

CIRCULAR

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Person in charge : Choi Dae-gon

To : All Surveyors and whom it may concern

No : 2017-8-E

Date : 2017.12.05

Subject	9.106 Notice for Amendments of welder and welder performance qualification scheme (Rules and Guidance Part 2)
Application	Welder or welding operator qualification which is applied for approval on or after 1st January 2018

1. Please be informed that the amendments have been made to the following Rules/Guidance for the Classification of Steel Ships 2017 as attachment to reflect IACS UR W32(New) which are to be applied on or after 1 January 2018. You are kindly requested to apply the amendments on the relevant works according to effective date.
 - (1) Rules for the Classification of Steel Ships Pt 2 Materials and Welding
 - (2) Guidance for the Classification of Steel Ships Pt 2 Materials and Welding
2. Furthermore, please be informed that the amendments will be included in 2018 edition on KR Technical Rules which will be published in the first half of 2018.

Attachments: Amended KR Technical Rules --- each 1 copy. (The End)



Kim Chang-wook

Executive Vice President, Technical Division

< Attachment >

Amended Rules for Classification(Steel Ships)
(Part 2 Materials and Welding)



Machinery Rule Development Team

- Main Amendments -

(1) Enter into force on 1 January 2018

- (a) Applications for welder or welding operator qualification dated on or after 1 January 2018. However these amendments do not invalidate welder's qualifications issued and accepted by the Society before 1 January 2018 provided the welder's qualifications are considered by the Society to meet the technical intent of these amendments. These qualifications are to be renewed in accordance with these amendments latest by 31 December 2020.
- (b) The welder's or welding operator's qualifications which have not been required by current Rules before 1 January 2018, such as tack welders and automatic welders, are to be initially issued in accordance with these amendments by 31 December 2020 at the latest.

● To reflect Request for Establishment/Revision of Classification Technical Rules
- IACS UR W32(New, Sept 2016)

Present	Amendment
<p style="text-align: center;">CHAPTER 1 <Omitted></p> <p style="text-align: center;">CHAPTER 2 WELDING</p> <p style="text-align: center;">Section 1 ~ Section 4 <Omitted></p> <p style="text-align: center;">Section 5 <u>Welders and Welder Performance Qualification Tests</u></p> <p>501. General</p> <ol style="list-style-type: none"> 1. Each welder intended to engage in the manual and semi-automatic welding work specified in this Section is to pass the performance qualification tests required according to the applicable welding process, welding position and kinds of materials to be welded and to have the performance qualification by the Society. 2. Welders engaged in tack welding should be qualified for either butt welds or fillet welds, for the welding process and the position corresponding to the joint to be welded. If requested, the Society may qualify those welders engaged in tack welding works only in accordance with the Guidance in relating to Rules. [See Guidance] 3. Welding operators intended to engage in automatic welding work are to be those skillful for the actual welding work in which they will engage. If requested, the Society may qualify those welding operators engaged in automatic welding works only in accordance with the Guidance in relating to Rules. [See Guidance] 4. The performance qualification test of welder intended to engage in the special material and welding work not prescribed in this Section are to be at the discretion of the Society. [See Guidance] 5. The application of more suitable requirements instead of the requirements of this Section is left to the discretion of the Society. [See Guidance] 	<p style="text-align: center;">CHAPTER 1 <Same as the present Rules></p> <p style="text-align: center;">CHAPTER 2 WELDING</p> <p style="text-align: center;">Section 1 ~ Section 4 <Same as the present Rules></p> <p style="text-align: center;">Section 5 <u>Welders and Welder Performance Qualification Scheme (2018)</u></p> <p>501. General</p> <ol style="list-style-type: none"> 1. <u>Each welder intended to engage in the welding work for shipbuilding and repair is to pass the performance qualification tests required according to the applicable welding process, welding position and kinds of materials to be welded and to have the performance qualification by the Society.</u> 2. <u>Welders engaged in tack welding are to pass the performance qualification tests and should be qualified for tack welds in accordance with the requirements in this Section. A welder qualified for butt or fillet welding can be engaged in tack welding for the welding process and position corresponding to those permitted in his certificate.</u> 3. <u>Welding operators responsible for setting up and/or adjustment of fully mechanized and automatic equipment, such as submerged arc welding, gravity welding, electro-gas welding and MAG welding with auto-carriage, etc., must be qualified whether they operate the equipment or not. However a welding operator, who solely operates the equipment without responsibility for setting up and/or adjustment, does not need qualification provided that he has experience of the specific welding work concerned and the production welds made by the operators are of the required quality.</u> 4. <u>The performance qualification test of welder intended to engage in the special material and welding work not prescribed in this Section are to be at the discretion of the Society. [See Guidance]</u> 5. <u>The training of welders, control of their qualification and maintenance of their skills are the responsibility of shipyards and manufacturers. The Surveyor is to verify and be satisfied that the welders are appropriately qualified.</u>

Present

6. <New>

502. Grades, and range of qualification

1. A welder should be qualified in relation to the variables such as base material, welding process, type of welded joint, plate thickness and welding position.

2. Welding processes

(1) The welding processes for welder's qualification are to be classified in **Table 2.2.12-1**.

Table 2.2.12-1 Welding processes for welder's qualification

Symbol	Welding process in actual welding works	
M	Manual welding	Shield Metal Arc Welding(SMAW)
S	Semi-automatic welding	(1) Flux Cored Arc Welding(FCAW) (2) Gas Metal Arc Welding(GMAW)
T	TIG welding	Gas Tungsten Arc Welding(GTAW)

(2) A welder intended to engage in the multi-process welding work is to pass the separate performance qualification tests for each welding process.

Amendment

6. Welders or welding operators qualified in accordance with national or international welder qualification standards may also be engaged in welding of hull structures at the discretion of the Society provided that the qualification testing, range of approval and revalidation requirements are considered equivalent to this Section.

502. Grades, and range of qualification

1. A welder should be qualified in relation to the variables such as base material, welding process, welding consumables type, type of welded joint, plate thickness and welding position.

2. Welding processes

(1) The welding processes for welder's qualification are to be classified in **Table 2.2.12**.

Table 2.2.12 Welding processes for welder's qualification

Symbol	Welding process in actual welding works ⁽¹⁾⁽²⁾		ISO 4063
M	Manual welding	Shield Metal Arc Welding(SMAW)	<u>111</u>
G	Gas welding	Gas Welding(GW)	<u>31</u>
S	Semi-automatic welding	(1) Metal Inert Gas welding(MIG) (2) Metal Active Gas welding(MAG) (3) Flux Cored Arc Welding(FCAW)	<u>131</u> <u>135, 138</u> <u>136</u>
T	TIG welding	Gas Tungsten Arc Welding(GTAW)	<u>141</u>
A	Automatic welding	(1) Submerged Arc Welding(SAW) (2) Gravity Welding(GRW) (3) Electro-gas Welding(EGW) (4) Electro-slag Welding(ESW)	<u>121</u> <u>112</u> <u>73</u> <u>72</u>

NOTES:

(1) Each testing normally qualifies only for one welding process. A change of welding process requires a new qualification test. Welders who have passed qualification tests for semi-automatic welding or TIG welding may be similarly regard as the welder responsible for setting up and/or adjusting of the welding process using an auto-carriage in the range of qualification for the qualification they qualified.

(2) It is permitted for a welder to be qualified for two or more welding processes by welding a single test piece with multi-process joint and sequence or by two or more separate qualification tests. The sequence of welding processes can not be changed.

Present	Amendment
<p data-bbox="331 193 465 220"><u>3. <New></u></p>	<p data-bbox="1171 193 1491 220"><u>3. Welding consumables</u></p> <ul data-bbox="1205 236 1973 448" style="list-style-type: none"><li data-bbox="1205 236 1973 328">(1) <u>The welding consumable covers qualification of the welder or welding operator for the welding of all other consumables within base material group classified as specified in 5..</u><li data-bbox="1205 328 1973 389">(2) <u>For manual welding, qualification tests are required using basic, acid or rutile covered electrodes.</u><li data-bbox="1205 389 1973 448">(3) <u>Welding with filler material qualifies for welding without filler material, but not vice versa.</u>

Present					Amendment																																																						
<p>3. Types of welded joint</p> <p>(1) The types of welded joint for welder's qualification are to be classified as shown in Table 2.2.12-2 in accordance with the qualification test.</p> <p>Table 2.2.12-2 Types of welded joint for welder's qualification</p> <table border="1"> <thead> <tr> <th colspan="4">Type of welded joint used in the test assembly for the qualification test⁽¹⁾</th> <th>Type of welded joint qualified</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Butt weld</td> <td rowspan="2">Single sided weld⁽²⁾</td> <td>With backing</td> <td><u>WB</u></td> <td><u>WB, FW</u></td> </tr> <tr> <td>Without backing</td> <td><u>NB</u></td> <td><u>WB, NB, FW</u></td> </tr> <tr> <td>Fillet weld</td> <td></td> <td>-</td> <td><u>FW</u></td> <td><u>FW</u></td> </tr> </tbody> </table> <p>NOTES:</p> <p>(1) A qualification test performed using butt weld test assembly for pipes automatically qualifies butt weld test for plates.</p> <p>(2) A qualification test performed using single sided weld automatically qualifies double sided weld.</p>					Type of welded joint used in the test assembly for the qualification test ⁽¹⁾				Type of welded joint qualified	Butt weld	Single sided weld ⁽²⁾	With backing	<u>WB</u>	<u>WB, FW</u>	Without backing	<u>NB</u>	<u>WB, NB, FW</u>	Fillet weld		-	<u>FW</u>	<u>FW</u>	<p>4. Types of welded joint</p> <p>(1) The types of welded joint for welder's qualification are to be classified as shown in Table 2.2.13 in accordance with the qualification test.</p> <p>Table 2.2.13 Types of welded joint for welder's qualification</p> <table border="1"> <thead> <tr> <th colspan="4">Type of welded joint used in the test assembly for the qualification test</th> <th>Type of welded joint qualified</th> </tr> </thead> <tbody> <tr> <td rowspan="6">Butt weld</td> <td rowspan="3">Single Sided weld</td> <td>with Material Backing</td> <td><u>SS MB</u></td> <td><u>SS MB, DS MB, SL, ML</u></td> </tr> <tr> <td>with Gas Backing</td> <td><u>SS GB</u></td> <td><u>SS MB, SS GB, DS MB, SL, ML</u></td> </tr> <tr> <td>with No Backing</td> <td><u>SS NB</u></td> <td><u>SS MB, SS NB, SSGB, DS MB, DS NB, SL, ML</u></td> </tr> <tr> <td rowspan="2">Double Sided weld</td> <td>with gouging</td> <td><u>DS MB</u></td> <td><u>SS MB, DS MB, SL, ML</u></td> </tr> <tr> <td>without gouging</td> <td><u>DS NB</u></td> <td><u>SS MB, DS MB, DSNB, SL, ML</u></td> </tr> <tr> <td rowspan="2">Fillet weld</td> <td>Single Layer weld</td> <td>-</td> <td><u>SL</u></td> <td><u>SL</u></td> </tr> <tr> <td>Multi-Layer weld</td> <td>-</td> <td><u>ML</u></td> <td><u>SL, ML</u></td> </tr> </tbody> </table> <p>(2) <u>Welders engaged in full/partial penetration T welds are to be qualified for butt welds for the welding process and the position corresponding to the joints to be welded.</u></p>					Type of welded joint used in the test assembly for the qualification test				Type of welded joint qualified	Butt weld	Single Sided weld	with Material Backing	<u>SS MB</u>	<u>SS MB, DS MB, SL, ML</u>	with Gas Backing	<u>SS GB</u>	<u>SS MB, SS GB, DS MB, SL, ML</u>	with No Backing	<u>SS NB</u>	<u>SS MB, SS NB, SSGB, DS MB, DS NB, SL, ML</u>	Double Sided weld	with gouging	<u>DS MB</u>	<u>SS MB, DS MB, SL, ML</u>	without gouging	<u>DS NB</u>	<u>SS MB, DS MB, DSNB, SL, ML</u>	Fillet weld	Single Layer weld	-	<u>SL</u>	<u>SL</u>	Multi-Layer weld	-	<u>ML</u>	<u>SL, ML</u>
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	Fillet weld	Single Layer weld	-	<u>SL</u>	<u>SL</u>																																																						
Multi-Layer weld		-	<u>ML</u>	<u>SL, ML</u>																																																							
<p>(2) A qualification test performed using butt welds automatically qualifies fillet welding.</p> <p>(3) The Society may qualify the welders who are employed to perform fillet welding only. However, where such welders are engaged to weld fillet with groove they are to be qualified for butt welds.</p>																																																											

