| ACUREN                |  |                       |                              | Sin                          | Single Wall Exposure Method |   |                            |               | Pr   | ocedure RT-0016<br>Technique 1                            |                                       |  |
|-----------------------|--|-----------------------|------------------------------|------------------------------|-----------------------------|---|----------------------------|---------------|--|---|---------------------------------------|--|
| Proce                 | dure llse  | h<br>h                | BT                           | 016                          |                             | Technique Description   Conorol Single Maller |                            |               |  |   |                                       |  |
| Annli                 | cable ene  | cificatione           |                              | JE Sect V C                  | SA 766                      | A 7662 and CCA WED                            |                            |               |  | al Single   | vvali exposure                        |  |
| Mator                 | vial   | cincations            |                              | - D5                         |                             | Z, and C                                      | CA VUS                     | <u> </u>      |  | 20 mm   | 160 mm                                |  |
| Joint                 |  |                       | But                          |                              |                             |   | ss kange                   |               |  | 2.0 1111  |                                       |  |
|                       |  |                       |                              |                              |                             |   |                            |               |  | 220100000000000000000000000000000000000                   |                                       |  |
| Beam Angle:           |  |                       |                              |                              |                             |   |                            | Angle:        | Source<br>Film<br>Materia<br>Beam d<br>90° Per | of Radiation<br>I wall<br>lirection<br>pendicular to weld |                                       |  |
| PAR                   |  | <b>PS</b>             |                              |                              |                             |   |                            |               |  |   |                                       |  |
| Source                |  | IR 102                | Sour                         |                              |                             |   |                            |               |  |   |                                       |  |
| Sourc                 | o Type   | pe IR 192 Source size |                              |                              | < 5.0  m                    | 1111<br>am                                    | Thickne                    | ess rang      | je<br>ro                                       |   | 2mm – 70mm                            |  |
| Stren                 | ath  | Min 15 Ci             | Evno                         |                              |                             | uired   | SED                        | 655 rang      | Je   |   |                                       |  |
| Techr                 | nique  | Single Wall           | ingle Wall Viewing           |                              |                             |   |                            |               |  |   |                                       |  |
| Calcu                 |  |                       |                              |                              | Vvaii                       |   | <u>030163</u>              |               |  |   |                                       |  |
| Intensifying Screene  |  |                       |                              | 20                           | TL Erc                      | not   | 0 005"                     |               | The  | ak  | < 0.020                               |  |
| Film Designation      |  | Class                 | alorli                       | Rrand                        | Л                           | 0.005   | Kodok                      | No / Cassotto |  |   |                                       |  |
| Panotromotor Turce    |  |                       | ACT                          |                              |                             |   | Agia or                    | Nouak         |  |   |                                       |  |
| Ecooptic Constitution |  |                       | ASI                          |                              |                             | 3   | Design                     | ation #       | As per   | referenc  | ed code.                              |  |
| Donot                 | ramotore   | por Film              | CSA codes - 2 (middle/end)   |                              |                             |   | Platelli<br>Dor Wo         |               | 2 por  |   |                                       |  |
| Fenet                 | lameters   | per Film              | ASME codes - 1               |                              |                             |   | Per we                     | Ia            | 2 per 0  | exposure  |                                       |  |
| Comn                  | arator Sh  | ims nor Film          | 1 (CSA 7662 only)            |                              |                             |   | Por Wo                     | Id            | 1 per o  | exposure  |                                       |  |
| Shim                  | Used   |                       | Only ASME hole penetrameters |                              |                             | meters  | Thickness 0.062            |               |  | ' each  |                                       |  |
| Locat                 | ion Marke  | er Type               | Lead                         | Only ASME hole penetrameters |                             |   | Metric C Imperi            |               |  |   |                                       |  |
| Locat                 | ion Marke  | er Placement          | Onn                          | nart                         |                             |   | Source side when accessi   |               |  | esiblo  |                                       |  |
|                       |  |                       |                              | art                          |                             |   | Filmside is only allowed v |               |  | l when so   | when source to material               |  |
|                       |  |                       |                              |                              |                             |   | distance equals the rad    |               |  | adius of component.                                       |                                       |  |
| Densi                 | tv   |                       | 2 to 4                       | 1.0 H&D                      |                             |   | Area Taken Throu           |               |  | rough Weld  |                                       |  |
| Additi                | ional Info   | rmation               | • N                          | lust meet th                 | e UG far                    | ctor with                                     | SFD                        |               | 1  | 3.1 17010   |                                       |  |
| Identi                | fication o   | n film                | • A                          | s per snecif                 | ication -                   | Lead N  | umbers o                   | r Flash       |  |   | · · · · · · · · · · · · · · · · · · · |  |
| PRO                   | CESSIN   | G AND STO             | BAG                          |                              | 1                           |   |                            |               |  |   |                                       |  |
| Mothe                 |  | Manual                |                              |                              | a Timo                      | 5 min   | itor                       | Tomp          | roturo   | ľ   | 0005                                  |  |
| Fiving                | timo   | 3 minutos             |                              | Washing T                    | y me                        | 20 mi   |                            | Druine        | Tame   |   | 68°F                                  |  |
| Store                 | re of Eini   | abad Padiagr          | ,<br>anho                    |                              |                             |   | nues                       | Drying        | Jiemp  |   | 150° F                                |  |
|                       |  | sneu kaulogra         |                              | Placed in in                 |                             | es and fil                                    | m enveic                   | ppe           |  |   |                                       |  |
| , in pro              | All processing and storage in accordance with ASME SE999.<br>s.19(1) s.19(1) |                       |                              |                              |                             |   |                            |               |  |   |                                       |  |
| ſ                     | <b></b>  |                       |                              | ****                         | Kitching                    | - A.a.  |                            | T             |  |   |                                       |  |
|                       |  |                       |                              | NAME                         |                             | ŞIGN  | ATURE                      |               |  | POSITI  | ON                                    |  |
|                       | Level III  | Reviewed              |                              |                              |                             |   |                            | 1             | SNT / C  | GSB RT II   | 1                                     |  |
|                       | QA Approval  |                       |                              |                              |                             |   | Quality I                  |               | Manager  |   |                                       |  |

