# INTERNATIONAL STANDARD ISO 4628/I

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

# Paints and varnishes — Evaluation of degradation of paint coatings — Designation of quantity and size of common types of defect — Part I : General principles and pictorial scales for blistering and rusting

*Peintures et vernis — Évaluation de la dégradation des surfaces peintes — Désignation de la quantité et de la dimension des types courants de défauts — Partie I : Principes généraux et échelles illustrées de cloquage et d'enrouillement*

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## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4628/I was developed by Technical Committee ISO/TC 35, *Paints and varnishes*, and was circulated to the member bodies in July 1976.

It has been approved by the member bodies of the following countries :

| | | |
|---|---|---|
| Australia | India | Romania |
| Austria | Iran | South Africa, Rep. of |
| Brazil | Italy | Sweden |
| Canada | Korea, Rep. of | Switzerland |
| Chile | Mexico | Turkey |
| Czechoslovakia | Netherlands | United Kingdom |
| France | New Zealand | Yugoslavia |
| Germany | Portugal | |

No member body expressed disapproval of the document.





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# Paints and varnishes — Evaluation of degradation of paint coatings — Designation of quantity and size of common types of defect — Part I : General principles and pictorial scales for blistering and rusting



## 0 INTRODUCTION

This International Standard is one of a series of standards dealing with the sampling and testing of paints, varnishes and related products.

The scheme given in this International Standard is intended to provide a system for describing, in a standard manner, test areas showing the common types of defects of coatings, in particular the defects caused by ageing and weathering.

Section one of this International Standard outlines the basic principles of the system in respect of designation of the quantity and size of defects. The other sections (and the further parts, to be issued subsequently) provide auxiliary pictorial or other reference scales for rating particular types of defect. As far as possible, these scales are based on existing well-established schemes.

## 1 SCOPE AND FIELD OF APPLICATION

This part of this International Standard establishes a general scheme for designating the quantity and size of common types of defects of paint coatings. It also provides pictorial standards for designating the degree of blistering of paint coatings and the degree of rusting of painted steel surfaces.

## SECTION ONE : GENERAL PRINCIPLES

### 2 REFERENCE

ISO 4540, *Rating of electroplated test specimens subjected to corrosion tests.*

### 3 DESIGNATION OF QUANTITY OF DEFECTS

A uniform convention has been adopted for designating the quantity of defects by means of ratings on a numerical scale ranging from 0 to 5, "0" denoting no defects, and "5" denoting defects so severe that further discrimination has no practical meaning.

The other ratings, corresponding to the numbers 1,2, 3 and 4, are so defined that they give an optimal discrimination over the whole range of the scale.

The use of intermediate half-steps is permissible, if required, to give a more detailed report of the defects observed.

A general description of each of the ratings is given in tables 1 and 2.

Table 1 refers to defects consisting of a uniform deterioration of the visual appearance of the coating.

Table 2 applies to defects in the form of discontinuities or other local irregularities of the coating, scattered over the test area in a more or less even pattern.

NOTE – If appropriate, the quantity of small defects scattered over the test area can be assessed in terms of their frequency by means of a grid method. Details of such a method are described in ISO 4540.

### 4 DESIGNATION OF SIZE OF DEFECTS

The average size of defects shall be designated, if required and meaningful, according to the classification given in table 3.

### 5 RATING

Rate the intensity or quantity of the observed defects on the basis of the schemes given in table 1 or 2, depending on the type of phenomenon in question.

If applicable, also rate the average size of the individual defects on the basis of the scheme given in table 3.

### 6 TEST REPORT

The test report shall rate the observed phenomena by indicating firstly the kind of defect and secondly the intensity (table 1) or quantity (table 2) of the defects.

The rating, if any, of the size of the defect (table 3) shall be added in parentheses, proceeded by the letter "S".

*Examples* : cratering of top coat : 2 (S3)
whitening : 4
rivelling : 3 (S2)

If necessary, the test report may be amplified in words, for example "confined to edges" or "blistering to undercoat". The use of such comments shall, however, be avoided wherever possible.

TABLE 1 – **Uniform deterioration – Rating scheme for designating intensity of deterioration consisting of a uniform change in the visual appearance of the paint coating**

| Rating | Intensity of change |
|---|---|
| 0 | unchanged, i.e. no perceptible change |
| 1 | very slight, i.e. just perceptible change |
| 2 | slight, i.e. clearly perceptible change |
| 3 | moderate, i.e. very clearly perceptible change |
| 4 | considerable, i.e. pronounced change |
| 5 | severe, i.e. intense change |

TABLE 2 – **Scattered defects – Rating scheme for designating quantity of defects consisting of discontinuities or other local imperfections of the paint coating**

| Rating | *Quantity of defects* (relative to a test surface area of 1 to 2 $dm^2$) |
|---|---|
| 0 | none, i.e. no detectable defects |
| 1 | very few, i.e. some just significant defects |
| 2 | few, i.e. small but significant amount of defects |
| 3 | moderate, i.e. medium amount of defects |
| 4 | considerable, i.e. serious amount of defects |
| 5 | dense, i.e. dense pattern of defects |

TABLE 3 – **Rating scheme for designating size (order of magnitude) of defects**

| Class | Size of defect |
|---|---|
| 0 | not visible under 10 X magnification |
| 1 | only visible under magnification up to 10 X |
| 2 | just visible with normal corrected vision |
| 3 | clearly visible with normal corrected vision (up to 0,5 mm) |
| 4 | range 0,5 to 5 mm |
| 5 | larger than 5 mm |

## SECTION TWO : DESIGNATION OF DEGREE OF BLISTERING

### 7 RATING

Rate the density and size of the blisters in a paint coating by means of the pictorial standards reproduced on pages 4 to 7.