Present	Amendment
<p><u>4. Base materials</u></p> <p>(1) Base materials for qualification tests are grouped <u>as follows</u>;</p> <p>(a) <u>Carbon and low alloy rolled steels, tubes and pipes, castings and forgings</u></p> <p>(b) <u>Stainless rolled steels, tubes and pipes, castings and forgings</u></p> <p>(c) <u>Aluminium alloy</u></p> <p>(d) <u>Copper alloy castings</u></p> <p>(2) A welder passed the qualification test with certain material in specific material group may be accepted to weld other materials in same material group.</p> <p>(3) For welding with materials in different material groups, qualification approval may be carried out with separate qualification test for each material.</p>	<p><u>5. Base materials</u></p> <p>(1) Base materials for qualification tests are grouped in <u>Table 2.2.14.</u></p>

<New>

Table 2.2.14 Base material group for welder's qualification

Base material group used in the test assembly for the qualification test ⁽¹⁾			Qualified group ⁽¹⁾⁽²⁾	
<u>Carbon steels⁽¹⁾</u>	<u>Rolled steels for hull structural</u> <u>Rolled steel plates for boiler</u> <u>Rolled steel plates for pressure vessel</u> <u>Rolled steels for low temperature service (except nickel alloy)</u> <u>Round bars for chain</u> <u>Rolled steel bars for boiler</u> <u>High strength steels for welded structures</u> <u>YP47 steel plates</u> <u>Steel tubes for boilers and heat exchangers</u> <u>Steel pipes for pressure piping</u> <u>Steel pipes for low temperature service (except nickel alloy)</u> <u>Carbon steel castings</u> <u>Low alloy steel castings</u> <u>Steel castings for chains</u> <u>Steel castings for low temperature service (except RLC2 and RLC3)</u> <u>Carbon steel forgings</u> <u>Alloy steel forgings</u> <u>Steel forgings for chains</u> <u>Steel forgings for low temperature service (except RLF3 and RLF9)</u>	<u>A ~ FH 40</u> <u>RSP 42 ~ RSP 49A</u> <u>RPV 24 ~ RPV 50</u> <u>RL 235A ~ RL 360</u> <u>RSBC 31 ~ RSBC 70</u> <u>RSB 42 ~ RSB 46</u> <u>AH 43 ~ FH 70</u> <u>EH47-H</u> <u>RSTH 12 ~ RSTH 52</u> <u>RST 138 ~ RST 424</u> <u>RLPA ~ RLPC</u> <u>RSC 410 ~ RSC 600</u> <u>RSC 440A ~ RSC 550A</u> <u>RSCC 50, RSCC 70</u> <u>RLCA, RLCB</u> <u>RSF 400 ~ RSF 760(H/M)</u> <u>RSF 550AM ~ RSF 1100AM</u> <u>RSFC 50, RSFC 70</u> <u>RLFA ~ RLFC</u>	CS	CS
<u>Stainless steels</u>	<u>Rolled stainless steels</u> <u>Stainless steel pipes</u> <u>Stainless steel castings</u> <u>Stainless steel casting for propeller</u> <u>Stainless steel forgings</u> <u>Duplex stainless steel</u>	<u>RSTS 304 ~ RSTS 347</u> <u>RSTS 304TP ~ RSTS 347TP</u> <u>RSSC 13 ~ RSSC 21</u> <u>12Cr1Ni, 19Cr11Ni</u> <u>RSSF 304 ~ RSSF 347</u> <u>S31803, S32750</u>	STS	STS
<u>Nickel alloy</u>	<u>Rolled steels for low temperature service (except carbon steels)</u> <u>Steel pipes for low temperature service (except carbon steels)</u> <u>Steel castings for low temperature service (except RLCA and RLCB)</u> <u>Steel forgings for low temperature service (except RLFA ~ RLFC)</u>	<u>RL 1N355 ~ RL 9N490</u> <u>RLP 2 ~ RLP 9</u> <u>RLC 2, RLC 3</u> <u>RLF 3, RLF 9</u>	NI	NI
<u>Copper and copper alloy</u>	<u>Copper and copper alloy pipes and tubes</u> <u>Copper alloy castings</u>	<u>C 1201 ~ C 7150</u> <u>CU 1 ~ CU 4</u>	CU	CU
<u>Aluminium alloys</u>	<u>Aluminium alloys</u>	<u>5083 ~ 6082 (P/S)</u>	AL	AL

NOTES :

- (1) Base materials for qualification of welders or welding operators are combined into one group with a specified minimum yield strength $R_{eH} \leq 460 \text{ N/mm}^2$ for hull structures.
- (2) For welding with materials in different material groups, qualification approval may be carried out with separate qualification test for each material.

Present	Amendment																																												
<p>5. Thickness and outer diameter of base metal</p> <p>(1) The welder qualification carried out on a plate or pipe test assembly of thickness T is valid for the thickness range given in Table 2.2.13-1.</p> <p>Table 2.2.13-1 Qualified thickness range for welder qualification</p> <table border="1"> <thead> <tr> <th>Grade</th> <th>Thickness of test assembly, T(mm)</th> <th>Qualified thickness range t(mm)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>$T \leq 3$</td> <td>$T \leq t < 2T$</td> </tr> <tr> <td>2</td> <td>$3 < T \leq 20$</td> <td>$3 < t \leq 2T$</td> </tr> <tr> <td>3⁽¹⁾</td> <td>$20 < T$</td> <td>$5 < t$</td> </tr> <tr> <td>3R</td> <td>$12.5 < T$</td> <td>$5 < t$</td> </tr> </tbody> </table> <p>Note (1) For aluminium alloy, the upper limit of qualified thickness range is to be 40mm. For aluminium alloy with thickness over 40mm, additional tests may be carried out as deemed necessary by the Society.</p> <p>(2) The welder qualification carried out on a pipe test assembly is valid for the outer diameter range given in Table 2.2.13-2.</p> <p>Table 2.2.13-2 Qualified outer diameter range for pipe welds</p> <table border="1"> <thead> <tr> <th>Grade</th> <th>Outer diameter D (mm)</th> <th>Qualified range</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>$D \leq 25$</td> <td>$D \sim 2D$</td> </tr> <tr> <td>2</td> <td>$25 < D \leq 150$</td> <td>$0.5D \sim 2D$ (Min. 25mm)</td> </tr> <tr> <td>3</td> <td>$150 < D$</td> <td>$\geq 0.5D$</td> </tr> <tr> <td>3R(T, K and Y Joint)</td> <td>$150 < D$</td> <td>$\geq 100\text{mm}$</td> </tr> </tbody> </table> <p>Note; (1) Test assemblies for the pipes over 500 mm in diameter may be those for the plates.</p>	Grade	Thickness of test assembly, T(mm)	Qualified thickness range t(mm)	1	$T \leq 3$	$T \leq t < 2T$	2	$3 < T \leq 20$	$3 < t \leq 2T$	3 ⁽¹⁾	$20 < T$	$5 < t$	3R	$12.5 < T$	$5 < t$	Grade	Outer diameter D (mm)	Qualified range	1	$D \leq 25$	$D \sim 2D$	2	$25 < D \leq 150$	$0.5D \sim 2D$ (Min. 25mm)	3	$150 < D$	$\geq 0.5D$	3R(T, K and Y Joint)	$150 < D$	$\geq 100\text{mm}$	<p>6. Thickness and outer diameter of base metal</p> <p>(1) The welder qualification carried out on a plate or pipe test assembly of thickness T is valid for the thickness range given in Table 2.2.15-1.</p> <p>Table 2.2.15-1 Qualified thickness range for welder qualification</p> <table border="1"> <thead> <tr> <th>Thickness of test assembly, T(mm)</th> <th>Qualified thickness range t(mm)</th> </tr> </thead> <tbody> <tr> <td>$T < 3$</td> <td>$T \leq t \leq 2T$</td> </tr> <tr> <td>$3 \leq T < 12$</td> <td>$3 \leq t \leq 2T$</td> </tr> <tr> <td>$12 \leq T$</td> <td>$3 \leq t$</td> </tr> </tbody> </table> <p>(2) The welder qualification carried out on a pipe test assembly is valid for the outer diameter range given in Table 2.2.15-2.</p> <p>Table 2.2.15-2 Qualified outer diameter range for pipe welds</p> <table border="1"> <thead> <tr> <th>Outer diameter D (mm) of the test piece⁽¹⁾⁽²⁾</th> <th>Qualified range d (mm)</th> </tr> </thead> <tbody> <tr> <td>$D \leq 25$</td> <td>$D \leq d \leq 2D$</td> </tr> <tr> <td>$25 < D$</td> <td>$0.5D \leq d$ (Min. 25 mm)</td> </tr> </tbody> </table> <p>Note; (1) Test assemblies for the pipes over 500 mm in diameter may be those for the plates. (2) For non-circular hollow sections, D is the dimension of the smaller side.</p>	Thickness of test assembly, T(mm)	Qualified thickness range t(mm)	$T < 3$	$T \leq t \leq 2T$	$3 \leq T < 12$	$3 \leq t \leq 2T$	$12 \leq T$	$3 \leq t$	Outer diameter D (mm) of the test piece ⁽¹⁾⁽²⁾	Qualified range d (mm)	$D \leq 25$	$D \leq d \leq 2D$	$25 < D$	$0.5D \leq d$ (Min. 25 mm)
Grade	Thickness of test assembly, T(mm)	Qualified thickness range t(mm)																																											
1	$T \leq 3$	$T \leq t < 2T$																																											
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3 ⁽¹⁾	$20 < T$	$5 < t$																																											
3R	$12.5 < T$	$5 < t$																																											
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1	$D \leq 25$	$D \sim 2D$																																											
2	$25 < D \leq 150$	$0.5D \sim 2D$ (Min. 25mm)																																											
3	$150 < D$	$\geq 0.5D$																																											
3R(T, K and Y Joint)	$150 < D$	$\geq 100\text{mm}$																																											
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Present	Amendment
<p data-bbox="331 193 479 220"><u>6</u> Positions</p> <p data-bbox="360 245 1137 304">The positions for qualification test and positions qualified for actual welding work are to comply with the <u>Table 2.2.14</u>.</p>	<p data-bbox="1173 193 1321 220"><u>7.</u> Positions</p> <p data-bbox="1202 245 1977 304">The positions for qualification test and positions qualified for actual welding work are to comply with the <u>Table 2.2.16-1</u>.</p>

Table 2.2.14 Welding Positions for Welder Qualification (2017)

