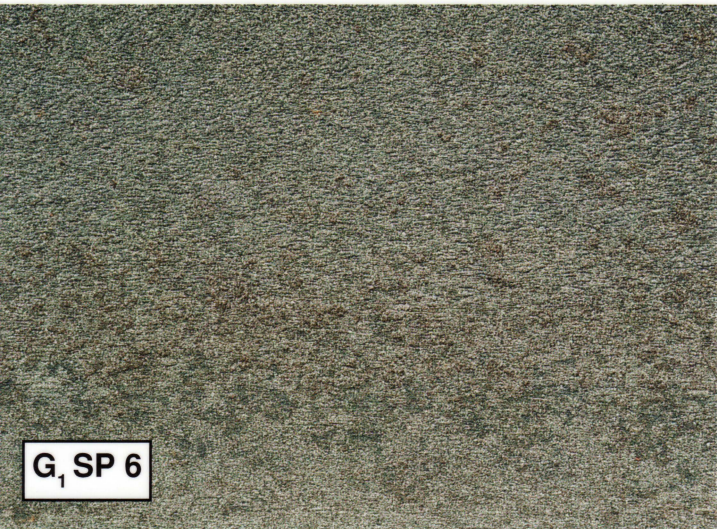


A SP 5-M2

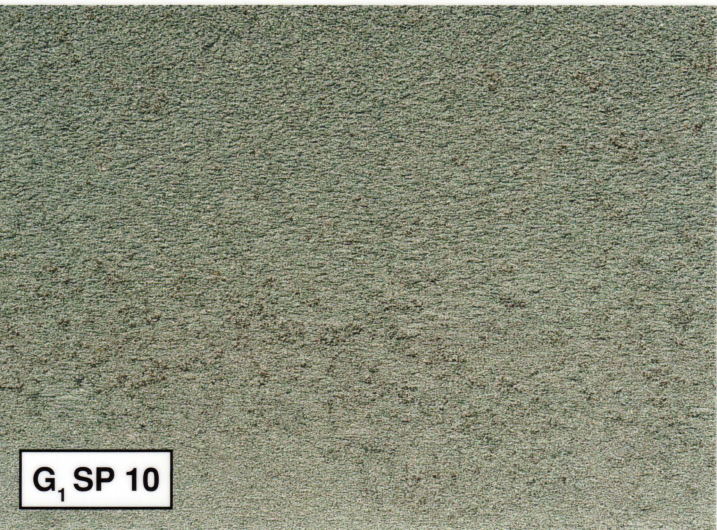


A SP 5-M3

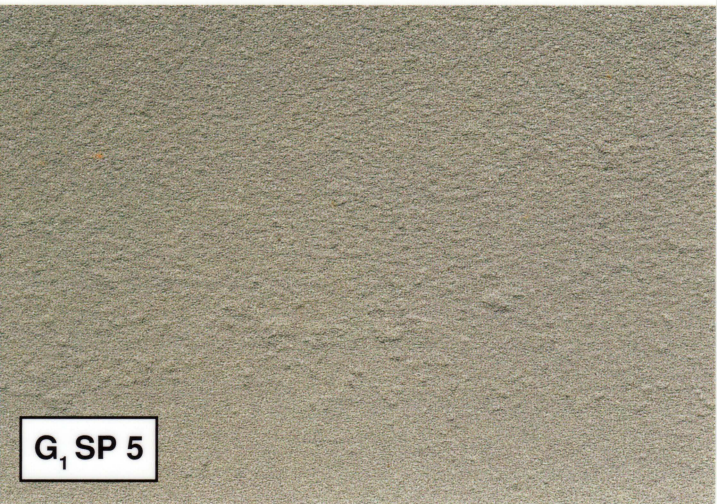




G₁ SP 6



G₁ SP 10



G₁ SP 5



G₂ Initial Condition²



G₂ SP 7



G₂ SP 14

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





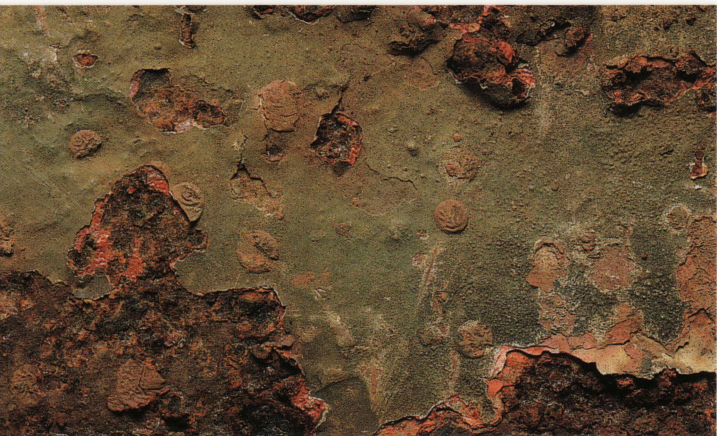
G₂ SP 6



G₂ SP 10



G₂ SP 5



G₃ Initial Condition



G₃ SP 7



G₃ SP 14





G₃ SP 6



G₃ SP 10



G₃ SP 5