These standards illustrate blisters in the respective densities 2, 3, 4 and 5 and each density in the sizes 2, 3, 4 and 5.

### 8 TEST REPORT

The test report shall indicate the appropriate rating of density and size.

*Example :* blisters 2 (S2)

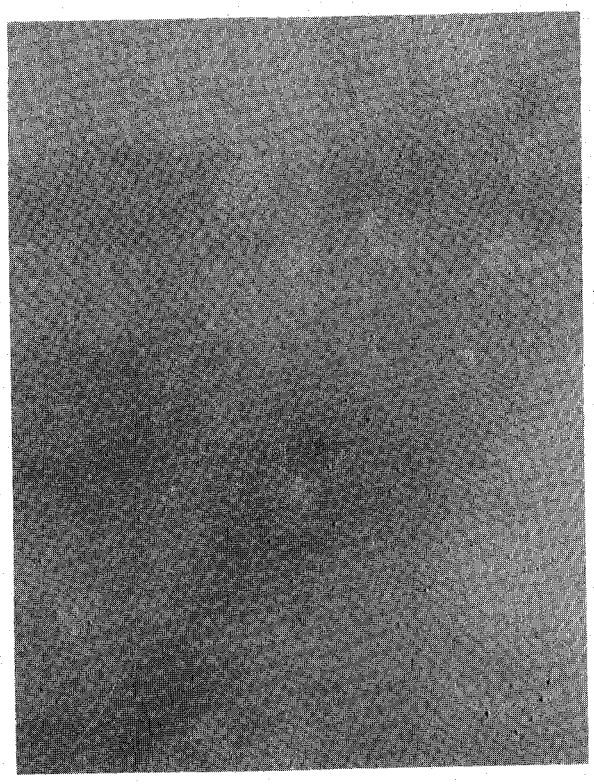
Where a test piece exhibits blisters of varying size, quote as the size rating that of the largest blisters which are numerous enough to be typical of the test piece.

NOTE – The photographic reference standards have been adopted from ASTM D 714-56.

The correlation between the ISO and the ASTM rating system is as shown in table 4.

TABLE 4 – **Correlation between ISO and ASTM rating systems**

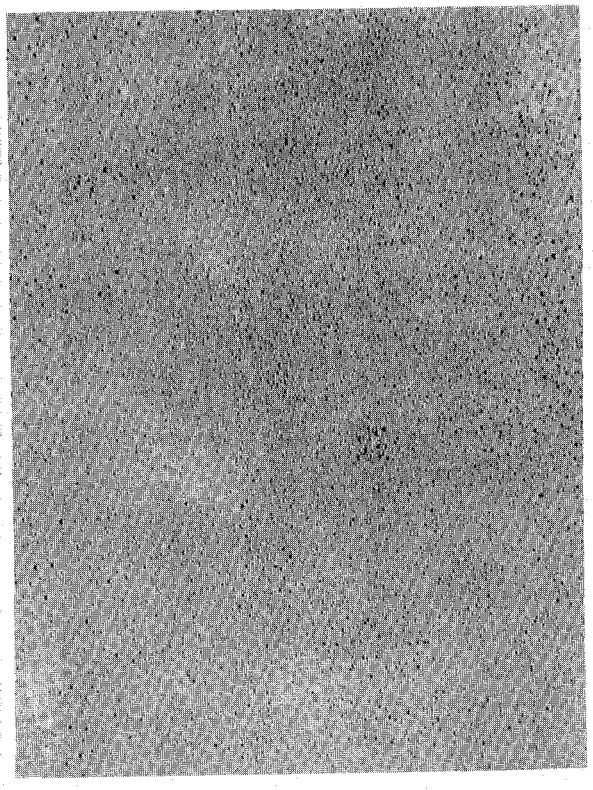
| Density | | Size | |
|---|---|---|---|
| **ASTM** | **ISO** | **ASTM** | **ISO** |
| None | 0 | | |
| (less than few) | 1 | (smaller than 8) | 1 |
| Few | 2 | 8 | 2 |
| Medium | 3 | 6 | 3 |
| Medium – Dense | 4 | 4 | 4 |
| Dense | 5 | 2 | 5 |