Grade	Test Positions ⁽¹⁾		Welding positions in actual welding work ⁽²⁾			
			Plates		Pipes	
			Butt joint	Fillet joint	Butt joint	Fillet joint
For each grade of plates	Flat	1G	F	F, H	F ⁽³⁾	F, H ⁽³⁾
		1F	-	F	-	F ⁽³⁾
	Horizontal	2G	F, H	F, H	F, H ⁽³⁾	F, H ⁽³⁾
		2F	-	F, H	-	F, H ⁽³⁾
	Vertical-upward	3G-up	F, H, VU	F, H, VU	F, H, VU ⁽³⁾	F, H, VU ⁽³⁾
		3F-up	-	F, H, VU	-	F, H, VU ⁽³⁾
	Vertical-downward	3G-down	F, VD	F, VD	-	-
		3F-down	-	F, VD	-	-
	Overhead	4G	F, H, OH	F, H, OH	F, OH ⁽³⁾	F, H, OH ⁽³⁾
		4F	-	F, H, OH	-	F, H, OH ⁽³⁾
3G-up+4G		All ⁽⁵⁾	All ⁽⁵⁾	All ⁽³⁾	All ⁽³⁾	
For each grade of pipes	Horizontal-rolled	1G-P	F	F	F	F, H
		1F-P	-	F	-	F
	Vertical-fixed	2G-P	F, H	F, H	F, H	F, H
		2F-P	-	F, H	-	F, H
	Horizontal-fixed	5G-P	F, V, OH	F, V, OH	F, V, OH	F, V, OH
		5F-P	-	F, V, OH	-	F, V, OH
	Vertical-fixed+Horizontal-fixed (2G-P)+(5G-P)		All	All	All	All
	Inclined-fixed	6G-P	All	All	All	All
		6F-P	-	All	-	All
	Inclined-fixed with restriction ring (6GR-P) ⁽⁴⁾		All	All	All	All
<p>NOTES:</p> <p>(1) Test positions are to comply with Fig 2.2.9 and Fig 2.2.10.</p> <p>(2) F=Flat, VU=Vertical-Up, VD=Vertical-Down, H=Horizontal, OH=Overhead</p> <p>(3) Only qualified for pipe over 500 mm in outer diameter.</p> <p>(4) Test in the 6GR-P position qualify welding in T, K & Y connection(Grade 3R) and welds with restricted access.</p> <p>(5) Vertical-downward position is not included.</p>						

Table 2.2.16-1 Welding Positions for Welder Qualification

Test Positions ⁽¹⁾⁽²⁾		Welding positions in actual welding work ⁽¹⁾⁽²⁾																								
		Plates ⁽³⁾										Pipes ⁽⁴⁾														
		Butt joint					Fillet joint					Butt joint					Fillet joint									
		PA	PC	PE	PF	PG	PA	PB	PC	PD	PE	PF	PG	PA	PC	PH	PJ	PH-45	PJ-45	PA	PB	PD	PH	PJ	PH-45	PJ-45
Plates	Butt joint	Flat	PA	●						●	●								●	●						
		Horizontal	PC	●	●															●	●					
		Overhead	PE	●	●	●				●	●									●	●	●				
		Vertical-up	PF	●			●						●							●	●					
		Vertical-down	PG																							
	Fillet joint	Flat	PA								●									●						
		Horizontal vertical	PB								●	●								●	●					
		Horizontal	PC								●	●	●							●	●					
		Horizontal overhead	PD								●	●	●	●	●					●	●	●				
		Overhead	PE								●	●	●	●	●					●	●	●				
		Vertical-up	PF								●	●								●	●					
		Vertical-down	PG																							●
	pipes	Butt joint	Flat	PA	●						●	●								●	●					
			Horizontal	PC	●	●															●	●				
Upwards			PH	●		●	●				●	●		●	●					●	●	●	●			
Downwards			PJ	●		●		●		●	●		●			●				●	●	●		●		
Inclined upwards			PH-45	●	●	●	●				●	●	●	●	●					●	●	●	●		●	
Inclined downwards			PJ-45	●	●	●		●		●	●	●	●		●					●	●	●		●		●
Fillet joint		Flat	PA								●									●						
		Horizontal vertical	PB								●	●								●	●					
		horizontal overhead	PD								●	●	●	●	●					●	●	●				
		Upwards	PH								●	●		●	●					●	●	●	●			
		Downwards	PJ								●	●		●	●					●	●	●		●		
		Inclined upwards	PH-45								●	●	●	●	●					●	●	●	●		●	
		Inclined downwards	PJ-45								●	●	●	●	●					●	●	●		●		●

NOTES:

- (1) ● indicates those welding positions for which the welder is qualified.
- (2) Test positions are to comply with Fig 2.2.16-2 and Fig 2.2.16-3.
- (3) The welders or welder operators only qualified for pipe over 25 mm in outer diameter are permitted the welding for plates.
- (4) The welders or welder operators qualified for plates are only permitted the welding for pipe over 500 mm in outer diameter.

Table 2.2.16-2 Welding position of plates


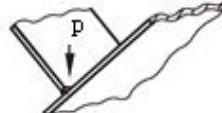
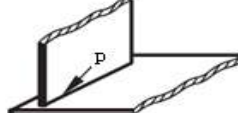
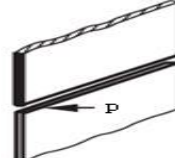
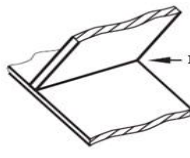
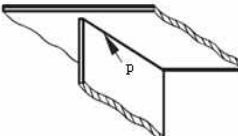
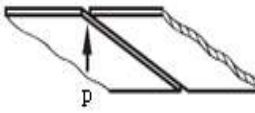
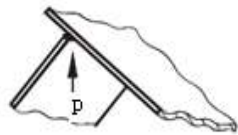
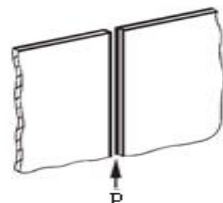
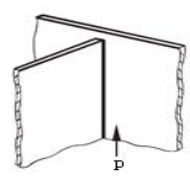
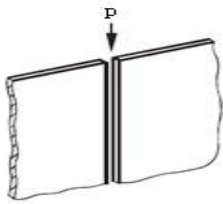
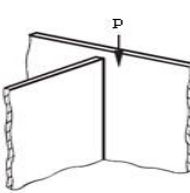
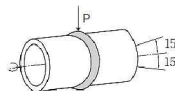
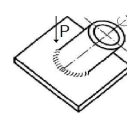
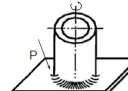
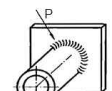
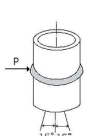
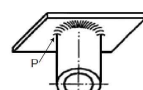
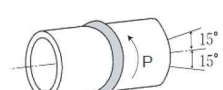
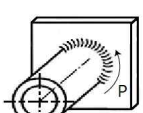

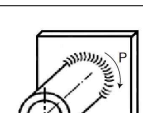
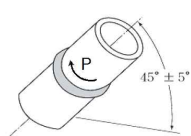
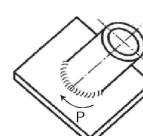
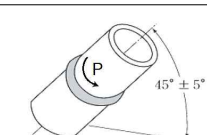
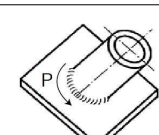
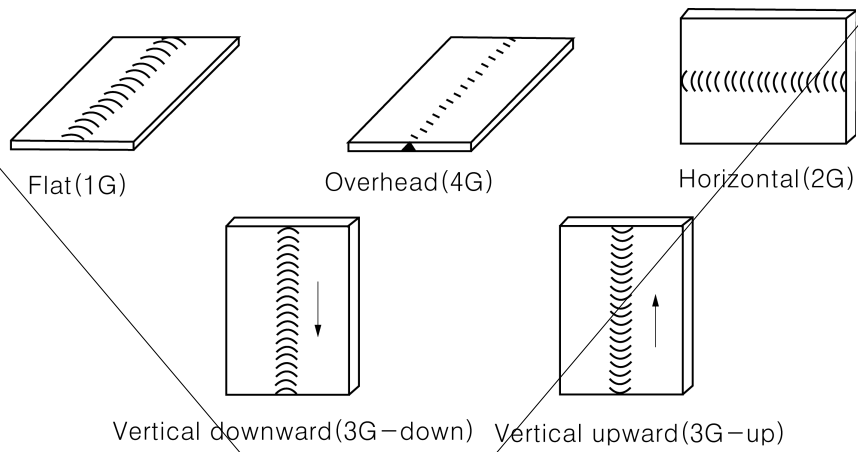
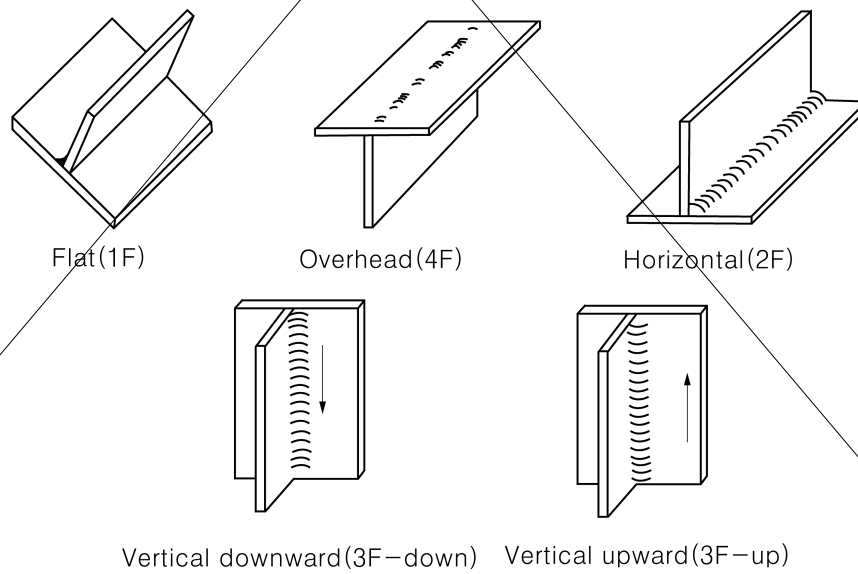
Welding position		Description of welding position	
		Butt welds	Fillet welds
Flat	PA		
Horizontal vertical	PB	-	
Horizontal	PC		
Horizontal overhead	PD	-	
Overhead	PE		
Vertical up	PF		
Vertical down	PG		
Upwards	PH	-	-
Downwards	PJ	-	-
Inclined upwards	PH-45	-	-
Inclined downwards	PJ-45	-	-

Table 2.2.16-3 Welding position of pipes

Welding position		Description of welding position	
		Butt welds	Fillet welds
Flat	PA	 pipe rotating	 pipe rotating
Horizontal vertical	PB	-	  pipe fixed or rotating pipe rotating
Horizontal	PC	 pipe fixed or rotating	-
Horizontal overhead	PD	-	 pipe fixed or rotating
Overhead	PE	-	-
Vertical up	PF	-	-
Vertical down	PG	-	-
Upwards	PH	 pipe fixed	 pipe fixed
Downwards	PJ	 pipe fixed	 pipe fixed
Inclined upwards	PH-45	 pipe fixed	 pipe fixed
Inclined downwards	PJ-45	 pipe fixed	 pipe fixed



