



VERBAND FÜR SCHIFFBAU UND MEERESTECHNIK E.V.

Arbeitskreis Fertigung Schiffbau

**STANDARD**  
**PREPARATION FOR COATING**  
**(Final Version)**

as part of

Production Standard of the German Shipbuilding Industry  
(Substitution for chapter 2)

Federführung:



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**Preamble:**

The quoted norms are valid with the extensions described in this production standard. Different treatment procedures designated as attaining the same grade of surface preparation are considered as equivalent, that means it lies in the free responsibility of the yard to decide which of these is to be applied.

## 2 PREPARATION FOR COATING

### 2.1 PRIMARY SURFACE PREPARATION

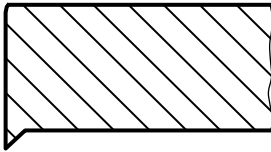
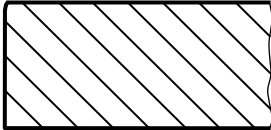
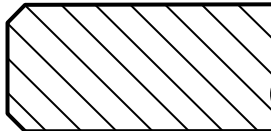
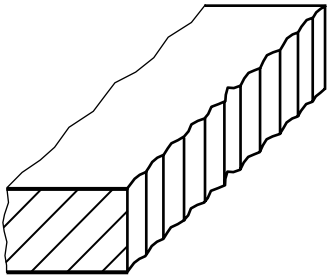
Feature	Preparation Grade	
2.1.1 Grades for surface preparation	<b>A</b>	<b>St 2</b> according to ISO 12944-4 and ISO 8501-1 Plates <5 mm thickness pre-treatment by manual or mechanical grinding or brushing or similar method
	<b>B</b>	<b>St 3</b> according to ISO 12944-4 und ISO 8501-1 Plates <5 mm thickness pre-treatment by manual or mechanical grinding or brushing or similar method
	<b>C</b>	<b>Be</b> according to ISO 12944-4 Plates <5mm thickness and profiles pickling with acid
	<b>D</b>	<b>Sa 2½</b> according to ISO 12944-4 and ISO 8501-1 Plates ≥ 5mm thickness and profiles blasting in pre-treatment lines Pipes for hull (pillars, frames, etc.) outside blasting only
2.1.2 Roughness of surface after blasting	<b>Rz = 25 .. 60 µm</b> Only valid in connection with preparation grade <b>D</b> Rz = maximum height of roughness profile according to ISO 4287	
2.1.3 Film thickness of shop primer	Dry film thickness according to reference of manufacturer :  <b>10 – 25 µm</b> Only valid in connection with preparation grade <b>D</b>	

### 2.2 SECONDARY SURFACE PREPARATION

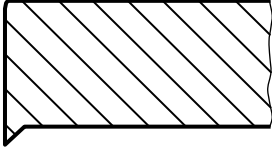
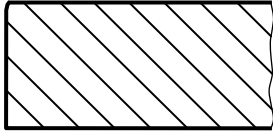
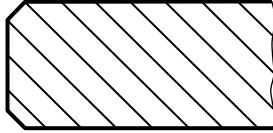
Feature	Preparation Grade	
2.2.1 Grades for surface preparation	<b>A</b>	<b>P St 2</b> according to ISO 8501-2 and ISO 12944-4 Achieved by partial manual or mechanical grinding or brushing, partial dry ice (CO <sub>2</sub> ) cleaning or similar method
	<b>B</b>	<b>P St 3</b> according to ISO 8501-2 and ISO 12944-4 Achieved by partial manual or mechanical grinding or brushing, partial dry ice (CO <sub>2</sub> ) cleaning or similar method
	<b>C</b>	<b>P Ma</b> according to ISO 8501-2 and ISO 12944-4 Achieved by partial mechanical grinding
	<b>D</b>	<b>P Sa 2</b> according to ISO 8501-2 and ISO 12944-4 Achieved by partial blasting

	<b>E</b>	<b>P Sa 2½</b> according to ISO 8501-2 and ISO 12944-4 Achieved by partial blasting
	<b>F</b>	<b>Sa 2</b> according to ISO 8501-1 and ISO 12944-4 Achieved by blasting
	<b>G</b>	<b>Sa 2½</b> according to ISO 8501-1 and ISO 12944-4 Achieved by blasting