Density 2

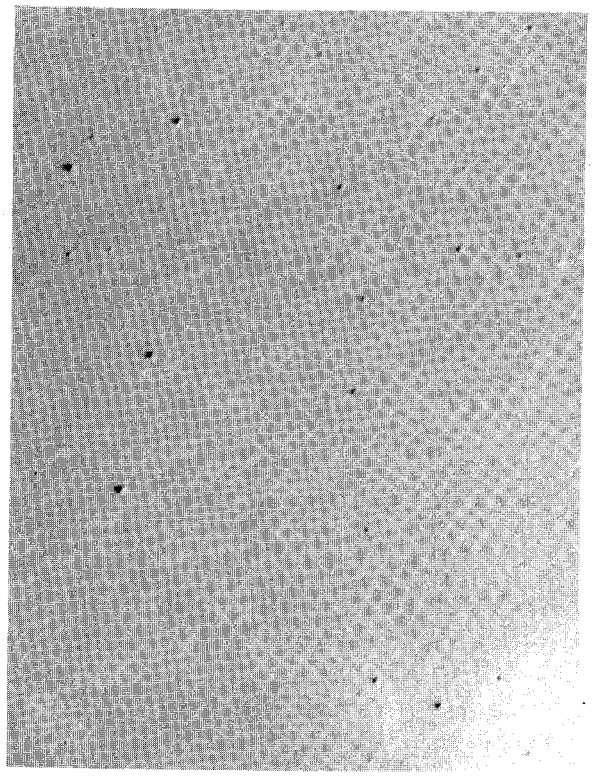
Density 3

Density 4

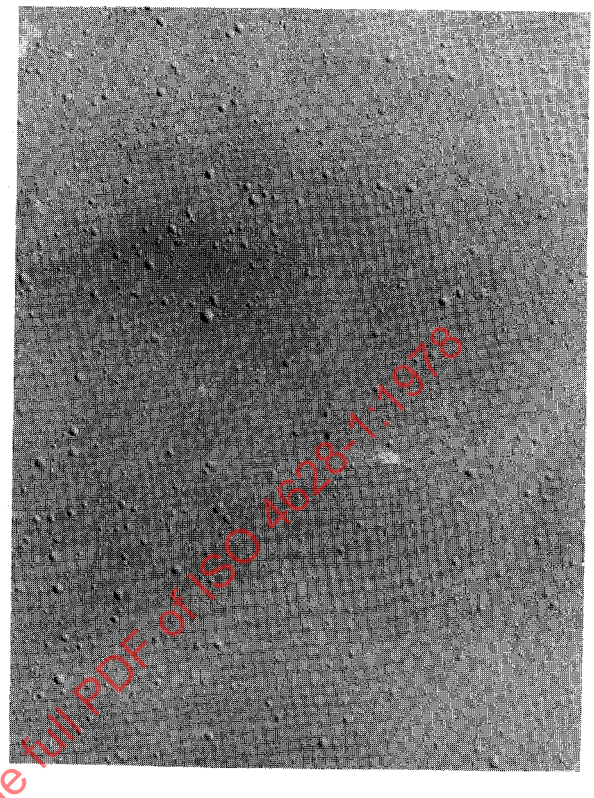


Density 5

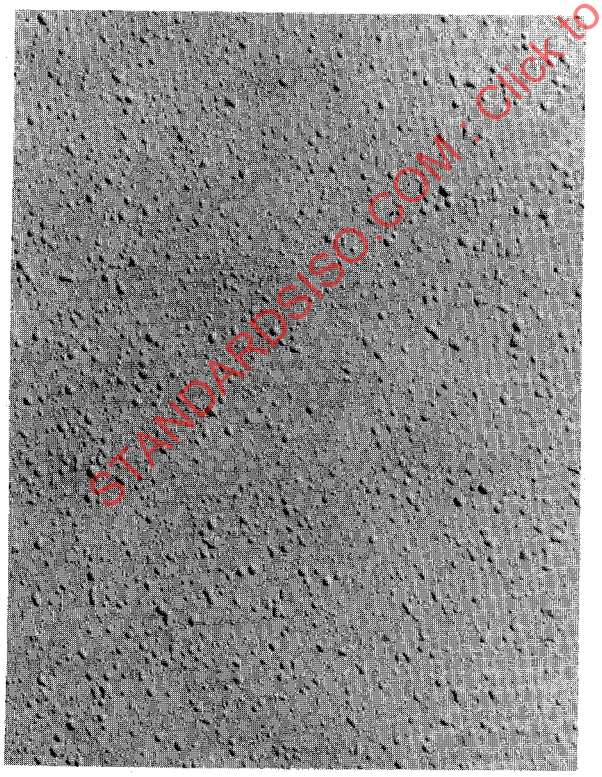
Blisters of size 2



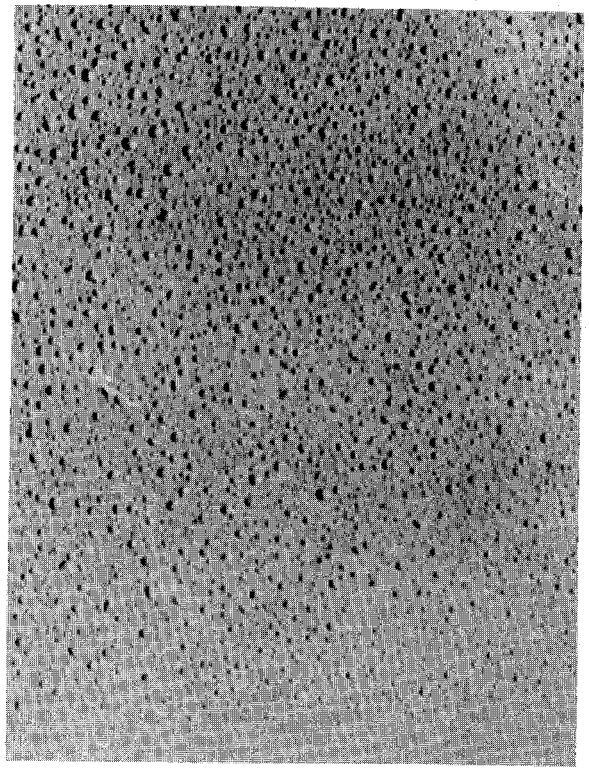
Density 2



Density 3

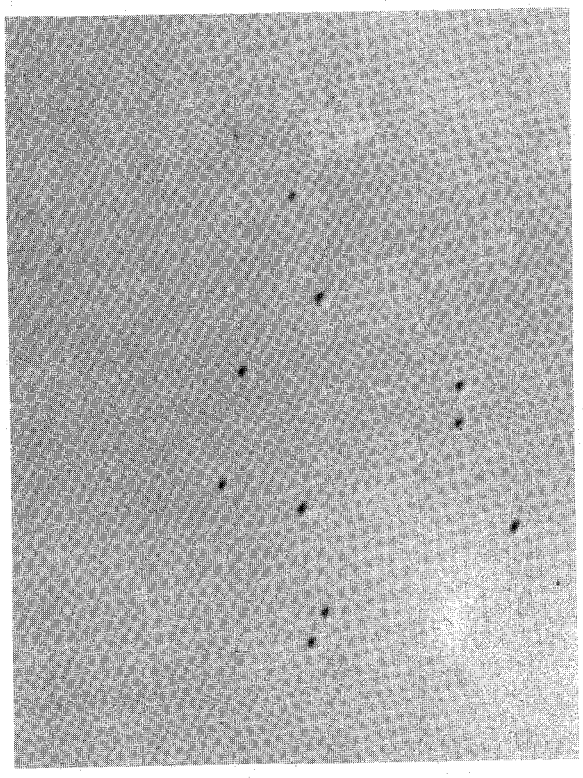


Density 4

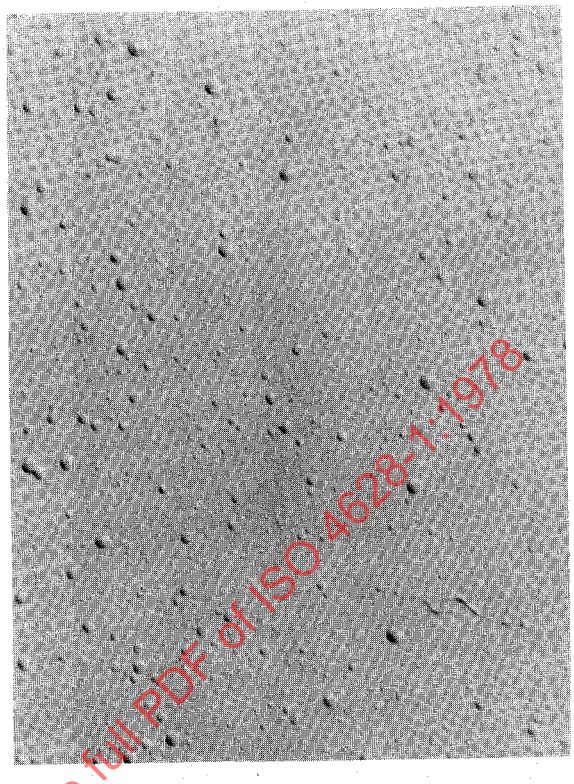


Density 5

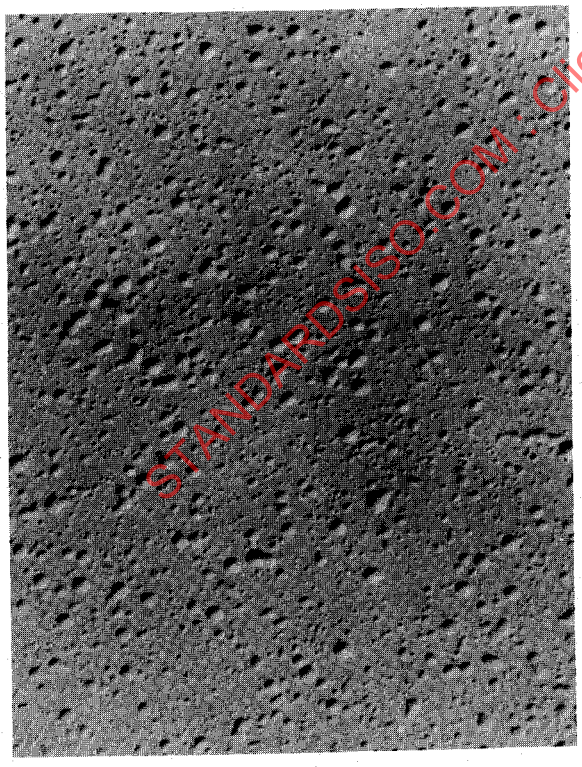
Blisters of size 3



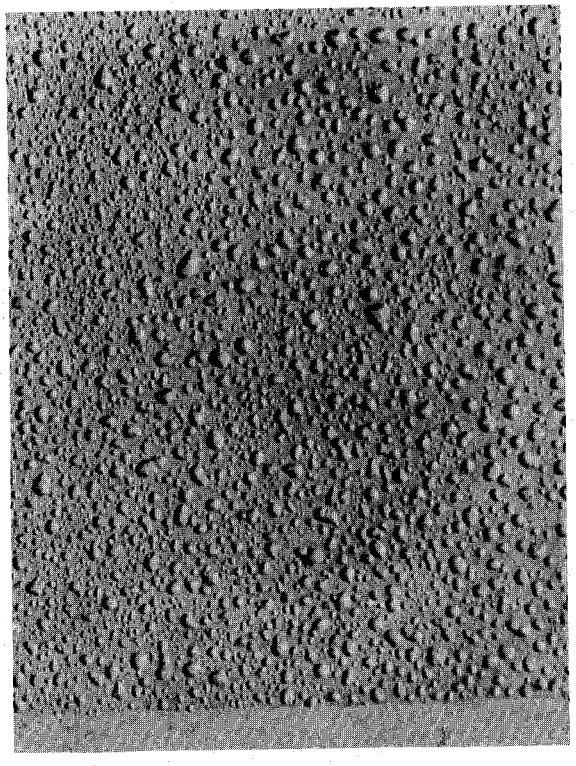
Density 2



Density 3

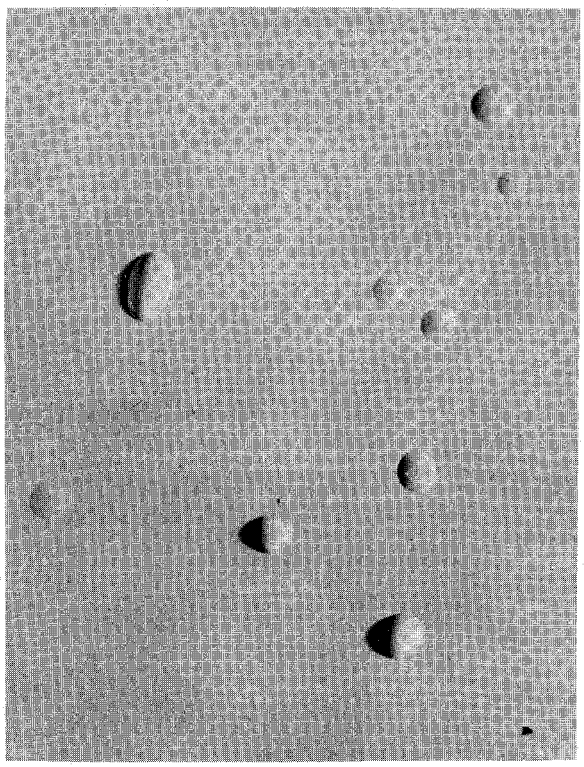


Density 4



Density 5

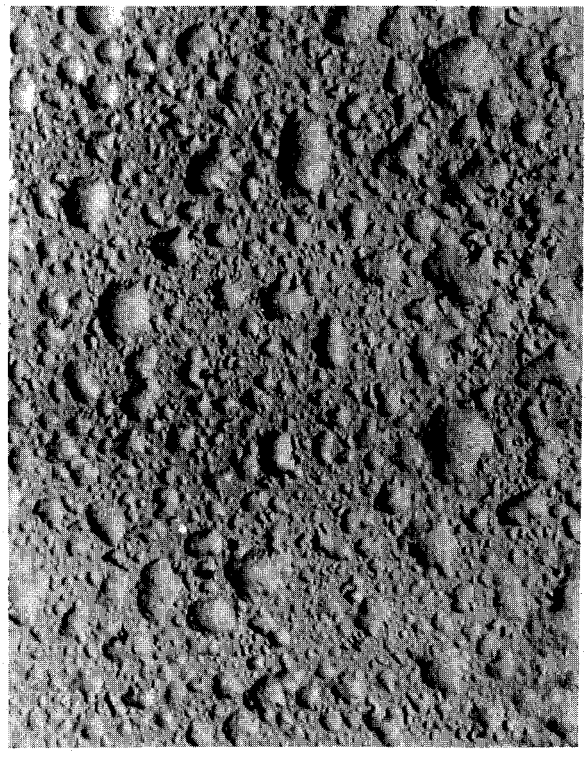
Blisters of size 4



Density 2

Density 3

Density 4



Density 5

Blisters of size 5

## SECTION THREE : DESIGNATION OF DEGREE OF RUSTING

### 9 RATING

Designate the degree of rust formation by reference to the pictorial standards reproduced on pages 9 to 13.