(a) Butt welds



(b) Fillet welds

Fig 2.2.9 Welding position of plates

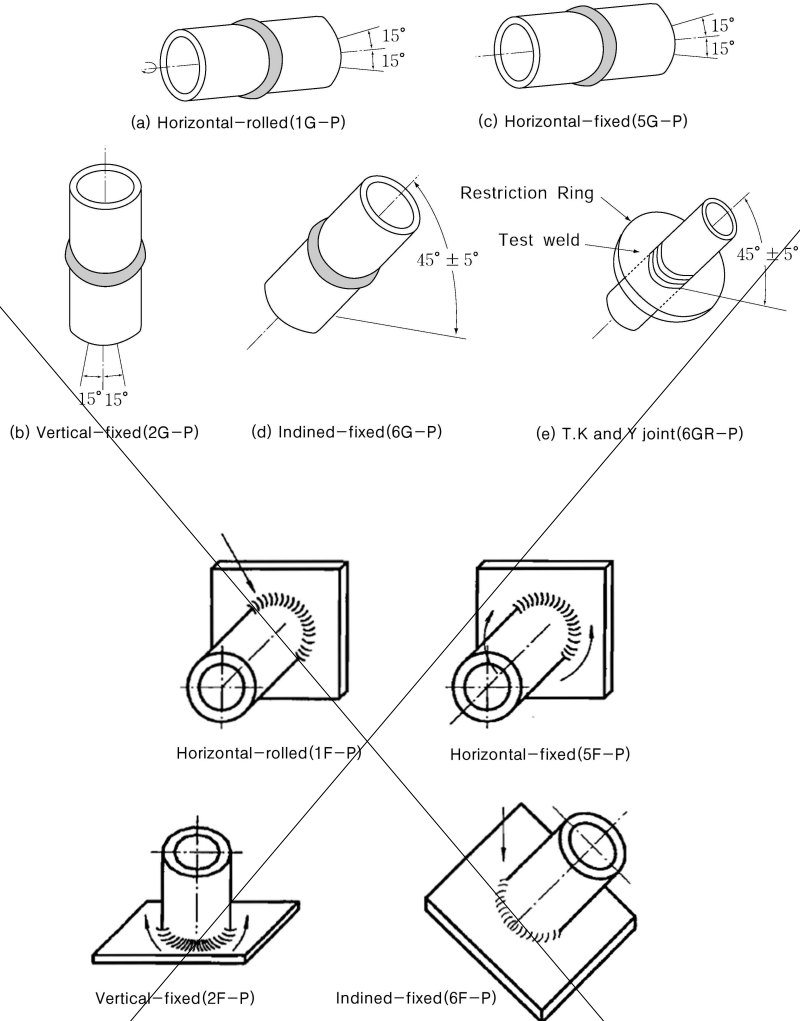


Fig 2.2.10 Welding position of pipes

Present	Amendment
<p>503. Testing procedure</p> <p>1. General</p> <p>(1) Test assemblies may be welded with either alternating current or direct current.</p> <p>(2) The test assemblies are not to be changed their up-and-down or right-and-left position throughout the welding operation.</p> <p>(3) The welding is to be carried out only on one side and the back welding is not to be carried out unless specified otherwise.</p> <p>(4) In general, the test assemblies for plates are to be so restrained or prestrained that the warping due to the welding does not exceed an angular distortion of 5 degrees.</p> <p>(5) The test assemblies are not to be subjected to peening or heat treatment throughout the period before, during and after the welding.</p> <p>(6) The backing strips of the test assemblies may be used steel plates, copper plate, ceramic or similar materials to obtain the enough penetration.</p> <p>(7) Welding of the test assemblies and testing of test specimens should be witnessed by the Surveyor.</p> <p>2. Test assemblies</p> <p>(1) Test assemblies for butt welds and for fillet welds are to be prepared as shown in Fig 2.2.11 to Fig 2.2.15 in each qualification test.</p> <p>(2) Materials used for tests are to be those specified in 502. 4 or those which are considered equivalent by the Society.</p>	<p>503. Testing procedure</p> <p>1. General</p> <p>(1) <Deleted></p> <p>(1) The test assemblies are not to be changed their up-and-down or right-and-left position throughout the welding operation.</p> <p>(3) <Deleted></p> <p>(4) <Deleted></p> <p>(2) The test assemblies are not to be subjected to peening or heat treatment throughout the period before, during and after the welding.</p> <p>(3) The backing strips of the test assemblies may be used steel plates, copper plate, ceramic, similar materials to obtain the enough penetration or backing gas used for WPS or pWPS.</p> <p>(4) Welding of the test assemblies and testing of test specimens should be witnessed by the Surveyor.</p> <p>2. Test assemblies</p> <p>(1) Test assemblies for butt welds and for fillet welds are to be prepared as shown in Fig 2.2.11 to Fig 2.2.18 in each qualification test.</p> <p>(2) Materials used for tests are to be those specified in 502. 5 or those which are considered equivalent by the Society.</p>

Present

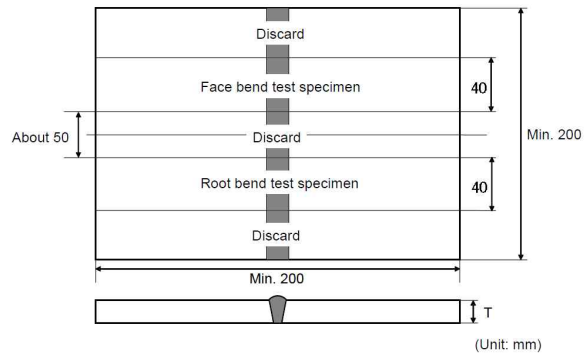


Fig 2.2.11 Dimensions and types of test assembly for butt welds

Amendment

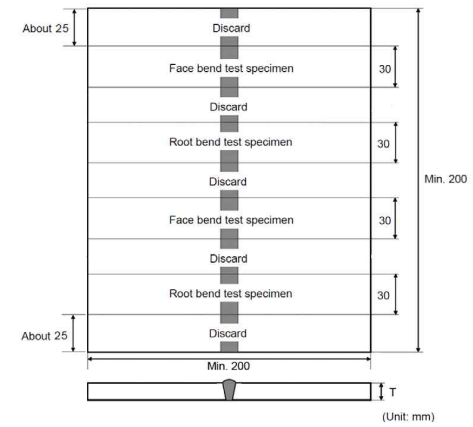


Fig 2.2.11 Dimensions and types of test assembly for butt welds (T < 12mm)

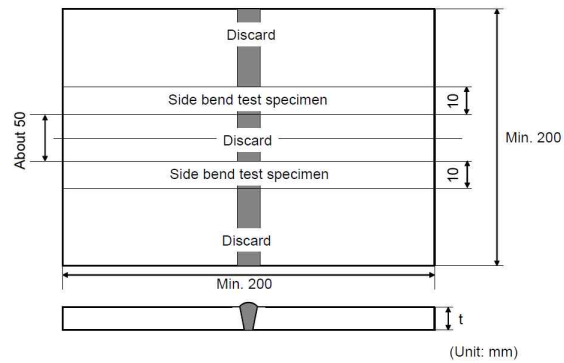


Fig 2.2.12 Dimensions and types of test assembly for butt welds (T ≥ 12mm)

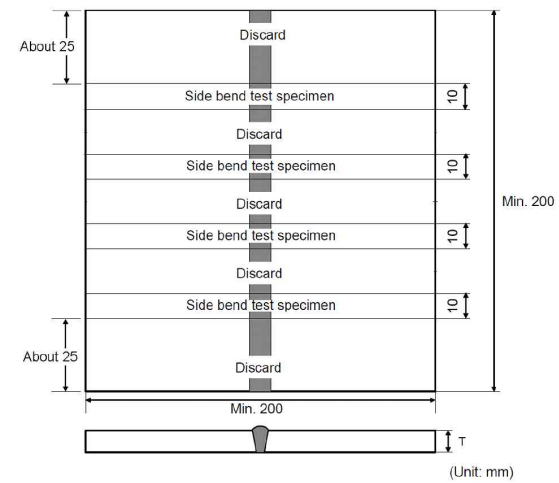


Fig 2.2.12 Dimensions and types of test assembly for butt welds (T ≥ 12mm)

Present

Amendment

Fig 2.2.13 <New>

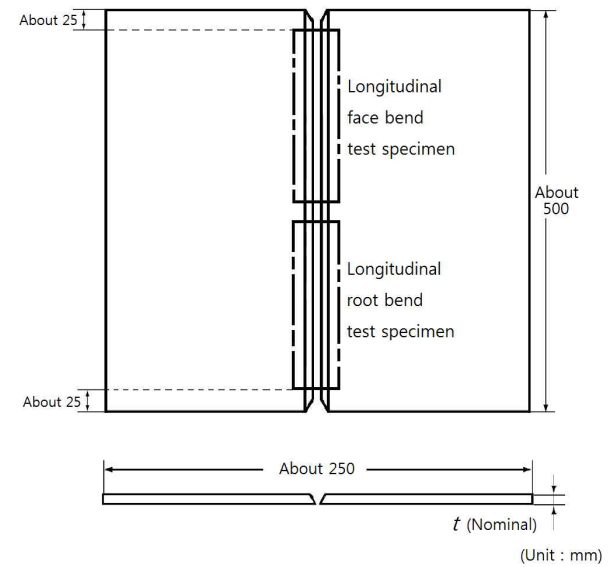


Fig 2.2.13 Dimensions and types of test assembly for butt welds(For 9%nickel alloys)