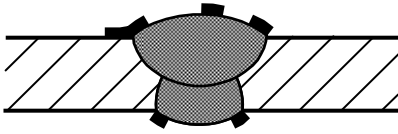
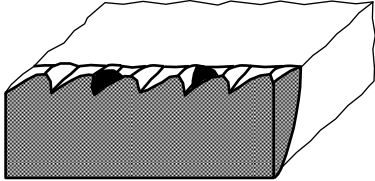
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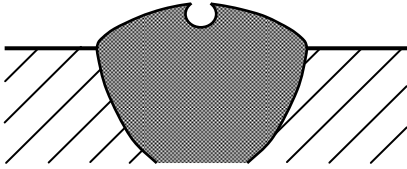
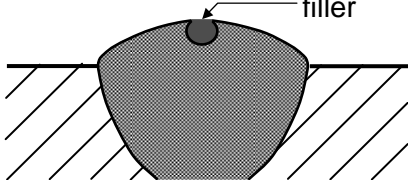
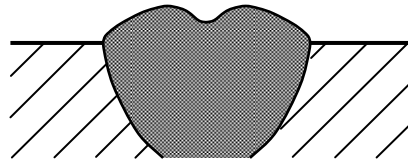
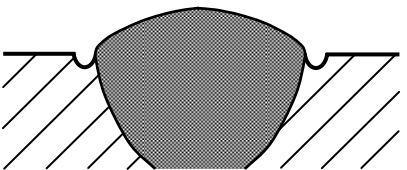
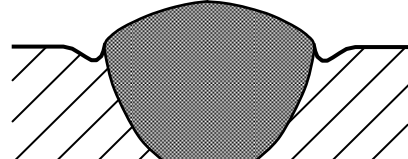
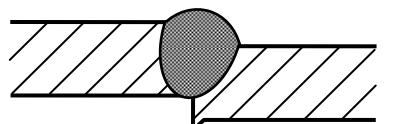
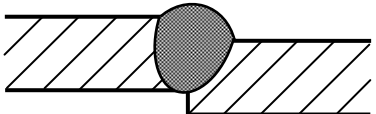
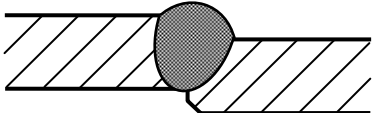
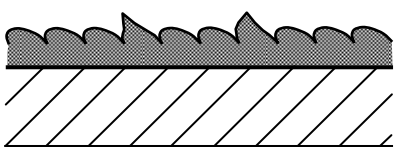
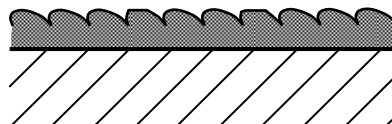
Feature	Preparation Grade	
2.3.1 Cutting slag	<b>A</b>	<b>No treatment</b> – Cutting slag not removed during secondary surface preparation remains.
	<b>B</b>	<b>Complete removal of cutting slag</b>
2.3.2 Cutting edges 	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<b>Burr removal</b> from below side edge of the plate by means of scraper, grinding wheel or similar The top side edge of the plate remains untreated. 
	<b>C</b>	<b>Chamfer edges</b> from top and below side edge of the plate by slightly chamfering at approx. 45° by means of flap-disk, grinding wheel, edge-miller or similar 
2.3.3 Cutting grooves 	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<b>Removal of individual sharp notches</b> ≥ 3mm depth, whenever practicable by grinding instead of weld filling
	<b>C</b>	<b>Smoothing of cut joint faces</b> if depth of grooves > 1mm by grinding <b>Individual non-sharp notches &lt; 3mm depth remain</b> , e.g. sharp notches because of torch failures (scouring)

2.4 EXPOSED SAWCUT OR SHEARCUT JOINT FACES

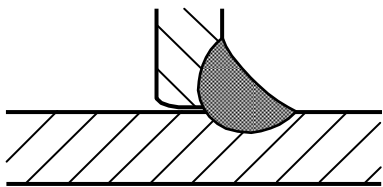
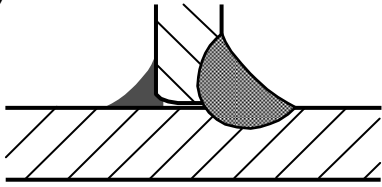
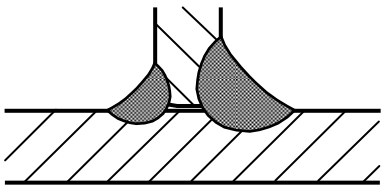
Feature	Preparation Grade	
<p>2.4 Cutting edges</p> 	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<p><b>Burr removal</b> from below side edge of the plate by means of grinding wheel or similar The top side edge of the plate remains untreated.</p> 
	<b>C</b>	<p><b>Chamfer edges</b> from top and below side edge of the plate by slightly chamfering at approx. 45° by means of flap-disk, grinding wheel, edge-miller or similar</p> 