These standards show coated steel surfaces deteriorated to different degrees by a combination of rust broken through the coating and apparent underrust.

The approximate amounts of the rust broken through the coating and of the total apparent rust (rust broken through + underrust) shown on these standards are as indicated in table 5.

TABLE 5 – **Degree of rusting and area**

| Degree | Area rusted % |
|---|---|
| Ri 0 | 0 |
| Ri 1 | 0,05 |
| Ri 2 | 0,5 |
| Ri 3 | 1 |
| Ri 4 | 8 |
| Ri 5 | 40/50 |

The standards given are basically intended for rating the degree of rust on coated steel.

They may be used for designating the degree of corrosion on coated non-ferrous metals if the form of breakdown is comparable with that on the standards.

### 10 TEST REPORT

The test report shall indicate the rating (degree of rusting) in accordance with table 5, which is most representative of the corrosion phenomena on the test piece, especially in respect of the amount of rust that has broken through the coating.

If the average sizes of the rust spots on the test piece differ considerably from those shown on the standards, an indication of their size may be given by reference to the rating scheme given in table 3.

*Example* : Rust : Ri 3 (S4) = rusted area, as a percentage of rust, approximates standard 3, the sizes of the individual rust spots are of the order of a few millimetres.

NOTES

1 The pictorial standards are selected from the European rust scale published by the European Committee of Paint, Printing Ink and Artists' Colours Manufacturers' Associations, Brussels.

The correlation between the ISO and European rust scales is as shown in table 6.