Present

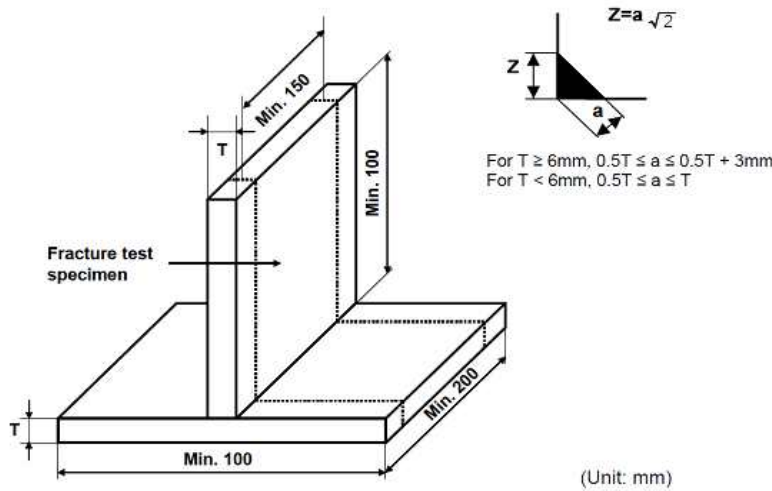


Fig 2.2.13 Dimensions and types of test assembly for fillet welds

Amendment

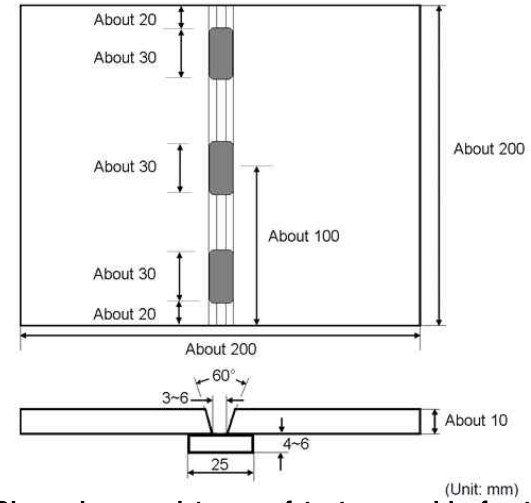


Fig 2.2.14 Dimensions and types of test assembly for tack butt welds

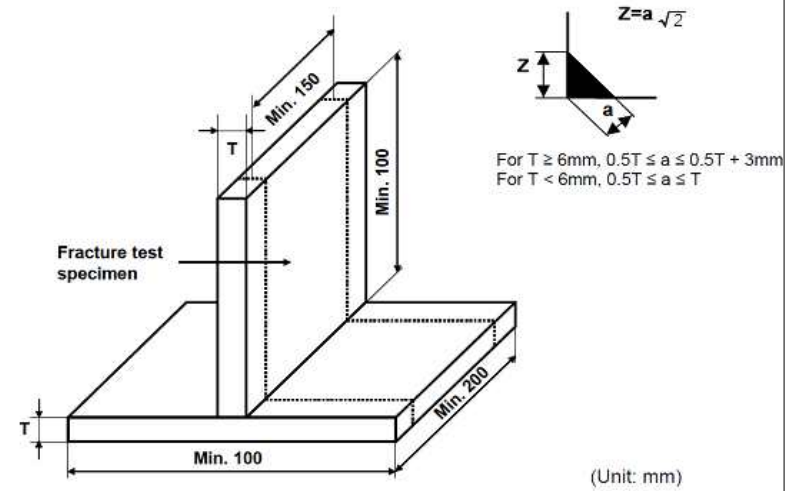


Fig 2.2.15 Dimensions and types of test assembly for fillet welds

Present

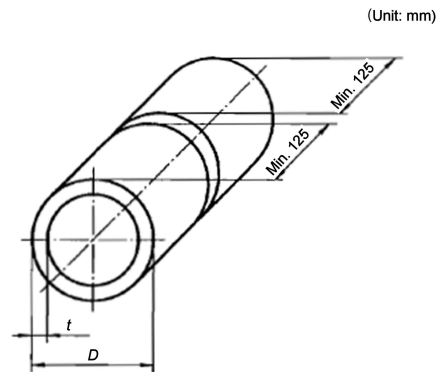


Fig 2.2.14 Dimensions and types of test assembly for pipe butt welds

Fig 2.2.16 <New>

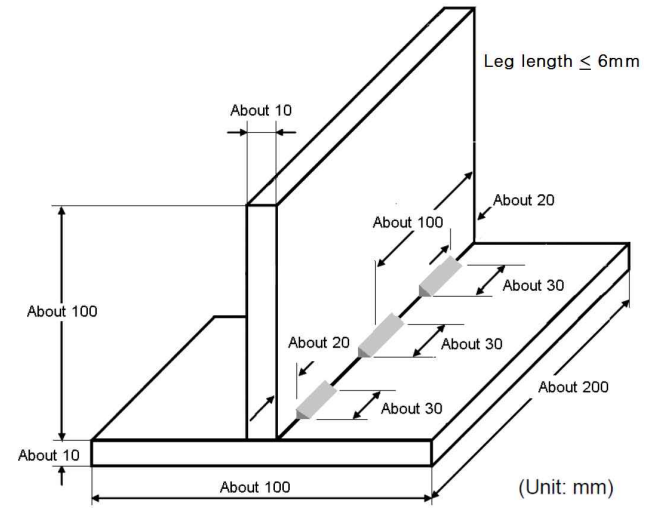
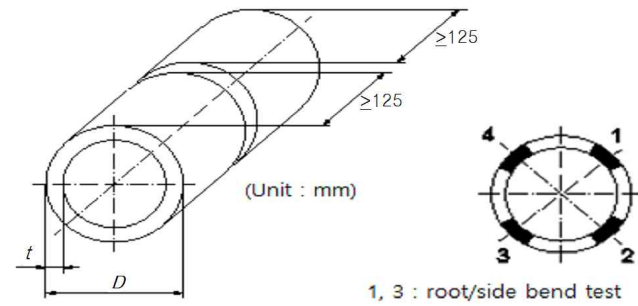


Fig 2.2.16 Dimensions and types of test assembly for tack fillet welds



D : diameter of pipe
t : thickness of pipe

1, 3 : root/side bend test
or root fracture test specimen
2, 4 : face/side bend test
or face fracture test specimen

Fig 2.2.17 Dimensions and types of test assembly for pipe butt welds

Present

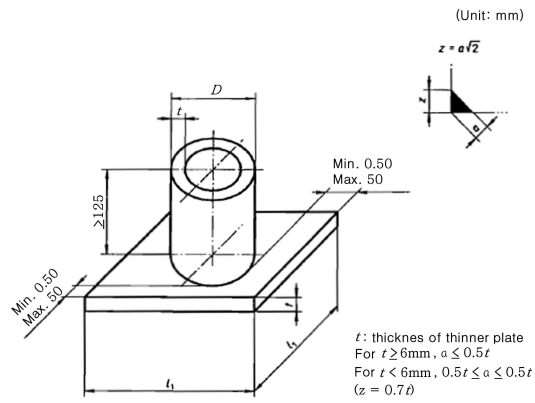


Fig 2.2.15 Dimensions and types of test assembly for pipe fillet welds

Amendment

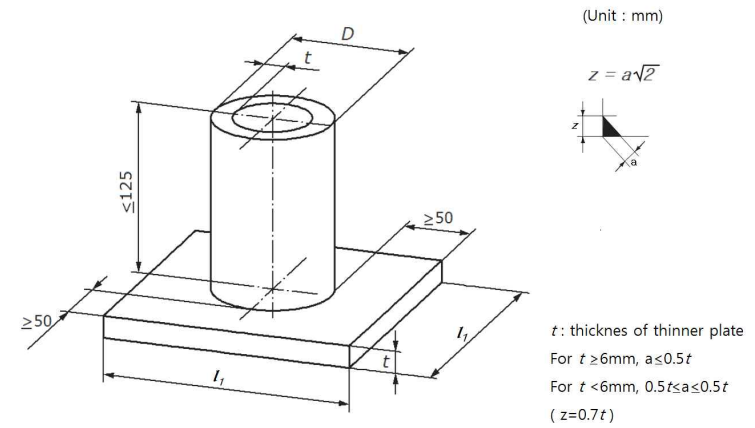


Fig 2.2.18 Dimensions and types of test assembly for pipe fillet welds

Present	Amendment
<p>(3) The dimensions and types of welded joint are to be as indicated in Fig 2.2.16 and Fig 2.2.17 or those which are considered equivalent by the Society. [See Guidance]</p> <p>(4) Welding consumables used in qualification tests should be type approved one or those which are considered equivalent by the Society.</p> <p>(5) <New></p> <p>(6) <New></p> <p>(7) <New></p>	<p>(3) The dimensions and types of welded joint are to be in accordance with WPS or pWPS.</p> <p>(4) Welding consumables used in qualification tests should be type approved one or those which are considered equivalent by the Society.</p> <p>(5) Root run and capping run need each to have a minimum of one stop and restart. The welders are allowed to remove minor imperfections only in the stop by grinding before restart welding.</p> <p>(6) Test assembly for automatic welding is to comply with 404.3 and 405.3. For butt welded joints, the width of test assembly is not to be less than 300 mm and the length not to be less than 400 mm. For fillet welded joints, the width of test assembly is not to be less than 150 mm and the length not to be less than 400 mm.</p> <p>(7) Test assemblies used in the qualification test of gas welding are to be of without backing, and gas welding rods are to be those for mild steel complying with a <i>KS D7005</i> (Gas welding rods for mild steel) or <i>EN 12536</i> or those considered appropriate by the Society.</p>

<Present>

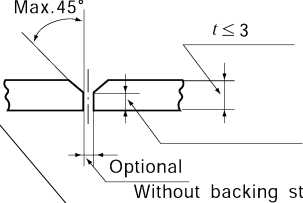
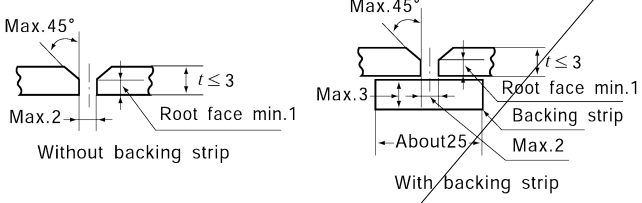
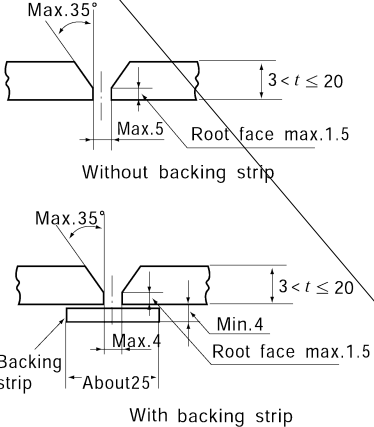
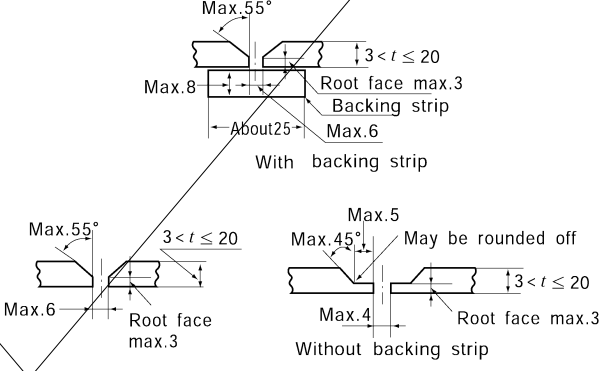
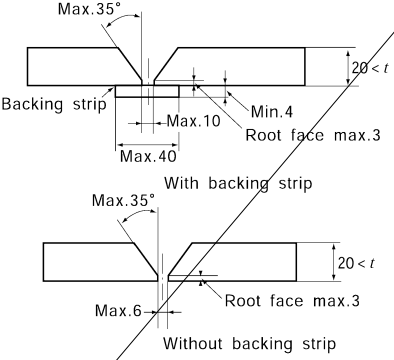
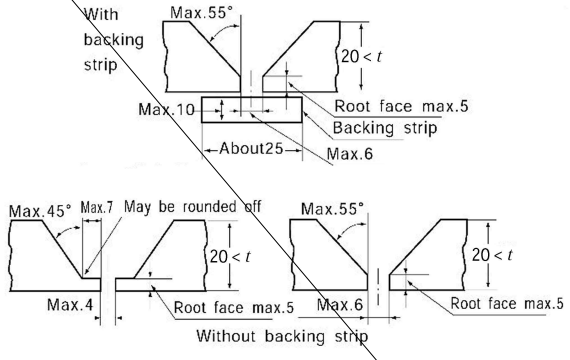
Materials	Mild steel and stainless steel	Aluminium alloy
Grade 1	 <p>Max. 45° $t \leq 3$ Optional Without backing strip</p>	 <p>Max. 45° Max. 2 Root face min. 1 $t \leq 3$ Without backing strip</p> <p>Max. 45° Max. 3 Root face min. 1 Backing strip About 25 Max. 2 $t \leq 3$ With backing strip</p>
Grade 2	 <p>Max. 35° Max. 5 Root face max. 1.5 $3 < t \leq 20$ Without backing strip</p> <p>Max. 35° Max. 4 Min. 4 Root face max. 1.5 About 25 $3 < t \leq 20$ Backing strip With backing strip</p>	 <p>Max. 55° Max. 8 Root face max. 3 Backing strip About 25 Max. 6 $3 < t \leq 20$ With backing strip</p> <p>Max. 55° Max. 6 Root face max. 3 $3 < t \leq 20$ Without backing strip</p> <p>Max. 45° Max. 5 May be rounded off Max. 4 Root face max. 3 $3 < t \leq 20$ Without backing strip</p>
Grade 3	 <p>Max. 35° Backing strip Max. 10 Min. 4 Root face max. 3 Max. 40 $20 < t$ With backing strip</p> <p>Max. 35° Max. 6 Root face max. 3 $20 < t$ Without backing strip</p>	 <p>With backing strip Max. 55° Max. 10 Root face max. 5 Backing strip About 25 Max. 6 $20 < t$</p> <p>Max. 45° Max. 7 May be rounded off Max. 55° Max. 6 Root face max. 5 Max. 6 Root face max. 5 $20 < t$ Without backing strip</p>