| ACUR                 | Sing                                  | Single Wall Panoramic Exposure<br>Method |  |           |            |                       | Procedure RT-0016<br>Technique 2 |                 |  |  |  |
|----------------------|---------------------------------------|--|--|-----------|------------|-----------------------|----------------------------------|-----------------|--|--|--|
| Procedure Use        | d                                     | RT00                                     | )016 Technique Description   Single Wall Description |           |            |                       |                                  |                 |  | romio Evenoure                                     |  |
| Annlicable sne       | cifications                           |  | AE Sect V CSA 7662 and CSA W/50                      |           |            |                       |                                  |                 |  | pramic Exposure                                    |  |
| Material             | , cincations                          |  | $D_{5}$  |           | z, anu c   | on Dana               | ~                                |                 | 2.0  | 100  |  |
| Joint Type           |                                       | Butt \                                   | Nold   |           | mckne      | ss range              | <del>U</del>                     |                 | 2.0 mm ·   | - 160 mm   |  |
| DRAMING              |                                       |  |  |           |            |                       |                                  |                 |  |  |  |
|                      |                                       | UL.                                      |  |           |            |                       | Beam                             | Angle:          | Source c<br>Film<br>Pipe wal<br>Beam dii<br>90° Perp | of Radiation<br>I<br>rection<br>vendicular to weld |  |
|                      | 26                                    |  |  |           |            |                       |                                  |                 |  |  |  |
|                      |                                       | S  |  | 100       |            |                       |                                  |                 |  | 70   |  |
| Source Type          | IR 192                                | Sourc                                    | e size   | < 5.0 m   | ım         | Inickn                | ess ranç                         | je              | <u>  2mm -</u>                                       | - 70mm   |  |
| Strongth             | Min 15 Ci                             | Sourc                                    | e size   | < 7.0 m   | im<br>     | Inickn                | ess ranç                         | je              | 25mm   | -160mm   |  |
| Strength             | Min 15 Ci                             |  | sure   | As requ   | uired      | SFD                   |                                  | 0.5             |  | must meet Ug                                       |  |
| Coloulated Up Faster |                                       |  | ng<br>0"   | Single    |            | # of Exposures        |                                  | <b>i</b>        | 3 to 4   |  |  |
|                      | Factor                                | < 0.02                                   | 0"   | Max A     | lowable    | Ug Fac                | tor                              |                 |  | 0.020"   |  |
| Intensitying Sc      | Lead                                  |  | Tk. Fro  | ont       | 0.005"     |                       | IK Back                          |                 | 0.010"   |  |  |
| Film Designatio      | Class                                 | l or ll                                  | Brand  |           | Agfa or    | Kodak                 | No./ Cas                         | ssette          | 1 (one)  |  |  |
| Penetrameter Type AS |                                       |  | wire or AS   | ME Hole   | 2          | Design                | ation #                          | As per re       | eference   | d code.  |  |
| Essential Sens       | itivity                               | As per                                   | code   | Placem    | ient       | Source s              | side only                        | when accessible |  |  |  |
| Penetrameters        | per Film                              | N/A                                      | Α  |           |            |                       | ld                               | 3 @ 120         | l° apart   |  |  |
| Comparator Sh        | ims per Film                          | 1 (CSA                                   | 1 (CSA only)   |           |            | Per We                | ld                               | 3 @ 120         | l° apart   |  |  |
| Shim Used            |                                       | Only A                                   | ly ASME hole penetrameters                           |           |            | Thickn                | ess                              | 0.062" e        | ach  |  |  |
| Location Marke       | er Type                               | Lead #                                   | ad #   |           |            | Metric 🗆 Imperi       |                                  |                 |  |  |  |
| Location Marke       | er Placement                          | On par                                   | rt   |           |            | Source side D Film si |                                  |                 | side 🗹   |  |  |
| Density              |                                       | 2 to 4.0                                 | 0 H&D  |           |            | Area Taken Throug     |                                  |                 | ugh Weld   |  |  |
| Additional Info      | rmation                               | • Mu                                     | ust meet th  | e UG fac  | ctor with  | SFD                   |                                  | X               |  |  |  |
| Identification o     | n film                                | • As                                     | per specif   | ication - | Lead N     | umbers o              | r Flash                          |                 |  |  |  |
| PROCESSIN            | G AND STO                             | RAGE                                     | OF FIL M   | 1         |            |                       |                                  |                 |  |  |  |
| Method               | Manual                                |  | Develonin  | a Time    | 5 min      | Ites                  | Tompo                            | raturo          |  | 200  |  |
| Fixing time          | 3 minutes                             |  | Washing T  | ime       | 20 mi      |                       | Drving                           | Tomn            |  |  |  |
| Storage of Finie     | shed Radiogra                         | nhe [                                    | Placed in ir   | torloove  |            | monuolo               |                                  | Temp            |  | 150° F   |  |
| All processing a     | nd storage in ad                      | s.19(1                                   | )  | ME SE-6   | 999.<br>s. | 19(1)                 | эрс                              |                 |  |  |  |
|                      |                                       |  |  |           |            |                       |                                  |                 |  |  |  |
| <b>I</b>             | Г                                     | N  |  | T         | - SICN     | ATIIDE                |                                  |                 | DAGITIAN   |  |  |
|                      | Reviewed                              |  |  |           | ZIGN       | MUKE                  |                                  | ENIT I CO       | CD DT  |  |  |
|                      | A A A A A A A A A A A A A A A A A A A |  |  |           |            |                       |                                  | SINT / CG       | GSB RT III   |  |  |
|                      |                                       |  |  |           | r          | -                     | <u> </u>                         | Quality M       | anager   |  |  |
|                      |                                       |  |  |           | 1          |                       |                                  |                 |  |  |  |