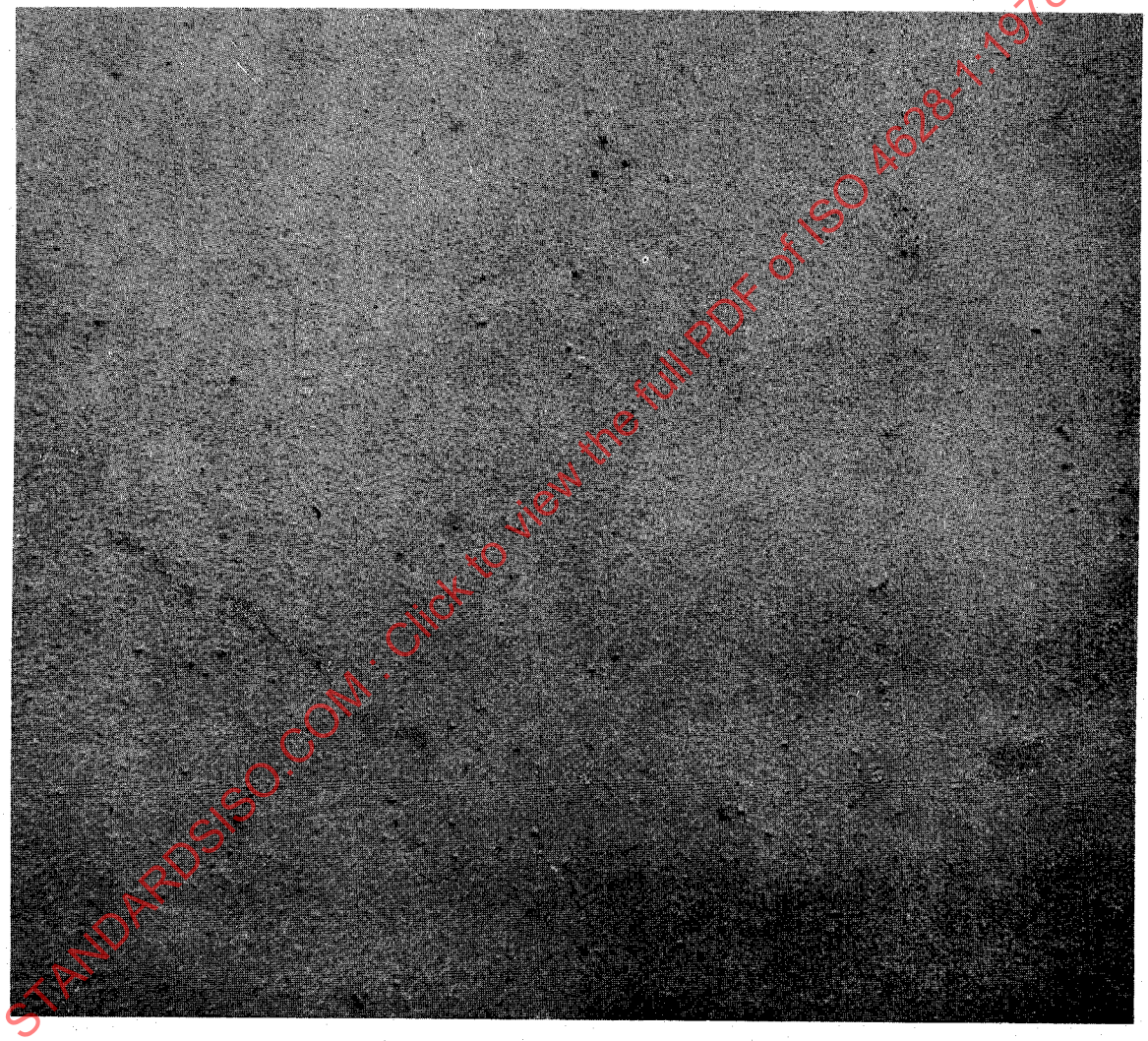
TABLE 6 – **Correlation between ISO and European rust scales**

| ISO rust scale | European rust scale |
|---|---|
| Ri 0 | Re 0 |
| Ri 1 | Re 1 |
| Ri 2 | Re 2 |
| Ri 3 | Re 3 |
| Ri 4 | Re 5 |
| Ri 5 | Re 7 |

