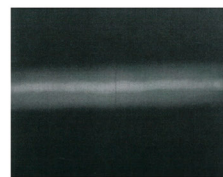


# Radiographic Reference Chart

## Industrial X-RAY FILM

### IMPERFECTION

#### TRANSVERSE CRACK

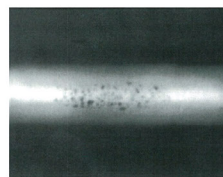


##### RADIOGRAPHIC IMAGE

Fine black lines (often discontinuous) with a feathery appearance and situated close together depending on the severity of the crack.

**DESCRIPTION**  
Crack essentially transverse to the axis of the weld

#### POROSITY

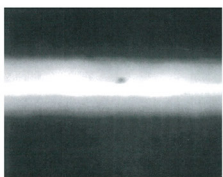


##### RADIOGRAPHIC IMAGE

Gas inclusions from spherical blow holes or bubbles, their images appear as black round spots with sharp contours randomly distributed.

**DESCRIPTION**  
Group of gas pores having a random geometric distribution

#### GAS PORE

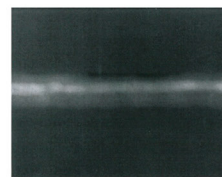


##### RADIOGRAPHIC IMAGE

The image appears as a black round spot with sharp contours.

**DESCRIPTION**  
Gas cavity of essentially spherical form

#### UNDERCUT

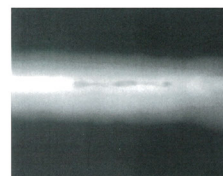


##### RADIOGRAPHIC IMAGE

A sharp dark irregular line running along the toe edge of the weld run. This line normally follows the edge profile of the weld cap.

**DESCRIPTION**  
Irregular groove at a toe of a run in the parent material or in previously deposited weld metal

#### SLAG INCLUSION

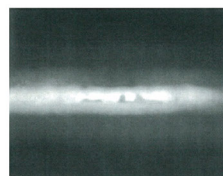


##### RADIOGRAPHIC IMAGE

Dark indications with irregular shapes sometimes elongated with sharp pointed ends, usually following the line of the weld run.

**DESCRIPTION**  
Solid inclusion in the form of slag slag inclusions can be linear, isolated, clustered.

#### LACK OF FUSION

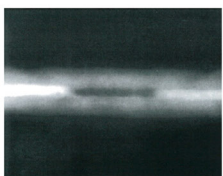
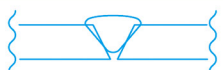


##### RADIOGRAPHIC IMAGE

Indicated by a straight black line which may be intermittent, situated at one or both sides of the weld often showing triangular areas along the length of the line pointing towards the centre of the weld.

**DESCRIPTION**  
Lack of union between the weld metal and the parent material or between the successive layers of weld metal

#### ROOT CONCAVITY

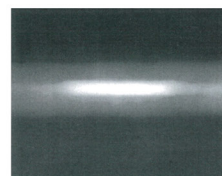


##### RADIOGRAPHIC IMAGE

Indicated on the radiograph as a dark shadow intermittent between the lighter image of the root pass and usually the same width as the normal root bead.

**DESCRIPTION**  
Shallow groove due to shrinkage of a butt weld at the root

#### EXCESSIVE PENETRATION

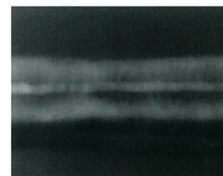


##### RADIOGRAPHIC IMAGE

It appears as a broad white band superimposed on the same line as the root bead and slightly wider than the normal root bead.

**DESCRIPTION**  
Reinforcement of the butt weld on the root side is too large

#### INCOMPLETELY FILLED GROOVE

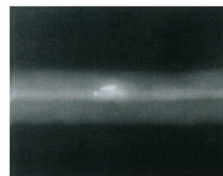


##### RADIOGRAPHIC IMAGE

A broad dark band which varies in width and runs along the weld surface mostly central. It has a higher density than the image of the weld cap and the parent plate.

**DESCRIPTION**  
Longitudinal continuous or intermittent channel in the surface of a weld due to insufficient of weld filler material

#### TUNGSTEN INCLUSION

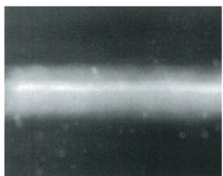


##### RADIOGRAPHIC IMAGE

It appears in the radiographic image as bright white spots with sharp outlines and can be of any shape (tungsten does not alloy with the weld metal).

**DESCRIPTION**  
Solid inclusion in the form of foreign tungsten

#### SPATTER

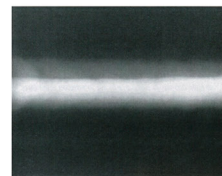


##### RADIOGRAPHIC IMAGE

Small round light spots the image of the parent metal and on the image of the weld.

**DESCRIPTION**  
Globules of weld metal or filler metal expelled during welding and adhering to the surface of parent material or solidified weld metal

#### LINEAR MISALIGNMENT



##### RADIOGRAPHIC IMAGE

A sudden change in density of the image of the weld cap along the edge of the root run adjacent to the high side of the parent metal. This is due to excess reinforcement of the cap weld on the low side superimposed on the image of the root run.