Fig 2.2.16 Dimensions and types of welded joint-plates

<Present>

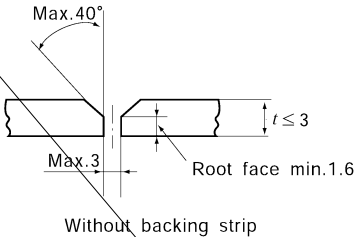
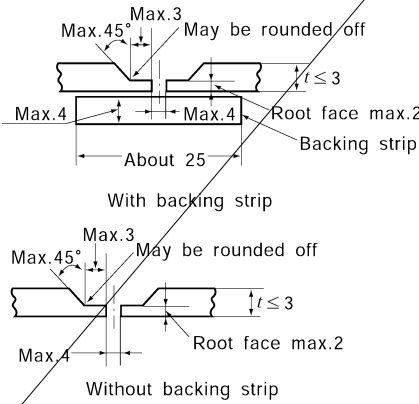
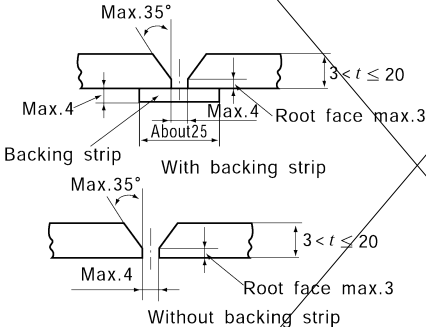
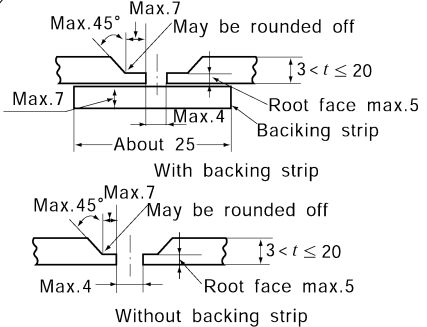
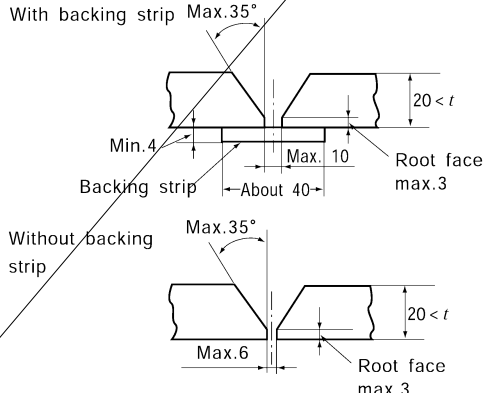
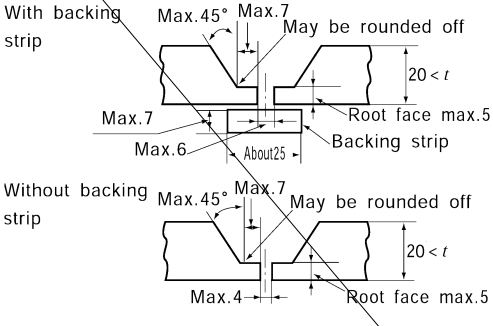
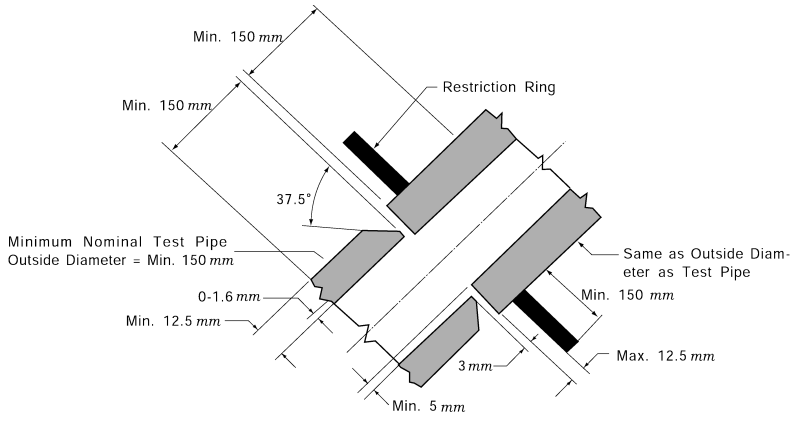
Materials	Mild steel and stainless steel	Aluminium alloy
Grade 1	 <p>Without backing strip</p>	 <p>With backing strip</p> <p>Without backing strip</p>
Grade 2	 <p>With backing strip</p> <p>Without backing strip</p>	 <p>With backing strip</p> <p>Without backing strip</p>
Grade 3	 <p>With backing strip</p> <p>Without backing strip</p>	 <p>With backing strip</p> <p>Without backing strip</p>
Grade 3R	 <p>Restriction Ring</p> <p>Minimum Nominal Test Pipe Outside Diameter = Min. 150 mm</p> <p>0-1.6 mm</p> <p>Min. 12.5 mm</p> <p>37.5°</p> <p>3 mm</p> <p>Min. 5 mm</p> <p>Max. 12.5 mm</p> <p>Same as Outside Diameter as Test Pipe</p> <p>Min. 150 mm</p> <p>T, K and Y connection(6GR-P)</p>	

Fig 2.2.17 Dimensions and types of welded joint-pipes

Present

3. Examination and test

(1) Examination and test are as specified in **Table 2.2.15**.

Table 2.2.15 Examination and test for Welder Qualification

Kinds	Examination and test ⁽³⁾
Butt welds	Visual inspection, Bend test ⁽¹⁾
Fillet welds	Visual inspection, Fracture test ⁽²⁾

NOTES

(1) Radiographic test may be carried out in lieu of bend test.

(2) <New>

(3) <New>

(4) <New>

(2) Two macro sections may be taken in lieu of the fracture test.

(3) Additional tests may be required, at the discretion of the Society.

[See Guidance]

Amendment

3. Examination and test

(1) Examination and test are as specified in **Table 2.2.17**.

Table 2.2.17 Examination and test for Welder Qualification

Kinds	Examination and test ⁽⁶⁾
Butt welds	Visual inspection, Bend test ⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾
Fillet welds	Visual inspection, Fracture test ⁽⁵⁾
Tack welds	Visual inspection, Fracture test

NOTES

(1) Radiographic test or fracture test may be carried out in lieu of bend test except the gas-shielded welding processes with solid wire or metal cored wire.

(2) For 9%nickel alloy in plates, longitudinal bend test specimens may be used as shown in **Fig 2.2.13**.

(3) For nickel alloy in tubes, radiographic tests or fracture test may be carried out in lieu of bend test notwithstanding (1) above.

(4) For pipe with outer diameters $D \leq 25$ mm, the bend or fracture tests may be replaced by a notched tensile test of the complete test assemblies as shown in **Fig 2.2.19**.

(5) Two macro sections may be taken in lieu of the fracture test.

(6) Additional tests may be required, at the discretion of the Society.

[See Guidance]

Present	Amendment
<p>(2) Visual examination</p> <p>(a) The welds should be visually examined prior to the cutting of the test specimen for the bend test.</p> <p>(b) The result of the examination is to show the absence of cracks or other serious imperfections. Imperfections detected are to be assessed in accordance with quality level B in KS B ISO 5817, except for imperfection type such as excess weld metal, excess penetration, excessive convexity and excessive throat thickness for which level C applies</p>	<div data-bbox="1227 193 1877 486" data-label="Diagram"> </div> <p>(Unit: mm)</p> <p>(Note)</p> <ol style="list-style-type: none"> The size of is as follows: <ol style="list-style-type: none"> $t \geq 1.8\text{mm}$: $d = 4.5\text{mm}$ $t < 1.8\text{mm}$: $d = 3.5\text{mm}$ <p>d: diameter of the hole in weld (Holes are not allowed in start and stop areas)</p> Notch profiles s and q are also permitted in circumferential direction according to <i>ISO 9017</i> <p>Fig 2.2.19 Notch tensile test for pipe assemblies outer diameter $D \leq 25\text{ mm}$</p> <p>(2) Visual examination</p> <p>(a) The welds should be visually examined prior to the cutting of the test specimen for the bend test.</p> <p>(b) The result of the examination is to show the absence of cracks or other serious imperfections. Imperfections detected are to be assessed in accordance with quality level B in <i>(KS B) ISO 5817</i>, except for imperfection type such as excess weld metal, excess penetration, excessive convexity and excessive throat thickness for which level C applies</p>

Present	Amendment
<p>(3) Bend test</p> <p>(a) <u>One face bend test and root bend test specimen are to be tested. For thickness 12 mm and over, two side specimens may be tested as an alternative.</u></p> <p>(b) <u><New></u></p> <p>(c) <u><New></u></p> <p>(b) Bend test specimens are to be of size and dimensions given in Table 2.2.2 according to the kind of test assemblies.</p> <p>(c) The mandrel diameter to thickness ratio (i.e. D/t) is to be that specified in each article of Pt 2, Ch 2, Sec 6 of the Rules +1 except for aluminium alloy for which requirements in Table 2.2.64 of Pt 2, Ch 2, 608 of the Rules applies</p> <p>(d) The test specimens are to be bent through 180 degrees. After the test, the test specimens should not reveal any open defects in any direction greater than 3mm. Defects appearing at the corners of a test specimen during testing should be investigated case by case. [See Guidance]</p> <p>(g) <u><New></u></p> <p>(4) Radiographic test</p> <p>When radiographic testing is used in lieu of bend test, <u>test procedures and acceptance criteria are to be in accordance with the Guidance in relating to Rules. [See Guidance]</u></p>	<p>(3) Bend test</p> <p>(a) <u>Two face bend test and two root bend test specimens are to be tested for initial qualification test. For thickness 12 mm and over, four side specimens with 10 mm in thickness may be tested as an alternative.</u></p> <p>(b) <u>One face and one root bend test specimens for maintenance of approval. For thickness 12 mm and over, two side specimens with 10 mm in thickness may be tested as an alternative.</u></p> <p>(c) <u>At least one bend test specimen is to be included one stop and restart in the bending part, for root run or for cap run.</u></p> <p>(d) Bend test specimens are to be of size and dimensions given in Table 2.2.2 according to the kind of test assemblies.</p> <p>(e) The mandrel diameter to thickness ratio (i.e. D/t) is to be that specified in each article of Pt 2, Ch 2, Sec 6 of the Rules +1 except for aluminium alloy for which requirements in Table 2.2.65 of Pt 2, Ch 2, 608 of the Rules applies</p> <p>(f) The test specimens are to be bent through 180 degrees. After the test, the test specimens should not reveal any open defects in any direction greater than 3mm. Defects appearing at the corners of a test specimen during testing should be investigated case by case. [See Guidance]</p> <p>(g) <u>For roller bend test of gas welding, the radii of the plunger of the jig and support roller are to be 10 mm, and the roller spans to be 53 mm.</u></p> <p>(4) Radiographic test</p> <p>(a) <u>When radiographic testing is used in lieu of bend test, imperfections detected are to be assessed in accordance with (KS B) ISO 5817, level B.</u></p> <p>(b) <u>Where deemed the excess of the amount of heat input by visual inspection after welding, bend tests other than radiographic testing may be required additionally.</u></p>