2 The approximate correlation between the ISO rust scale and the rating system of ASTM D 610 is given in table 7.

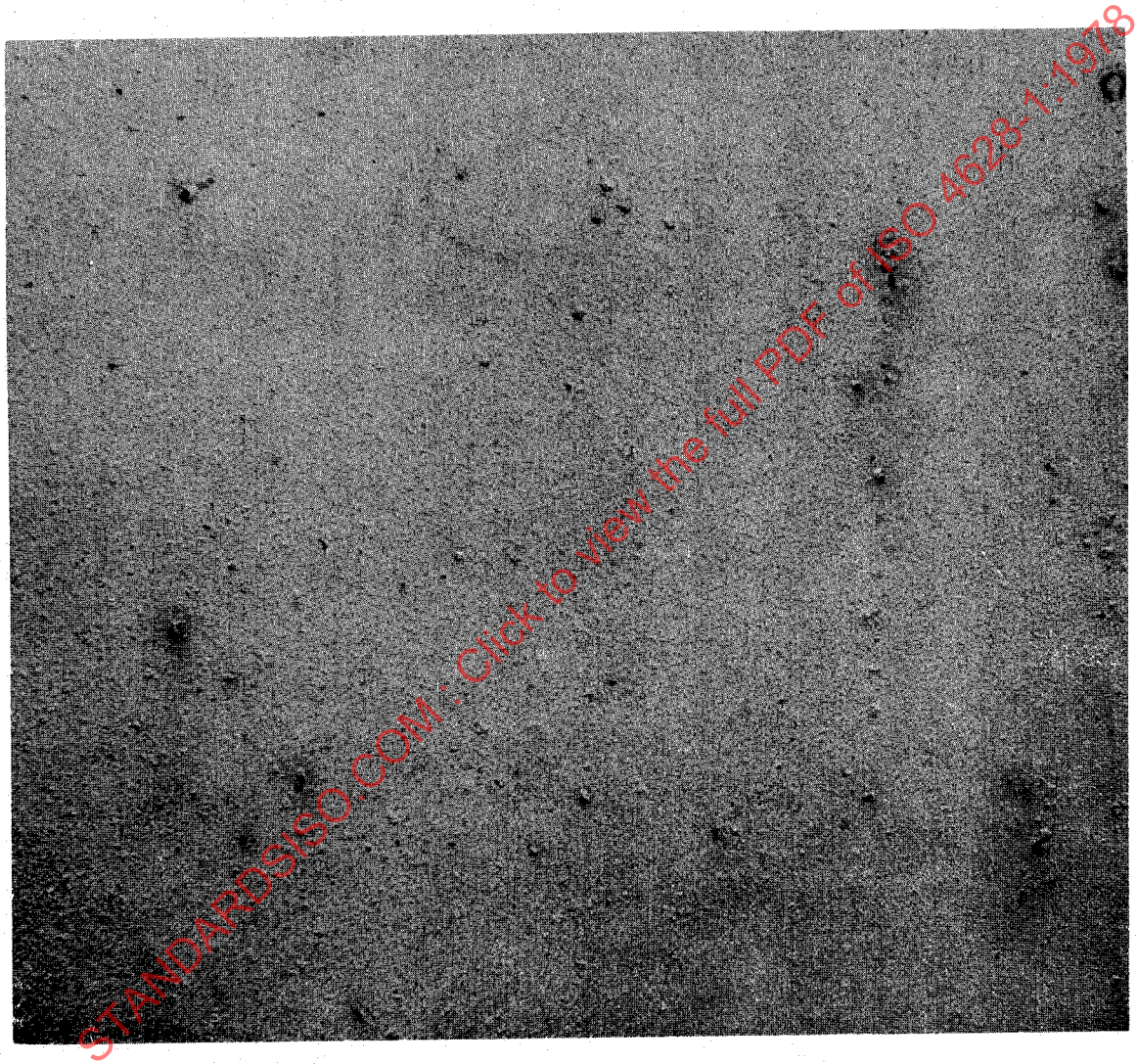
TABLE 7 – **Approximate correlation between ISO and ASTM rust scales**

| ISO rust scale | ASTM D 610 |
|---|---|
| Ri 0 | 10 |
| Ri 1 | 9 |
| Ri 2 | 7 |
| Ri 3 | 6 |
| Ri 4 | 4 |
| Ri 5 | 1 to 2 |