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| (          | ACUR                      | Double Wall Exposure Method |                              |                |               |           |                      | Procedure RT-0016<br>Technique 3 |               |  |  |
|------------|---------------------------|-----------------------------|------------------------------|----------------|---------------|-----------|----------------------|----------------------------------|---------------|--|--|
| 1.00       | Procedure Used RTO        |                             |                              | 16             | T             | echnia    | ue Descr             | intion                           | Double        | Wall Exr   | osure  |
|            | Applicable specifications |                             |                              | Sect V C       | SA 7662       | and C     | SA W59               | ption                            | Double        |  |  |
|            | Material                  |                             |                              |                |               |           |                      |                                  |               |  | – 70 mm  |
|            | Joint Type                |                             | Butt W                       | v<br>leld      |               | montho    | Jo nungo             |                                  |               | 2.0 mm   | 7011111  |
|            | DRAWING C                 |                             |                              |                |               |           |                      |                                  |               |  | an a             |
|            |                           |                             |                              |                |               |           |                      | Beam                             | Angle:        | Source o<br>Film<br>Pipe wa<br>Beam di<br>90° Perp | of Radiation<br>II<br>irection<br>pendicular to weld |
|            |                           | DC                          |                              |                |               |           |                      |                                  |               |  |  |
|            |                           |                             | Source                       | cizo           | < 5 0 m       |           | Thickne              |                                  |               | 1 2mm  | 70mm   |
| -<br>-<br> | Source Type               | IN 192                      | Source Size                  |                | < 7.0 mm      |           | Thickne              | ss rang                          |               | 25mm   | - 70mm   |
|            | Strength                  | Min 15 Ci                   | Exposure                     |                |               | wired SED |                      |                                  |               | Pine Diameter                                      |  |
|            | Technique                 | Double Wall                 | Viewing                      |                | Single V      | Nall      | # of Evr             | Neuroe                           |               | 3 to 4   |  |
|            | Calculated Ug             | Factor                      | < 0.020                      | <u>ອ</u><br>)" | Max Allowable |           | HIG Fact             | or                               |               | 0.020"   |  |
|            | Intensifying Screens      |                             | Lead                         | ,              |               | nt        |                      |                                  | Tk Bacl       | k  | 0.020  |
|            | Film Designation          |                             | Class I                      | or II          | Brand         |           | Anfa or              | Kodak                            | No / Ca       | n<br>ccatta  | 1 (one)  |
|            | Penetrameter 1            | ASTM wire or ASME Hole      |                              |                |               | Designa   | ation #              | As ner r                         | eference      | d code   |  |
|            | Essential Sensitivity A   |                             |                              | rode           |               |           | Placem               | ont                              | As per r      | oference   | ed code  |
| ()         | Penetrameters per Film 1  |                             |                              | 1              |               |           |                      | d                                | $\frac{1}{2}$ |  |  |
| $\sim$     | Comparator Sh             | ims per Film                | 1 (CSA                       | 1 (CSA only)   |               |           |                      | d                                | 1/expo        |  |  |
|            | Shim Used                 |                             | Only ASME hole penetrameters |                |               |           | Thickness 0.062      |                                  | 0.062" e      | each   |  |
|            | Location Marke            | er Type                     | Lead #                       | Lead #         |               |           |                      | Metric D Imperi                  |               |  |  |
|            | Location Marke            | er Placement                | On part                      | <u>t</u>       |               |           | Source side □ Film s |                                  | Film sid      | side 🗹   |  |
|            | Density                   |                             | 2 to 4.0                     | H&D            |               |           | Area Ta              | ken                              | Through       | ugh Weld   |  |
| a<br>P     | Additional Info           | rmation                     | <ul> <li>Mu:</li> </ul>      | st meet th     | e UG fac      | tor with  | SFD                  |                                  | <u>y</u>      |  |  |
|            | Identification o          | n film                      | • As                         | per specif     | ication -     | ead N     | umbers of            | r Flash                          |               |  |  |
| 4<br>1     | PROCESSIN                 | G AND STO                   | RAGE                         |                | 1             |           |                      |                                  |               |  |  |
|            | Method                    | Manual                      |                              |                | a Timo        | 5 min     | itos                 | Tompo                            | raturo        |  | 690F   |
|            | Fiving time               | 3 minutes                   |                              | Vaching T      | 'ime          | 20 mi     |                      | Drving                           | Tomp          |  |  |
|            | Storage of Fini           | shed Padiogra               | nhe D                        | laced in ir    | torlogyo      | s and fi  | m onvolo             |                                  | Temp          |  | 150° F   |
|            | All processing a          | nd storage in ad            | s.19(1)                      | e with AS      | ME SE-9       | 99.       | s.19(1)              |                                  |               |  |  |
|            | ſ                         | T.                          | NI/                          | AME            |               | RIGN      | ATIPE                | T                                |               | DUGILI   |  |
|            |                           | 20viewod                    | INA                          | -1815-         |               | PIGIA     | ZIURE                |                                  |               | CD DT II   |  |
| 6          |                           | oval                        |                              |                | -             |           |                      |                                  | Junlihr M     |  | 1  |
|            |                           |                             |                              |                | 4             |           | -                    |                                  | zuality ivia  | anayer   | 1  |

