

INTERNATIONAL STANDARD



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Recommended practice for radiographic inspection of fusion welded butt joints for steel plates 50 to 200 mm thick

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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 2405 was drawn up by Technical Committee ISO/TC 44, *Welding*.

It was approved in January 1972 by the Member Bodies of the following countries :

Austria	India	Sweden
Belgium	Ireland	Thailand
Canada	Israel	Turkey
Czechoslovakia	Italy	United Kingdom
Egypt, Arab Rep. of	Norway	U.S.S.R.
Finland	Romania	
France	South Africa, Rep. of	

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Germany
Japan
Switzerland

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0 INTRODUCTION

The radiographic techniques suitable for examination of fusion butt welds in steel plates up to 50 mm thick are described in ISO/R 1106. This new document is arranged on similar lines, to cover welds in plate thicknesses up to 200 mm.

It is hoped that these documents will have the effect of ensuring more unified practice and so simplify interpretation of results. This document does not lay down standards of acceptance for the welds.

There is only a limited number of types of equipment suitable for this work (for example there are no commercial X-ray sets operating between 400 and 1 000 kV). The available equipment has been arranged into a number of groups and techniques have been detailed which are suitable for the production of satisfactory radiographs, from the equipment in each group. Many clauses in the recommended practice are common to all the techniques.

The steel thickness for which each type of equipment is considered to be suitable is given in Table 1; it is possible to use betatrons and linear accelerators for greater thicknesses.

The Figure indicates the relative performance of the various types of equipment in terms of I.Q.I. sensitivity, using the techniques described. These values of sensitivity are not mandatory, but are given as a guide for choosing a technique for a particular weld thickness.

Explanatory notes are included, as necessary.

1 SCOPE

This International Standard provides general guidance on the techniques of radiography with the object of enabling satisfactory results to be obtained and it enunciates some rules which are based on generally accepted practice and the fundamental theory of the subject.

2 FIELD OF APPLICATION

This International Standard relates to the examination of fusion welded joints for steel plates 50 to 200 mm thick.

It should not be regarded as giving acceptance standards for joints and is concerned only with radiography as such.

3 REFERENCES

ISO/R 1027, *Radiographic image quality indicators – Principles and identification.*

ISO/R 1106, *Recommended practice for radiographic inspection of fusion welded butt joints for steel plates up to 50 mm (2 in) thick.*

ISO 2504, *Radiography of welds and viewing conditions for films – Utilization of recommended patterns of image quality indicators (I.Q.I.).*

4 PROTECTION

Exposure of any part of the human body to X-rays or gamma-rays can be highly injurious to health. It is therefore essential that, wherever X-ray equipment or radioactive sources are in use, adequate precautions be taken to protect the radiographer and any other person in the vicinity.

Safety precautions to be taken against X-rays and gamma-rays are those in force in each country*.

TABLE 1 – Type of equipment and thickness of steel

Group	Description of equipment	Useful thickness mm
A	X-rays : up to 400 kV	50 to 85
B (I)	X-rays : 1 and 2 MV, focus > 6 mm	50 to 125 ¹⁾
B (II)	X-rays : 1 and 2 MV, focus < 1 mm	50 to 125 ¹⁾
C	X-rays : linear accelerators 3 to 8 MV	70 ²⁾ to 200
D	X-rays : betatrons and linear accelerators, 8 to 35 MV	70 ²⁾ to 200
E	Gamma-rays, Cobalt 60	50 to 150 ³⁾
F	Gamma-rays, Iridium 192	50 to 110 ³⁾

1) For the 2 MV equipments, the maximum thickness can be extended to 200 mm.

2) This thickness may be reduced to 60 mm if very fine-grain films are used and a density of 3 is reached.

3) The upper end of the thickness range can only be achieved with either very high strength sources or very long exposure times.

* In default of such regulations, reference should be made to the latest Recommendations of the International Commission on Radiological Protection.