**DESCRIPTION**  
Misalignment between two welded pieces such that they are not in the same required parallel plane, even though their surface planes are parallel

### EXAMPLES OF PROBLEMATIC FILM HANDLING

#### FAULTS ASSOCIATED WITH STORAGE

##### LIGHT Fog

##### Phenomenon

The radiograph is fogged in the same pattern as that of the interleaving paper texture.

##### Probable cause

The film has been exposed to light while yet covered with interleaving paper.

##### Corrective Action

1. Check the darkroom for light leaks.
2. Check the X-ray film storage box for light leaks.
3. Before turning on the normal room lights make it a rule to insure that no film is on the work bench.
4. Be sure to seal the X-ray film case after use.

##### Radiation Fog

##### Phenomenon

The shadow of an unexpected object or the lead foil as embedded in the X-ray film case, appears in the radiograph.

##### Probable Cause

The film has been exposed to X-rays or gamma rays during storage.

##### Corrective Action

Keep X-ray films in a lead foil coated X-ray film storage box and store it in a place which is free of radiation.

#### FAULTS ASSOCIATED WITH THE SAFELIGHT

##### Safelight Fog

##### Phenomenon

The radiograph has fog on one side or shows letter form shadows.

##### Probable cause

1. White light is leaking from a slit in the safelight box.
2. The film has been allowed to stand under safelight illumination for too long a time or placed too near the safelight.
3. The film has been allowed to stand under safelight illumination too long a time or placed too near the safelight.
4. A lamp having a higher capacity than standard rating is used as the safelight source.

##### Corrective Action

1. Check the safelight filter periodically (every six months to once a year) and replace it if faded.
2. Observe safelight requirements, such as the prescribed lamp wattage and safelight-to-film distance, and complete work under safelight illumination as quickly as possible.
3. Check periodically to insure that the safelight is functioning under normal prescribed conditions.

#### FAULTS ASSOCIATED WITH HANDLING BEFORE DEVELOPMENT

##### Dirt Deposits or Stains on the Screen

##### Phenomenon

The radiograph has irregular shaped light spots.

##### Probable Cause

There are dirt deposits or stains on the intensifying screens.

##### Corrective Action

1. Keep the surfaces of intensifying screens clean and dry at all times.
2. Wipe the surfaces of intensifying screens with cleaner from time to time.

#### FAULTS ASSOCIATED WITH DEVELOPMENT

##### Uneven Development

##### Phenomenon

The radiograph exhibits streaks and mottle.

##### Probable Cause

Development proceeded locally.

##### Corrective Action

1. Comply with the recommended developer temperature.
2. Agitate the film adequately in the developer solution, especially in the early course of development.

#### Inadequately Dissolved Developer

##### Phenomenon

The radiograph has dark spots or black comets with tails.

##### Probable Cause

Chemical powder remains in the developer solution not being completely dissolved in water.

##### Corrective Action

1. When preparing the developer solution mix the powdered chemicals in hot water at about 50°C (122°F) and stir the solution until the chemicals are completely dissolved.
2. Prior to use make sure that the chemicals are completely dissolved.

#### FAULTS ASSOCIATED WITH LOADING AND UNLOADING

##### Film Adhesion

##### Phenomenon

The radiograph has irregular shaped spot-like marks.

##### Probable Cause

The film loaded in the cassette adhered to the intensifying lead screen.

##### Corrective Action

1. Do not leave the film in a cassette for a long time during hot, wet seasons on in a hot place.
2. When the cassette is wet, leave it to dry in the shade, choosing a place where there is a good draft.

##### Static Marks

##### Phenomenon

The radiograph has tree like or branching marks.

##### Probable Cause

Static marks result from the contact, peeling or friction of foreign matter caused by static electricity. They are apt to occur when the air is dry.

##### Corrective Action

1. Keep the darkroom air at the proper humidity levels (60 to 70% RH).
2. Any materials of rubber or synthetic fibers which are easily charged with static electricity should not be used near the film.
3. Handle the film gently.
4. Short the darkroom work bench to ground.

##### PRESSURE MAKE

##### Phenomenon

The radiograph has light or dark marks which are crescent shaped or irregular.

##### Probable cause

The film was broken locally or sharply bent during handling. Dark marks appear when the film is sharply bent before exposure while sharp bending of an exposed area may become the cause of light marks.

##### Corrective Action

Carefully hold the edge of the film and avoid bending it.

#### FAULTS ASSOCIATED WITH POST DEVELOPMENT PROCESSING

##### Uneven Fixing

##### Phenomenon

The radiograph has light, irregular shaped marks or streaks.

##### Probable cause

Fixing proceeded locally.

##### Corrective Action

1. Agitate the film in the fixer solution at frequent intervals, especially in early course of fixing.
2. Replace the fixer solution with a fresh one before it is exhausted beyond use.

##### Uneven Drying

##### Phenomenon

The radiograph has light, blurred lines or irregular shaped marks of film surface luster.

##### Probable cause

Draining was incomplete and uneven so that the drying speed differed from one area to the other.

##### Corrective Action

1. Use Fuji Drivel wetting agent to drain the film evenly.
2. When hot air is used, gradually heat the air that is blown over the film.

FUJIFILM INDUSTRIAL X-RAY FILM  
for consistent high quality non-destructive Testing

FUJIFILM