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|----------------|----------------|
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| ACUR                                | Ell                              | Elliptical Exposure Method    |                                  |  |                        |                     | Procedure RT-0016<br>Technique 4 |  |  |   |  |
|-------------------------------------|----------------------------------|-------------------------------|----------------------------------|--|------------------------|---------------------|----------------------------------|--|--|---|--|
| Procedure Lie                       |                                  |                               | 16                               | .   т  | oobnig                 |                     | Intion                           |  |  |   |  |
| Applicable spe                      | cifications                      |                               | = Sect V C                       | N 7662   |                        |                     | iption                           | Elliptica                                      | II Exposi                              | ure   |  |
| Material                            | cincations                       |                               | -5ect v, 0                       |  | hickne                 | e Panac             |                                  | 1  | 5 0 mm                                 | 25 mm   |  |
| Joint Type                          |                                  | Butt V                        | Neld                             |  | mennes                 | ss hange            | 5                                |  | 5.0 1111                               | 1 - 25 mm   |  |
|                                     |                                  |                               | VCIG                             |  |                        |                     |                                  |  |  |   |  |
| A&B - 30° offse                     | t                                | <b>ОЕ</b><br>А&В              | - 90°                            |  |                        |                     |                                  | ۲  | Source                                 | of Radiation  |  |
|                                     |                                  |                               |                                  | Film<br>Pipe wall<br>Beam direction<br>Beam Angle: 90° Perpendicular |                        |                     |                                  |  | all<br>lirection<br>pendicular to weld |   |  |
| PARAMETE                            | RS                               |                               |                                  |  |                        |                     |                                  |  |  |   |  |
| Source Type                         | IR 192                           | Source                        | e size                           | < 5 0 n  | nm                     | Thickne             | ss rang                          | 16   | 2mm                                    | – 25 mm   |  |
| Strenath                            | h Min 15 Ci Evposure             |                               |                                  | As rea   | uired                  | SED                 | so raily                         | <b>1</b> 2                                     | 101 /                                  | <u>-23 mini<br/>tia minimum</u>   |  |
| Technique                           |                                  |                               |                                  | Double   | Wall                   | # of Fx             | nsures                           |  |  |   |  |
| Calculated Ug                       | alculated Ug Factor              |                               |                                  | Max A  | x Allowable Ug F       |                     | Factor                           |  |  | 0.020"  |  |
| Intensifying Sc                     | Lead                             | •                             | Tk. Fr                           | ont  | 0.005" Tk Ba           |                     | Tk Bac                           | k  | 0.020                                  |   |  |
| Film Designation                    | Class I                          | orll                          | Brand                            | 5116   | Agfa or Kodak No / C   |                     | No/Ca                            | n<br>Issette                                   | 1 (one)                                |   |  |
| Penetrameter ]                      | ASTM                             | wire or ASM                   | AE Hole                          |  | Design                 | ation #             | As per                           | referenc                                       | ed code                                |   |  |
| Essential Sens                      | itivity                          | Asper                         | code                             |  |                        | Placem              | ent                              | Source   | Side                                   |   |  |
| Penetrameters                       | ner Film                         | 1                             |                                  |  |                        | Por Wo              |                                  |  | ° onort                                |   |  |
| Comparator Sk                       | per r nin                        | 1 (CSA only)                  |                                  |  |                        |                     |                                  | 2 @ 90   | apart                                  |   |  |
| Comparator 3                        |                                  | Only ASME hole ponetrameters  |                                  |  |                        | This                |                                  | 2 @ 90   | <u>° aparτ</u>                         |   |  |
| Sillin Used                         |                                  | Unity ASME note penetrameters |                                  |  | Metric D Imperi        |                     | 0.062 (                          |  |  |   |  |
| Location Marke                      | er Type                          | Lead #                        |                                  |  | Source side D Film si  |                     |                                  |  |  |   |  |
| Density                             | er Placement                     | On part                       |                                  |  |                        |                     |                                  |  |  |   |  |
| Density<br>Additional Info          | rmation                          | 2 to 4.0 H&D                  |                                  |  |                        | Area laken   Inroug |                                  |  | jn vveid                               |   |  |
| Additional into                     | rmation                          | IVIU                          | Must meet the UG factor with SFD |  |                        |                     |                                  |  |  |   |  |
| Identification o                    | on tiim                          | l● As                         | per specific                     | cation -   | Lead N                 | umbers o            | r Flash                          | and the first of the state of the state of the |  | and an and a stand of the stand o |  |
| PROCESSIN                           | G AND STO                        | RAGE                          | OF FILM                          |  |                        |                     |                                  |  |  |   |  |
| Method                              | Manual                           | 0                             | Developing                       | Time   | 5 min                  | utes                | Tempe                            | erature  |  | 68°F  |  |
| Fixing time                         | 3 minutes                        | V                             | Nashing Ti                       | me   | 20 mi                  | nutes               | Drying                           | Temp   |  | 150°F   |  |
| Storage of Fini<br>All processing a | shed Radiogra<br>nd storage in a | 19(1)                         | Placed in inf<br>ce with ASN     | terleave:<br>IE SE-9   | <u>s and fi</u><br>99. | Im envelo           | 1)                               |  |  |   |  |
|                                     |                                  |                               |                                  |  |                        | 3.13(               | • ]                              |  |  |   |  |
| Γ                                   |                                  | N                             | AME                              |  | SIGN                   | ATURE               |                                  |  | POSITION                               |   |  |
| I ava I                             | Reviewed                         |                               |                                  |  | 7                      |                     |                                  |  |  |   |  |
|                                     | roval                            |                               |                                  | +  |                        | SN1/CGSBRI          |                                  |  |  |   |  |
|                                     |                                  |                               |                                  | 4  |                        |                     |                                  | Juanty M                                       | anager                                 |   |  |
|                                     |                                  |                               |                                  |  |                        |                     |                                  |  |  |   |  |