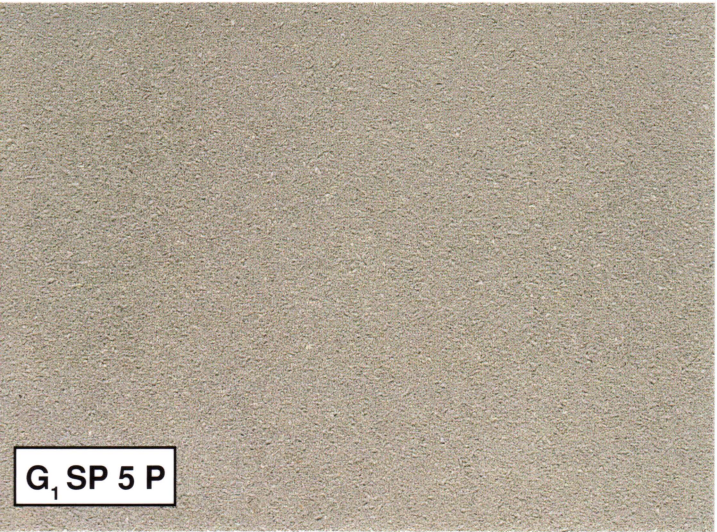
Appendix B

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



G₁ SP 5

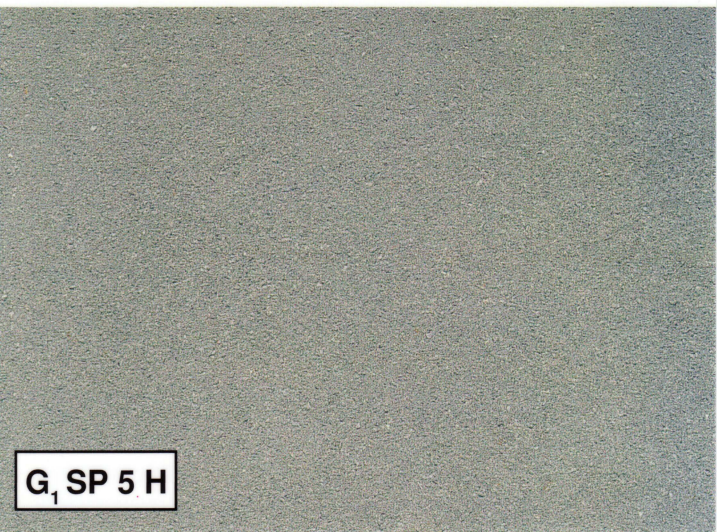
1 mil(25 μ m) profile



G₁ SP 5 P

4 mil(100 μ m) profile

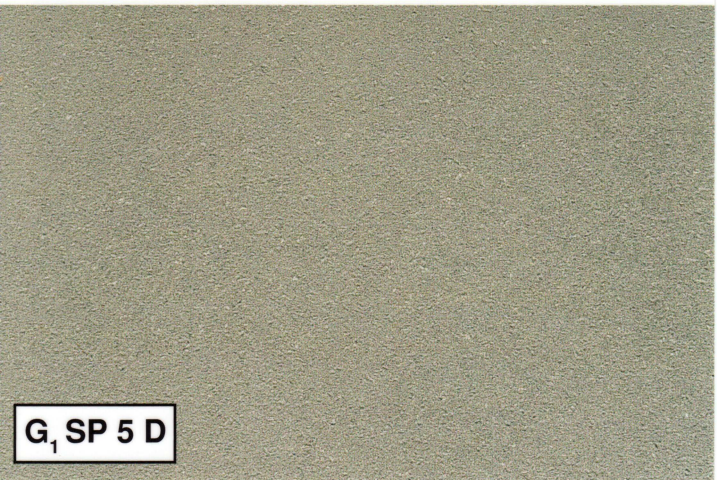




G₁ SP 5 H



G₁ SP 5 L



G₁ SP 5 D

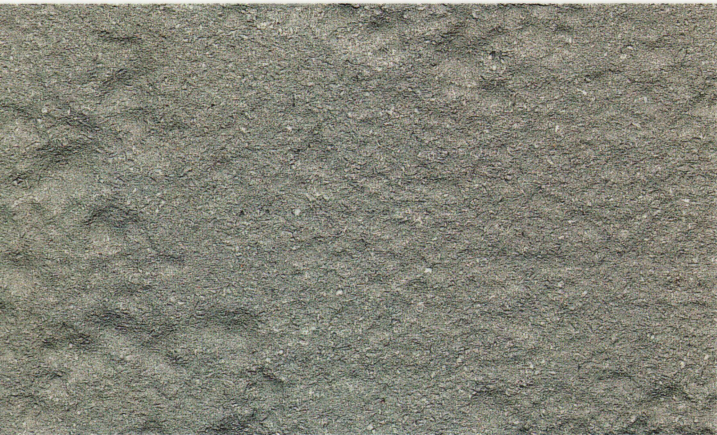


G₃ SP 5
1 mil (25 μ m) profile



G₃ SP 5 P
4 mil (100 μ m) profile





G₃ SP 5 H



G₃ SP 5 L



G₃ SP 5 D