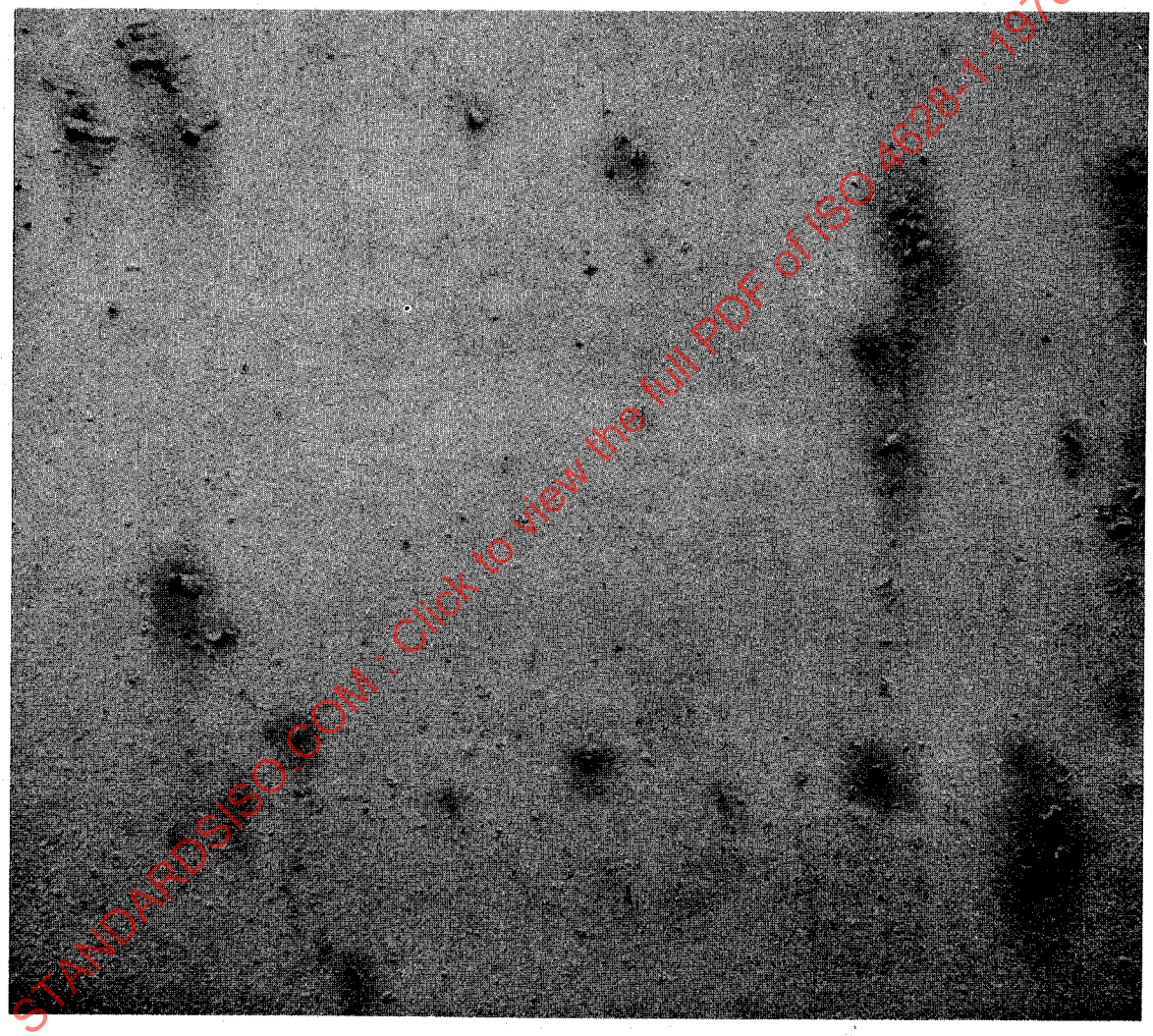




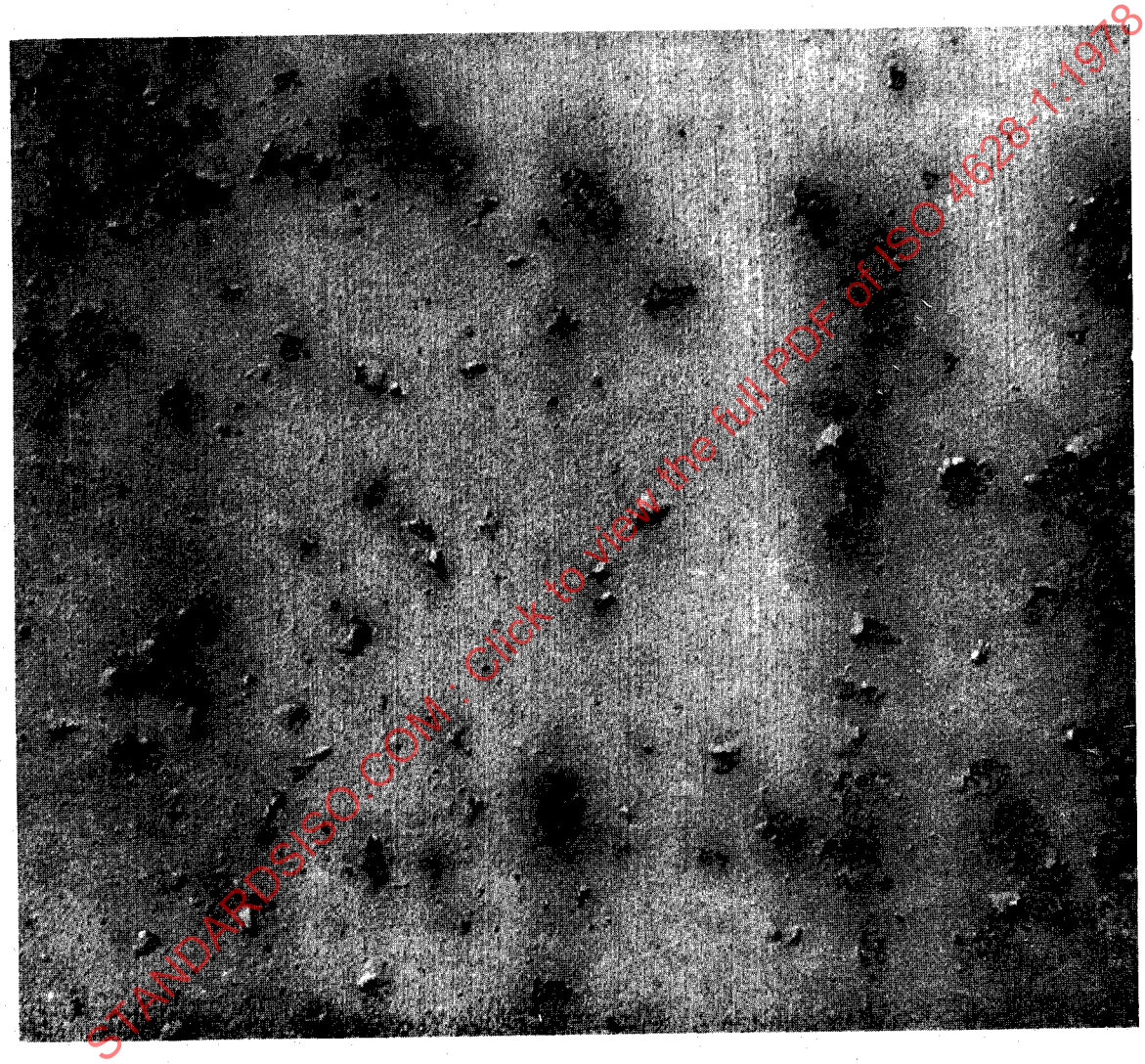
Ri 1



Ri 2



Ri 3



Ri 4