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| , i | ACUR                  | EN                     | ¢                       | Super         | impo            | sed E   | xposur   | e Met    | hod                                    | Pr   | ocedure RT-0016<br>Technique \$                        |
|-----|-----------------------|------------------------|-------------------------|---------------|-----------------|---|----------|----------|--|--|--|
|     | Procedure Use         | ed                     | RT0016                  | 6             | Т               | echnia  | ue Descr | iption   | Superin                                | nposed I                                       | Exposure   |
| :   | Applicable spe        | ecifications           | ASME                    | Sect V, CS    | A Z662          | , and C   | SA W59   |          |  |  |  |
|     | Material              |                        | P1 – P                  | 5             | T               | hicknes   | ss Range | ;        |  | 5.0 mm   | – 25 mm  |
|     | Joint Type            |                        | Butt We                 | eld           |                 |   |          |          |  |  |  |
|     |                       |                        | A<br>-                  | B             | C<br>•          | ·   |          | Beam     | Angle:                                 | Source<br>Film<br>Pipe wa<br>Beam d<br>90° Per | of Radiation<br>III<br>lirection<br>pendicular to welc |
|     | PARAMETE              | RS                     |                         |               |                 | i na seconda en la contra de prese de porte de la |          |          |  |  |  |
|     | Source Type           | IR 192                 | Source                  | size          | < <u>5.</u> 0 n | nm  | Thickne  | ess rang | je                                     | 2mm  | – 25 mm  |
|     | Strength              | Min 15 Ci              | Exposu                  | re ci/sec     | As req          | uired   | SFD      |          |  | 10X c  | lia. minimum   |
|     | Technique             | Double Wall            | Viewing                 |               | Double          | e Wall  | # of Ex  | osures   |  | 3  |  |
|     | Calculated Ug         | Factor                 | < 0.020"                |               | Max A           | llowab  | e Ug Fac | ctor     |  |  | 0.020"   |
|     | Intensifying So       | creens                 | Lead                    |               | Tk. Fr          | ont   | 0.005"   |          | Tk Bac                                 | k  | 0.010"   |
|     | Film Designati        | on                     | Class I c               | or II         | Brand           |   | Agfa or  | Kodak    | No./ Ca                                | ssette   | 1 (one)  |
|     | Penetrameter          | Гуре                   | ASTM w                  | vire or ASN   | IE Hole         |   | Design   | ation #  | As per r                               | eference                                       | ed code.   |
|     | Essential Sensitivity |                        | As per c                | ode           | -               |   | Placem   | ent      | Source                                 | Side   |  |
|     | Penetrameters         | Penetrameters per Film |                         |               |                 |   | Per We   | ld       | 1                                      |  |  |
|     | Comparator S          | nims per Film          | 1 (CSA 0                | only)         |                 |   | Per We   | d        | 3@45                                   | <sup>,</sup> angle b                           | between  |
|     | Shim Used             |                        | Only AS                 | ME hole pe    | enetran         | neters  | Thickne  | ess      | 0.062" e                               | each   |  |
|     | Location Mark         | er Type                | Lead # A                | А, В, С       |                 |   | Metric E | 1        | Imperia                                |  |  |
|     | Location Mark         | er Placement           | On part                 |               |                 |   | Source   | side 团   | Film sid                               | е 🗆  |  |
|     | Density               |                        | 2 to 4.0                | H&D           |                 |   | Area Ta  | iken     | Through                                | n Weld   |  |
|     | Additional Info       | ormation               | <ul> <li>Mus</li> </ul> | t meet the    | UG fac          | tor with  | SFD      |          |  |  |  |
|     | Identification of     | on film                | ● Asp                   | er specific   | ation - I       | _ead Nu   | umbers o | r Flash  | o vých kladní kladní zakratní kladní k |  |  |
|     | PROCESSIN             | IG AND STO             | RAGE C                  | OF FILM       |                 |   |          |          |  |  |  |
|     | Method                | Manual                 | De                      | eveloping     | Time            | 5 minu  | utes     | Tempe    | rature                                 |  | 68°F   |
|     | Fixing time           | 3 minutes              | W                       | ashing Tir    | ne              | 20 mir  | nutes    | Drying   | Temp                                   |  | 150° F   |
|     | Storage of Fini       | shed Radiogra          | phs Pla                 | aced in inte  | erleave         | s and fil   | m envelo | ре       |  |  |  |
|     |                       |                        | s.19                    | 9(1)          |                 |   | s.19(1)  |          |  |  |  |
|     |                       |                        |                         | AME SIGNATURE |                 |   |          | POSITION |  |  |  |
|     | QA App                | roval                  |                         |               |                 |   |          |          | Quality M                              | anager   |  |
|     | Pe                    |                        |                         |               |                 | A118, 2000  |          |          |  |  | F 1  |
|     |                       |                        |                         |               |                 |   |          |          |  |  |  |