Present	Amendment
<p>(5) Fracture test (Fillet welds)</p> <p>(a) <New></p> <p>(a) The fracture test of fillet welds is to be carried out in accordance with the requirements specified in Pt 2, Ch 2, 405. 8 of the Rules</p> <p>(b) Evaluation should concentrate on cracks, porosity and pores, inclusions, lack of fusion and incomplete penetration. Imperfections that are detected should be assessed in accordance with KS B ISO 5817, class B.</p> <p>(6) Macro examination</p> <p>When macro examination is used for fillet welds, examination procedures and acceptance criteria are to be as follows;</p> <p>(a) <u>The macro examination of fillet welds is to be carried out in accordance with the requirements specified in Pt 2, Ch 2, 405. 6 of the Rules</u></p> <p>(b) The test specimens are to be prepared and etched on one side to clearly reveal the weld metal, fusion line, root penetration and the heat affected zone.</p> <p>(c) Macro sections should include about 10mm of unaffected base metal.</p> <p>(d) The examination is to reveal a regular weld profile, through fusion between adjacent layers of weld and base metal, sufficient root penetration and the absence of defects such as cracks, lack of fusion etc.</p> <p>4. Retest</p> <p>(1) When a welder fails a qualification test, the following should apply.</p> <p>(a) <u>For the welder who fails to meet the requirements in a part of the tests, the retests as to the failed tests may be made on duplicate test specimens from the test assemblies welded within 1 month from the date of the failure and the welder may be treated to have passed the requirements where all test specimens fully comply with the test requirements.</u></p>	<p>(5) Fracture test</p> <p>(a) <u>When fracture test is used for butt welds, full test specimen in length is to be tested in accordance with <i>ISO 9017</i> and <i>ISO 9606-1</i>. Imperfections detected are to be assessed in accordance with <i>(KS B) ISO 5817</i>, level B.</u></p> <p>(b) The fracture test of fillet welds is to be carried out in accordance with the requirements specified in Pt 2, Ch 2, 405. 8 of the Rules</p> <p>(c) Evaluation should concentrate on cracks, porosity and pores, inclusions, lack of fusion and incomplete penetration. Imperfections that are detected should be assessed in accordance with <i>(KS B) ISO 5817</i>, level B.</p> <p>(6) Macro examination</p> <p>When macro examination is used for fillet welds, examination procedures and acceptance criteria are to be as follows;</p> <p>(a) <u>Two test specimens are to be prepared from different cutting positions; at least one macro examination specimen is to be cut at the position of one stop and restart in either root run or cap run.</u></p> <p>(b) The test specimens are to be prepared and etched on one side to clearly reveal the weld metal, fusion line, root penetration and the heat affected zone.</p> <p>(c) Macro sections should include about 10mm of unaffected base metal.</p> <p>(d) The examination is to reveal a regular weld profile, through fusion between adjacent layers of weld and base metal, sufficient root penetration and the absence of defects such as cracks, lack of fusion etc.</p> <p>4. Retest</p> <p>(1) When a welder fails a qualification test, the following should apply.</p> <p>(a) <u>In cases where the welder fails to meet the requirements in part of the tests, a retest may be welded immediately, consisting of another test assembly of each type of welded joint and position that the welder failed. In this case, the test is to be done for duplicate test specimens of each failed test. All retest specimens are fully comply with all of the specified requirements.</u></p>

Present	Amendment
<p>(b) In cases where the welder fails to meet the requirements in all parts of the required tests or in the retest prescribed in (a) above, the welder should undertake further training and practice.</p> <p>(2) Where any test specimen does not comply with dimensional specifications due to poor machining, a replacement test assembly should be welded and tested.</p> <p>5. Certification</p> <p>(1) Qualification certificates are normally issued to <u>the applicants(shipbuilder or manufacturer)</u> when the welder has passed the qualification test by the Society.</p> <p>(2) The following items should be specified in the certificate:</p> <p>(a) Range of qualification for materials, welding processes, types of welded joint, plate thicknesses and welding positions;</p> <p>(b) Expiry date of the validity of the qualification;</p> <p>(c) Name, date of birth, identification and the photograph of the welder;</p> <p>(d) Name of shipbuilder / manufacturer.</p> <p>(3) <u><New></u></p>	<p>(b) In cases where the welder fails to meet the requirements in all parts of the required tests or in the retest prescribed in (a) above, the welder should undertake further training and practice.</p> <p>(c) <u>When there is specific reason to question the welder's ability or the period of effectiveness has lapsed, the welder is to be re-qualified, not retested.</u></p> <p>(2) Where any test specimen does not comply with dimensional specifications due to poor machining, a replacement test assembly should be welded and tested.</p> <p>5. Certification</p> <p>(1) Qualification certificates are normally issued to <u>shipbuilder or manufacturer</u> when the welder has passed the qualification test by the Society. <u>Each Shipyard and Manufacturer is to be responsible for the control of the validity of the certificate and the range of the approval.</u></p> <p>(2) The following items should be specified in the certificate:</p> <p>(a) Range of qualification for materials, welding processes, <u>filler metal type</u>, types of welded joint, plate thicknesses and welding positions;</p> <p>(b) Expiry date of the validity of the qualification;</p> <p>(c) Name, date of birth, identification and the photograph of the welder;</p> <p>(d) Name of shipbuilder / manufacturer.</p> <p>(3) <u>When a certificate is issued, the relative documents such as test reports and/or re-validation records are to be archived as annexes to the copy of certificate.</u></p>

Present	Amendment
<p><u>6.</u> General requirements for qualification validity</p> <p>(1) <u>Each shipyard and manufacturer should be responsible for the employment, training, testing, control of the validity of the certificate and the range of the approval of the welders.</u></p> <p>(2) Where welder has not engaged in a particular process and equipment for a period exceeding six months, his qualification is automatically withdrawn. All the following conditions are fulfilled for maintaining welder's qualification.</p> <p>(a) The welder should be engaged with reasonable continuity on welding work within the current range of approval. The welder's work should in general be in accordance with the technical conditions under which the approval test is carried out.</p> <p>(b) The qualification validity of welder is to be confirmed at six-month intervals by the shipyards/manufacturers responsible for weld quality.</p> <p>(c) The status of approvals of each individual qualification is to be demonstrated to the Society when requested.</p> <p>(d) <New></p> <p>(3) <u>The welder failed to meet the required qualify of the Society in welding work may be suspended his qualification. [See Guidance]</u></p>	<p><u>504.</u> General requirements for qualification validity</p> <p><u>1.</u> Initial approval</p> <p>(1) <u>Normally the validity of the welder's approval begins from the issue date of qualification certificate when all the required tests are satisfactorily completed.</u></p> <p>(2) Where welder has not engaged in a particular process and equipment for a period exceeding six months, his qualification is automatically withdrawn. All the following conditions are fulfilled for maintaining welder's qualification. <u>If any of these conditions are not fulfilled, the Society is to be informed and the certificate is to be cancelled.</u></p> <p>(a) The welder should be engaged with reasonable continuity on welding work within the current range of approval. The welder's work should in general be in accordance with the technical conditions under which the approval test is carried out.</p> <p>(b) The qualification validity of welder is to be confirmed at six-month intervals by the shipyards/manufacturers responsible for weld quality. <u>After this confirmation, the certificate is to be signed by the shipyards/manufacturers.</u></p> <p>(c) The status of approvals of each individual qualification is to be demonstrated to the Society when requested.</p> <p>(d) <u>There shall be no specific reason to question the welder's skill and knowledge.</u></p> <p>(3) <u>Where welder has failed to meet the requirements of the Society in welding work as follows, his qualification is to be suspended.</u></p> <p>(a) <u>When welder quits his job from the company where he had employed and certified.</u></p> <p>(b) <u>Where there is some specific reason to question a qualified welder's ability.</u></p>

Present	Amendment
<p>(4) <u><New></u></p> <p><u>2. <New></u></p> <p><hereafter, omitted></p>	<p>(4) <u>The effectiveness of qualification of welder who has switched his job specified in (3) (a) above may be considered as remaining, provided that the all followings are satisfied. For remaining, the certificate may be issued to last ship-yards/manufacturers.</u></p> <p>(a) <u>It is to be proved that the welders have kept performance qualification at previous company.</u></p> <p>(b) <u>It is to be proved that welding condition is similar to those of previous company, and the welders carried out qualified work with acceptance welding performance.</u></p> <p>(c) <u>It is to be proved that welders had worked with a particular process and equipment for a period exceeding six months before quitting.</u></p> <p><u>2. Maintenance of the approval</u></p> <p>(1) <u>Revalidation is to be carried out by the Society. The skill of the welder is to be periodically verified by one of the following:</u></p> <p>(a) <u>The welder is to be tested every 3 years. The welder is to be performed the test for revalidation within 6 months before the expiration date of qualification. These tests revalidate the welder's qualifications for an additional 3 years.</u></p> <p>(b) <u>Every 2 years, two welds made during the last 6 months of the 2 years validity period are to be tested by radiographic or ultrasonic testing or destructive testing and shall be recorded. The weld tested shall reproduce the initial test conditions except for the thickness and the outer diameter. These tests revalidate the welder's qualifications for an additional 2 years.</u></p> <p>(c) <u>If, despite the preceding (a) and (b), you have completed the revalidation of the qualification within one month after the expiration date of qualification, you may be deemed to have maintained the approval for the period from the expiration date to the completion of the revalidation. When the revalidation is completed, the validity of the qualifications is to be as given in (a) or (b).</u></p> <p>(2) <u>The welder has to be verified compliance with the conditions of (1) above and the maintenance of the welder's qualification certificate is to be signed by the Surveyor.</u></p> <p><hereafter, same as the present Rules></p>

< Attachment >

Amended Guidance Relating to the Rules for
Classification(Steel Ships)
(Guidance Part 2 Materials and Welding)



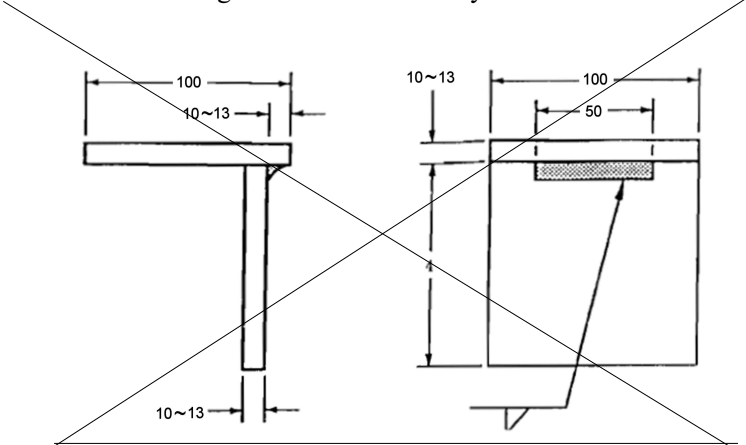
Machinery Rule Development Team

- Main Amendments -

(1) Enter into force on 1 January 2018

- (a) Applications for welder or welding operator qualification dated on or after 1 January 2018. However these amendments do not invalidate welder's qualifications issued and accepted by the Society before 1 January 2018 provided the welder's qualifications are considered by the Society to meet the technical intent of these amendments. These qualifications are to be renewed in accordance with these amendments latest by 31 December 2020.
- (b) The welder's or welding operator's qualifications which have not been required by current Rules before 1 January 2018, such as tack welders and automatic welders, are to be initially issued in accordance with these amendments by 31 December 2020 at the latest.