| ACUR                                     | Elli                          | Elliptical / Contact Exposure<br>Method |  |                            |  |  | Pr                     | ocedure RT-0016<br>Technique 6 |  |  |  |
|--|-------------------------------|---|--|----------------------------|--|--|------------------------|--------------------------------|--|--|--|
| Procedure Use                            | Procedure Used RT0016         |   |  |                            | e Desc   | ription  | FI                     | intical/ Co                    | ntact Ex                                   | nosure                                   |  |
| Applicable spe                           | cifications                   | ASME                                    | Sect V. CSA  | Z662                       | and CS   | A W59  |                        |                                | intaot L                                   |  |  |
| Material                                 |                               | P1 – P                                  | 5  |                            | hickne   | ss Range   | 20                     | ) mm – 25                      | imm  |  |  |
| Joint Type                               | eld                           |   |  | <u></u>                    |  | / 20   |                        |                                |  |  |  |
| DRAWING                                  | E TECHNIC                     |   |  |                            |  | alater anvelation and a state time. Victoria i Seconda |                        |                                |  |  |  |
| A - 30° offset                           |                               |   | 2 Contact exposures  |                            |  |  |                        | ۲                              | Source Film                                | of Radiation                             |  |
|  |                               | One                                     | each side B  | & C                        |  |  |                        |                                | Pipe wa<br>Beam d                          | ll<br>irection                           |  |
|  |                               | ¢                                       |  | $\supset$                  |  |  | Beam                   | Angle:                         | 90° Per                                    | pendicular to weld                       |  |
| PARAMETER                                | RS                            |   |  |                            |  |  |                        |                                |  | n an |  |
| Source Type                              | IR 192                        | Sourc                                   | e size   | < 5.0 n                    | nm   | Thickne  | ess rand               | ae                             | 2mm  | – 25 mm                                  |  |
| Strength                                 | Min 15 Ci                     | Expo                                    | SURE ci/sec  | As rea                     | uired  | SFD  |                        | <u>.</u>                       | 10X d                                      | ia. For A                                |  |
| J. J |                               |   |  |                            |  |  |                        |                                | Pipe                                       | tia. For B&C                             |  |
| Technique                                | Double Wall                   | Viewi                                   | ng   | Double                     | Wall   | # of Exp   | osures                 | s 3                            |  |  |  |
| Calculated Ug F                          | Calculated Ug Factor          |   |  | Max A                      | Max Allowable                                    |  | le Ug Factor           |                                | 1 -  | 0.020"                                   |  |
| Intensifying Sci                         | Intensifying Screens          |   |  | Tk. Fro                    | ont  | 0.005"   |                        | Tk Back                        | <  | 0.010"                                   |  |
| Film Designatio                          | Class                         | l or ll                                 | Brand  | Adfa or Koo                |  | Kodak  | No./ Cassette          |                                | 1 (one)                                    |  |  |
| Penetrameter T                           | ASTM                          | TM wire or ASME H                       |  |                            | Designatio                                       |  | As per A               | SME V                          | Art 2 table T-276                          |  |  |
| <b>Essential Sensi</b>                   | 2T                            |   |  |                            | Placem   | ent  | Source                 | side whe                       | en accessible                              |  |  |
| Penetrameters                            | 1                             | 1                                       |  |                            |  | ld   | 1                      |                                |  |  |  |
| Comparator Shi                           | ms per Film                   | N/A                                     | N/A  |                            |  | Per We   | ld                     | N/A                            |  |  |  |
| Shim Used                                |                               | N/A                                     |  |                            |  | Thickne  | ess                    | N/A                            |  |  |  |
| Location Marke                           | г Туре                        | Lead # A. B. C                          |  |                            |  | Metric 🗹 Impe  |                        |                                | П  |  |  |
| Location Marke                           | r Placement                   | On part                                 |  |                            | Source   | -<br>side M  | Film side              | e 🗹 for l                      | B&C  |  |  |
| Density                                  |                               | 2 to 4 0 H&D                            |  |                            |  | Area Taken Through Weld                                |                        |                                |  |  |  |
| Additional Infor                         | mation                        |   | A Minimum offset at 30° for Expos  |                            |  |  | osure A (must ellipse) |                                |  |  |  |
|  |                               |   | <ul> <li>Minimum onset at sol tor Exposure A (must empse).</li> <li>Contact shots for B &amp; C are opposite sides of topgonto.</li> </ul> |                            |  |  |                        |                                |  |  |  |
|  |                               | • SI                                    | -D at diame  | ter of we                  | uld  | pposite s  |                        | angenta.                       |  |  |  |
| Identification or                        | ı film                        |   | per specifi  | cation                     | and N  | umbore o   | r Eloch                |                                |  |  |  |
| DDOCESSIN                                |                               |   |  | Janon - 1                  |  |  | 1 10311.               |                                |  |  |  |
| Mathad                                   |                               |   |  |                            |  |  | -                      |                                |  |  |  |
|  | Ivianuai                      |   | Developing   | lime                       | 5 min  | utes   | Tempe                  | erature                        |  | 68°F                                     |  |
| Fixing time                              |                               | s                                       | wasning i  | me                         | 20 mi  | nutes  | Drying                 | JTemp                          |  | 150° F                                   |  |
| All processing ar                        | nd storage in a               | accordan                                | ce with ASN  | AE SE-9                    | 99.  |  |                        |                                |  |  |  |
|  |                               |   | s.19(1)  |                            |  | s.19(1)  |                        |                                | n den en en en ander son de state de state |  |  |
| ſ  | T                             | N                                       | IAME   | T                          | GN   | ATURE  | T                      |                                | POSITI                                     | ON                                       |  |
| Level III R                              | leviewed                      | -                                       |  |                            |  | <u> </u>   |                        | SNT/CGSR RT III                |  |  |  |
| QA Appro                                 | val                           |   |  | $\pm$                      |  |  |                        | Quality Ma                     | anader                                     | <u>.</u>                                 |  |
| <u>  </u>                                | an tiin an an tiin an tiin ta |   |  |                            |  | /  | <u> </u>               |                                |  |  |  |
|  |                               |   | T T  | <u>Makanan any samu</u> ny | <u>, waa waa ca waa ahaa ahaa ahaa ahaa ahaa</u> |  | T                      |                                |  |  |  |

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| When electronic document is printed it will be considered uncontrolled |                |              |  |  |  |  |



| Procedure Used               | RT-0016   |  |  |  |  |  |  |  |  |
|------------------------------|---|--|--|--|--|--|--|--|--|
| <b>Technique Description</b> | Calculation of wall thickness with shadow shot radiography  |  |  |  |  |  |  |  |  |
| Applicable Specification     | Providing information for client evaluation   |  |  |  |  |  |  |  |  |
| Material                     | Ferrous and Non ferrous Weld Types N/A  |  |  |  |  |  |  |  |  |
| Method                       | Projection of wall thickness to large format film.  |  |  |  |  |  |  |  |  |
| Equipment:                   | <ul> <li>Flat 14" x 17" or larger film holder with proper straps to secure film to part.</li> <li>Cobalt 60, Iridium 192, or X-Ray may be used to produce acceptable results. Choice is dependent upon the thickness range, and/or location or the component.</li> <li>Jig for positioning source and holding in stable position during exposure.</li> <li>Film cassettes of appropriate size to provide coverage</li> <li>Film</li> <li>Penetrameters</li> <li>Tungsten collimator</li> <li>High intensity viewer.</li> <li>Single edge razor blade for removing emulsion.</li> <li>Standard block of known thickness or diameter.</li> </ul>  |  |  |  |  |  |  |  |  |
| Planning                     | <ol> <li>Discuss the orientation with the client to ensure the desired positioning of<br/>the test is relative to the evaluation for traceability. This is normally in the<br/>horizontal or vertical position to determine corrosion or pitting in a<br/>selected area. (See figure 1)</li> <li>In most situations the exposure will only be in one direction at 90 degrees<br/>to the part, and utilize only one exposure per location. Verify with client.</li> <li>Select the film speed based on what the client's expectations are. Best<br/>industry practice is to select a fast film with lower contrast and higher grain<br/>to meet the productivity needs. The sensitivity provided is high due to the<br/>greater source to film distance (SFD).</li> <li>When requested by the client a standard may be used as a comparison tool<br/>to provided accuracy of the calculations.</li> <li>The set-up and technical information in the datasheet (Table 1) attached<br/>will provide best quality results.</li> </ol> |  |  |  |  |  |  |  |  |

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|                        | _  |   |
|------------------------|----|---|
| General set up         | 1. | Set-up the jig and collimator in exposure position.   |
| procedure              | 2. | Perform a test pocket dosimeter shot on opposite side of the part to  |
|                        |    | determine exposure time.  |
|                        | 3. | Position an attenuative material approximately 1 inch x 3 inches to block   |
|                        |    | out radiation in the top left hand corner of the film. This is for the Flash  |
|                        |    |   |
|                        | 4. | Position the film on the part 90 degrees perpendicular to the source  |
|                        |    | • Ensure that the film remains flat and is not curved. Measure from both  |
|                        |    | sides of the edge of the film to ensure distance is equal.  |
|                        |    | • Take care to prevent pressure marks due to handling and positioning the film.   |
|                        |    | • If a physical standard is used for comparison, position at the same distance where measurements will be compared. See technique |
|                        |    | drawing.  |
|                        |    | • It is critical to record and report orientation of the radiograph. (See figure 1.)  |
|                        | 5. | Take precautions to prevent movement of all equipment and film.   |
|                        | 6. | Project source and expose film for pre-determined time  |
|                        | 7. | Process film.   |
|                        |    |   |
|                        | 1  |   |
| Methods of determining | 1. | <u>Projected comparison</u>   |
| the wall thickness     |    | • Formulas  |
|                        |    | Actual wall thickness = Known outside diameter X Projected wall thickness   |
|                        |    | Projected outside diameter  |
|                        |    | Drainated $OD/Actual OD - Datia (then with this ratio)$   |
|                        |    | Projected OD/Actual OD = Ratio, (then with this ratio):   |
|                        |    | Actual wall = ratio x projected wall  |
|                        |    |   |
|                        |    |   |
|                        |    | -   |
|                        |    |   |

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|                |                |              |



|           | <ul> <li><u>Client is normally responsible for evaluation of the results.</u></li> <li>Acuren will provide calculations in accordance with this technique when requested by the client.</li> <li><u>Recommendations to assist in the evaluation</u></li> <li>If range of the radiographic density is high in the area of interest, a good practice is to remove the emulsion from one side of the film with</li> </ul>   |
|-----------|--|
|           | a single edge razor blade. This allows a reduction in the density and<br>permits easier measurement from the edges of the projected wall<br>thickness.   |
|           | • Swab the area of measurement with a damp cloth to soften the emulsion.   |
|           | • Once the emulsion is softened, position flat against the viewer and scrape the emulsion <u>only from the outer wall</u> with a smooth angular motion.  |
| Reporting | Identification on the radiograph.  |
|           | <ul> <li>Flash or lead numbers providing the Acuren name or logo, client name, ID number, date, part or line number. Best practice is with the flash in the top left hand corner utilizing a lead block or other similar material positioned during exposure to white out the area for the flash. This provides a small detailed identification of the identification.</li> <li>Data to be Recorded on Acuren Report Form (s)</li> <li>As per RT-0016</li> </ul> |

| Lead # | Designation |                               |  |
|--------|-------------|-------------------------------|--|
| Т      | Тор         | Film &<br>Lead #<br>positions |  |
| N      | North       |                               |  |
| Е      | East        |                               |  |
| W      | West        |                               |  |
| S      | South       |                               |  |