● To reflect Request for Establishment/Revision of Classification Technical Rules
- IACS UR W32(New, Sept 2016)

Present	Amendment
<p style="text-align: center;">CHAPTER 1 <Omitted></p> <p style="text-align: center;">CHAPTER 2 WELDING</p> <p style="text-align: center;">Section 1 ~ Section 4 <Omitted></p> <p style="text-align: center;">Section 5 <u>Welders and Welder Performance Qualification Tests</u></p> <p>501. General</p> <p>1. Qualification of tack welder</p> <p>— Qualification tests for tack welder, specified in 501. 2 of the Rules, are to be carried out in accordance with the followings:</p> <p>(1) Test assembly is to comply with Fig 2.2.8 of the Guidance. The leg length of tack welds will not be more than 6 mm. The bead length of tack welds may be of about 50 mm</p>  <p style="text-align: center;">Fig 2.2.8 Type and dimension of test assembly for qualification of tack welder</p> <p>(2) Visual inspection is to comply with Pt 2, Ch 2, 503. 3 (2) of the Rules and fracture test is to comply with Pt 2, Ch 2, 503. 3 (5) of the Rules.</p> <p>(3) The qualified thickness range is more than 3 mm.</p>	<p style="text-align: center;">CHAPTER 1 <Same as the present Rules></p> <p style="text-align: center;">CHAPTER 2 WELDING</p> <p style="text-align: center;">Section 1 ~ Section 4 <Same as the present Guidance></p> <p style="text-align: center;">Section 5 <u>Welders and Welder Performance Qualification Scheme (2018)</u></p> <p>501. <Deleted></p> <p>1. <Deleted></p>

Present	Amendment
<p>(4) The positions for qualification test and positions qualified for actual welding work are to comply with the requirements for the fillet joint of plates in Pt 2, Ch 2, 502. 6, Table 2.2.14 of the Rules.</p> <p>2. Qualification of welding operator</p> <p>— Qualification of welding operator specified in 501. 3 of the Rules are to be carried out as follows:</p> <p>(1) Test assembly is to comply with Pt 2, Ch 2, 404. 3 and 405. 3 of the Rules. For butt welded joints, the width of test assembly is not to be less than 300 mm and the length not to be less than 400 mm. For fillet welded joints, the width of test assembly is not to be less than 150 mm and the length not to be less than 400 mm.</p> <p>(2) Tests and inspections are to comply with Pt 2, Ch 2, 503. 3 of the Rules.</p> <p>3. Qualification of Gas welders</p> <p>— In application to 501. 4 of the Rules, the Qualification of gas welder is to comply with the followings:</p> <p>(1) Gas welders are to have the qualification in Table 2.2.12, 2.2.13 and 2.2.14 of the Rules according to the kind of welding material, plate thickness and welding position.</p> <p>(2) Test assemblies used in the qualification test are to be of without backing, and gas welding rods are to be those for mild steel complying with a <i>KS D7005</i> (Gas welding rods for mild steel) or those considered appropriate by the Society.</p> <p>(3) To the kind and procedure of the qualification tests, the requirements specified in Sec 5 of the Rules are to be applied. For roller bend test, the radii of the plunger of the jig and support roller are to be 10 mm, and the roller spans to be 53 mm.</p> <p>(4) The qualifications for gas welders is to represent "symbol G".</p> <p>4. Qualification test for 9% Ni steel</p> <p>— In application to 501. 4 of the Rules, the Qualification test for 9% Ni steel is to comply with the followings:</p>	<p>2. <Deleted></p> <p>3. <Deleted></p> <p>4. <Deleted></p>

Present	Amendment
<p>(1) Qualification</p> <p>(a) Welders are to have the qualification given in Table 2.2.12, 2.2.13 and 2.2.14 of the Rules according to the actual welding procedure, and the thickness of welding materials and welding position. However, the requirements equivalent to mild steel apply to welder having the qualification for all positions.</p> <p>(b) Any applications who intends to be qualified for each Grade and each Kind of 9% Ni steel are to have performance qualification of the corresponding Kind and Grade of mild steel.</p> <p>(c) The kinds of welding procedure are shield metal arc welding (hereinafter referred to "SMAW") and semi-automatic welding. The welders are to be pass the performance qualification test required according to the each applicable procedure.</p> <p>(d) Notwithstanding the requirements given in (c), welder having the qualification for SMAW who intended to be qualified for semi-automatic welding may make the performance qualification test for semi-automatic welding of the corresponding and lower qualification with the his SMAW qualification by the Society's approval.</p> <p>(2) Kinds and procedures—</p> <p>The welding procedure, welding position and test procedure for welders are to be in accordance with Table 2.2.12 and Table 2.2.13 of the Rules, respectively. In the test procedure for plates, longitudinal face bend test may be substituted for face bend test and root bend test, and longitudinal face bend test for side bend test. In the test procedure for pipes, radiographic inspection may be substituted for bend test.</p> <p>(3) Test assemblies and welding consumables</p> <p>(a) The test assemblies for plates are to be of RL 9N53 or RL 9N60 specified in Ch 1 of the Rules or those considered equivalent by the society.</p> <p>(b) The test assemblies for pipes are to be of RLP 9 specified in Ch 1 of the Rules or those considered equivalent by the Society.</p> <p>(c) Welding consumables used in the test are to be those for 9% Ni steel recognized by the Society.</p> <p>(4) Test assemblies for plates</p> <p>— The shape and size of the test assemblies of plates are to be in accordance with Fig 2.2.9-1 of the Guidance.</p>	

Present

Amendment

Grade	Dimension of Test Assembly	Type of joint		Remarks
		with backing strips	without backing strips	
Grade 1		—		$r < 9.5$
Grade 2				$9.5 \leq r < 25$
Grade 3				$r \geq 25$

Fig 2.2.9-1 Dimensions and Types of Plate Test Assembly of the Qualification Test for 9% Ni Steel (Units : mm)

~~(5) Test assemblies for pipes—~~

~~The shape and size of the test assemblies for pipe welding are to comply with Fig 2.2.9-2 of the Guidance.~~

Present

Amendment

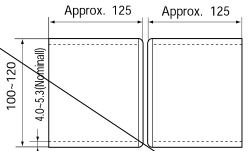
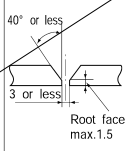
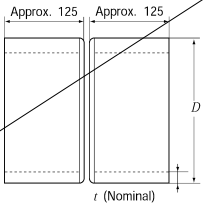
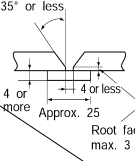
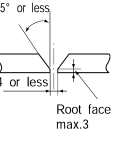
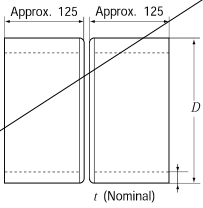
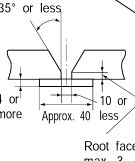
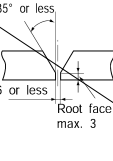
	Dimension of Test Assembly	Type of joint		Remarks
		with backing strips	without backing strips	
Grade 1		—		$t = \text{unlimited}$ $D \leq 100$
Grade 2				$t \leq 9.5$ $D > 100$
Grade 3				$t \leq 9.5$ $D > 100$

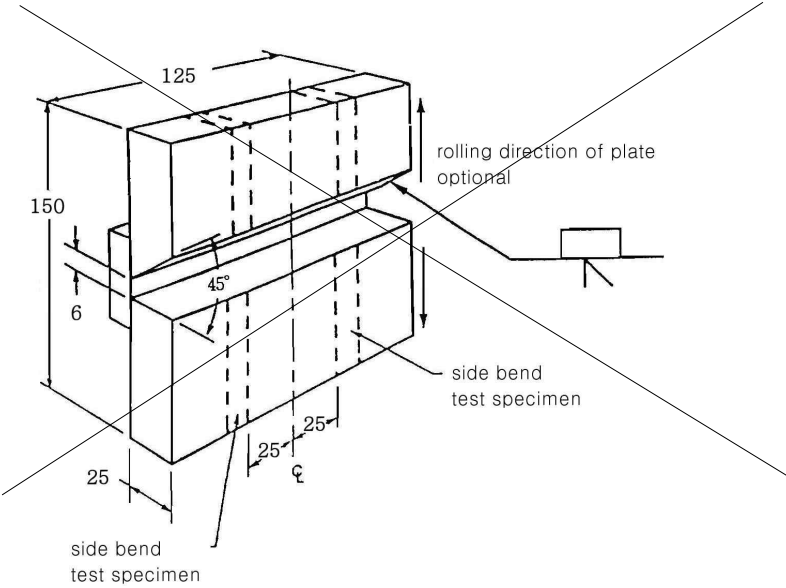
Fig 2.2.9-2 Dimensions and Types of Pipe Test Assembly of the Qualification Test for 9% Ni Steel
 (Units : mm)

(6) Longitudinal bend test

The shape and size of the longitudinal bend test specimen are to be of RB 1 in Table 2.2.2 of the Rules. The test specimen is to be face bent jig shown in Fig 2.2.1 or 2.2.2 of the Rules, and no cracks of 3 mm or more in length in any direction or no remarkable defect are to exist on the bent outer surface.

(7) Radiographic test

Radiographic test is to be carried out on all welding lines of the pipe test assemblies where no significant defects are to exist.

Present	Amendment
<p>5. Application of equivalent standards</p> <p>— In application to 501. 5 of the Rules, it may be considered as equivalent for that the requirements of the standard internationally recognized (<i>AWS, ASME</i> etc) or considered as equivalent for those by the Society instead of the requirements for welder performance qualification of this section are applied.</p> <p>503. Testing procedure</p> <p>1. Test assembly</p> <p>— In application to 503. 2 (3) of the Rules, the test position, dimensions of test assembly and edge preparation for welding in 2G position are to comply with Fig 2.2.10 of the Guidance:</p>  <p>Fig 2.2.10 Dimensions of test assembly and edge preparation in 2G position</p>	<p>5. <Deleted></p> <p>503. Testing procedure</p> <p>1. <Deleted></p>

Present	Amendment
<p>2. Examination and test</p> <p>(1) "at the discretion of the Society" referred in <u>Note (3)</u>, Table 2.2.15 of 503. 3 of the Rules means where the soundness for test specimens and welder qualification are difficult to be verified by test of Table 2.2.15 of the Rules.</p> <p>(2) In application to 503. 3 (3) (d) of the Rules, defects appearing at the corners of a test specimen during test can be investigated in accordance with Pt 1, Ch 1, 104. or 105. of the Guidance.</p> <p>(3) Radiographic testing— In application to 503. 3 (4) of the Rules, the radiographic testing procedures and acceptance criteria are to be in accordance with the followings:</p> <p>(a) Where deemed the excess of the amount of heat input by visual inspection after welding, bend tests other than radiographic testing may be required additionally.</p> <p>(b) The acceptance criteria for radiographic examination is to comply with the requirements specified in 3 (3) of Annex 2-7.</p> <p>3. General requirements for qualification validity</p> <p>(1) In application to 503. 6 (3) of the Rules, the suspension of welder qualification is to be in accordance with the followings:</p> <p>(A) When welder quits his job from the company where he had employed and certified:</p> <p>(B) Where there is some specific reason to question a qualified welder's ability:</p> <p>(2) The effectiveness of qualification of welder who has switched his job may be considered as remaining, provided that the followings are satisfied</p> <p>(A) It is to be proved that the welders have kept performance qualification at previous company.</p> <p>(B) It is to be proved that welding condition is similar to those of previous company, and the welders carried out qualified work with acceptance welding performance.</p> <p>(C) When welders have not used a particular process and equipment for a period excessing six months.</p> <p><hereafter, omitted></p>	<p>1. Examination and test</p> <p>(1) "at the discretion of the Society" referred in <u>Note (6)</u>, Table 2.2.17 of 503. 3 of the Rules means where the soundness for test specimens and welder qualification are difficult to be verified by test of Table 2.2.17 of the Rules.</p> <p>(2) In application to 503. 3 (3) (f) of the Rules, defects appearing at the corners of a test specimen during test can be investigated in accordance with Pt 1, Ch 1, 104. or 105. of the Guidance.</p> <p>(3) <Deleted></p> <p>3. <Deleted></p> <p><hereafter, same as the present Guidance></p>