Figure 1

s.19(1)

s.19(1)

|                        | NAME | SIGNATURE | POSITION          |
|------------------------|------|-----------|-------------------|
| Level III Reviewed     |      |           | SNT / CGSB RT III |
| QA Approval            |      |           | Quality Manager   |
|                        |      |           |                   |
|                        |      |           |                   |
| <b>D</b> • • • • • • • |      |           |                   |

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|                                |   | Table 1                   |  |                                 |                          |                  |                                       |                            |  |  |  |  |
|--------------------------------|---|---------------------------|--|---------------------------------|--------------------------|------------------|---------------------------------------|----------------------------|--|--|--|--|
| Procedure Us                   | Procedure Used RT0016   |                           |  |                                 |                          |                  |                                       |                            |  |  |  |  |
| Technique De                   | Technique Description         Wall thickness evaluation with radiography              |                           |  |                                 |                          |                  |                                       |                            |  |  |  |  |
| Applicable sp                  | Applicable specifications ASME Sect V, Article 2                                      |                           |  |                                 |                          |                  |                                       |                            |  |  |  |  |
| Material                       |   | N/A                       | Thickness R  | Thickness Range2.0 mm - 160 mm  |                          |                  |                                       |                            |  |  |  |  |
| Joint Type                     |   | N/A                       |  |                                 |                          |                  |                                       |                            |  |  |  |  |
| Drawing:                       | Drawing:<br>Source of Radiation<br>Film on rigid board<br>Pipe wall<br>Beam direction |                           |  |                                 |                          |                  |                                       |                            |  |  |  |  |
|                                |   |                           | Image: Physical Comparator Standard         Beam Angle:       90 degrees Perpendicular to weld         Image: Physical Comparator Standard         Beam Angle:       90 degrees Perpendicular to weld         Image: Physical Comparator Standard         Beam Angle:       90 degrees Perpendicular to weld         Image: Physical Comparator Standard         Penetrameter in contact film side |                                 |                          |                  |                                       | dard<br>to weld<br>Im side |  |  |  |  |
| Parameters<br>Common Type      | TD 102  |                           |  |                                 | -                        |                  |                                       |                            |  |  |  |  |
| Source Type                    | IK 192  | Source size               | < 5.0 mm   |                                 | kness rai                | nge              | 2.0  mm - 70  mm                      |                            |  |  |  |  |
| Source type                    |   | Source size               | < /.0 mm   |                                 | kness rai                | ness range       |                                       | - 160 mm                   |  |  |  |  |
| Strength                       | preferred.  | I Exposure                | As required  | SFD                             | v                        |                  | 7 x diameter                          |                            |  |  |  |  |
| Technique                      | Single Wall   | Viewing                   | Single Wall  | <b># of</b> ]                   | Exposure                 | es               | 1                                     |                            |  |  |  |  |
| Calculated Ug                  | Factor  | N/A                       | Max Allowa   | ble Ug F:                       | actor                    |                  | N/A                                   |                            |  |  |  |  |
| Intensifying S                 | creens  | Lead                      | Thk Front  | .005"                           | Thk B                    | ack              | .010"                                 |                            |  |  |  |  |
| Film Designati                 | ion   | Class II<br>preference    | Brand Ag   | Brand Agfa D7<br>Kodak AA       |                          | Per C            | Per Cassette 1 (one)                  |                            |  |  |  |  |
| Penetrameter                   | Туре  | ASTM wire or<br>ASME Hole | Designation  | Designation # U                 |                          |                  | Specificat                            | ion based on               |  |  |  |  |
| <b>Essential Sens</b>          | itivity   | N/A                       | Placement  |                                 | Film si                  | ide              |                                       |                            |  |  |  |  |
| Penetrameters                  | s per Film  | 1                         |  |                                 | 1~-                      |                  |                                       |                            |  |  |  |  |
| <b>Comparator S</b>            | tandard   | 1                         | Location   | As per                          |                          | r figure 1       |                                       |                            |  |  |  |  |
| Shim Used                      |   | None                      | Thickness  | Thickness                       |                          | N/a              |                                       |                            |  |  |  |  |
| Location Mar                   | ker Type  | Lead #                    | -  |                                 | 4                        |                  |                                       |                            |  |  |  |  |
| Location Mar                   | ker Placement   | On part                   | Source side Film side  |                                 |                          |                  |                                       |                            |  |  |  |  |
| Density                        |   | 1.2 to 2.0 H&D            | 1.2 to 2.0 H&D Area Taken  |                                 | Through double wall area |                  |                                       |                            |  |  |  |  |
| Additional Inf                 | formation   | Density specif            | ied above is no  | t critical.                     | <b>T</b>                 | material provide |                                       |                            |  |  |  |  |
| Identification                 | on film   | Lead Numbers              | s or Flash – To  | o left corr                     | ler or Top               | p cente          | er of wall                            | area.                      |  |  |  |  |
| Processing and Storage of Film |   |                           |  |                                 |                          |                  |                                       |                            |  |  |  |  |
| Method                         | hod Manual Developing Time  |                           | 5 minutes  | Temperature                     |                          | 68°              |                                       |                            |  |  |  |  |
| Fixing time                    | Fixing time 3 minutes W   |                           | 20 minutes   | inutes <b>Drying Temp</b> 150°F |                          | 'F               | · · · · · · · · · · · · · · · · · · · |                            |  |  |  |  |
| Storage of Fin                 | ished Radiographs   | Placed in int             | erleaves and fi  | lm envelc                       | pe                       |                  |                                       |                            |  |  |  |  |
|                                |   |                           |  |                                 |                          |                  |                                       |                            |  |  |  |  |

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