2.5 WELDING IMPERFECTIONS

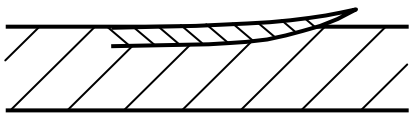
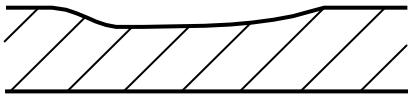
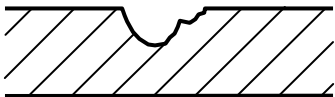

Feature	Preparation Grade	
<p>2.5.1 Welding slag</p> 	<b>A</b>	<b>No treatment</b> – The welding slag not removed during secondary surface preparation remains.
	<b>B</b>	<b>Complete removal of welding slag</b>
<p>2.5.2 Welding slag inclusions</p> 	<b>A</b>	<b>No treatment</b> - The slag inclusions not removed during secondary surface preparation remain.
	<b>B</b>	<b>Removal of all slag inclusions</b>
<p>2.5.3 Welding spatters</p>	<b>A</b>	<b>No treatment</b> - The welding spatters not removed during secondary surface preparation remain.
	<b>B</b>	<b>Removal of all welding spatters</b>

Feature	Preparation Grade	
<p>2.5.4 Pores and clusters of pores</p> 	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<p><b>Closing of all pores</b> by filler appropriate to coating system</p> 
	<b>C</b>	<p><b>Removal of all pores</b> by stroking, chiselling or grinding</p> 
<p>2.5.5 Undercuts</p> 	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<p><b>Removal of all sharp undercuts</b> by grinding or welding</p> 
<p>2.5.6 Misalignment</p> 	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<p><b>Burr removal</b> of sharp edges by means of grinding wheel or similar.</p> 
	<b>C</b>	<p><b>Chamfer sharp edges</b> by slightly chamfering at approx. 45° by means of flap-disk, grinding wheel or similar</p> 
<p>2.5.7 Weld face</p> 	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<p><b>Removal of all sharp edges in the weld face</b> by grinding</p> 

## 2.6 EXECUTION OF THE WELD

Feature	Preparation Grade	
2.6 Skip welding / one-sided fillet weld  	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<b>Closing of non-welded weld sections / of opposite weld side</b> by filler appropriate to coating system  
	<b>C</b>	<b>Full welding of non-welded sections / of opposite weld side</b>  

## 2.7 FURTHER SURFACE IMPERFECTIONS

Feature	Preparation Grade	
2.7.1 Lamination  		<b>Removal of laminations</b> by complete grinding  
2.7.2 Mechanical damages	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<b>Smoothing of sharp-edged grooves and burrs</b> caused by mechanical stress (e.g. resulting from auxiliary transportation means) by grinding
2.7.3 Pits and craters  	<b>A</b>	<b>No treatment</b>
	<b>B</b>	<b>Closing of sharp-edged pits and craters</b> by filler appropriate to coating system  
2.7.4 Production related markings		<b>No treatment</b> of all production related markings, like marking lines by ARC-marker or powder marking, centre punches and other markings

## 2.8 INSPECTION OF SURFACE FEATURES

### 2.8.1 Conditions of inspection

The inspection of surface features covered in 2.1 to 2.7 must be generally performed as visual inspection with the naked eye without any means for magnification. Thereby lighting conditions are assumed, which correspond to bright diffuse daylight or similar artificial illumination. This means only those surface features discernible under these conditions are defined as “visible” in terms of this production standard. Commonly, the inspection takes place immediately after completion of the related stage of surface preparation on announcement of the manufacturer. Areas presented for inspection must be checked as a whole. The extent and the duration of the inspection should be oriented according to the quality of the following coating system(s), the stress of the respective area and the local conditions. The inspection must be carried out in such a manner that the quality of surface preparation will not be negatively influenced.

### 2.8.2 Documentation of inspection

The results of inspection must be recorded in writing. All defects ascertained by the inspector must be documented.

## 2.9 AREAS OF APPLICATION / CLASSES FOR PREPARATION

Preparation grade			Outside areas					
			Areas insulated from outside	decks underneath deck covering	Cargo holds closed by hatch covers	Cargo holds open without hatch covers	Exposed decks incl. deck outfits, shell topside and superstructures	Underwater areas of shell, pools
			I	II	III	IV	V	VI
<b>2.3 EXPOSED THERMALLY CUT JOINT FACES</b>								
2.3.1	A	Cutting slag – No treatment						
	B	Removal of cutting slag	X	X	X	X	X	X
2.3.2	A	Cutting edges – No treatment						
	B	Burr removal from below	X	X	X	X		
	C	Chamfer cutting edges					X	X
2.3.3	A	Cutting grooves – No treatment						
	B	Removal of only individual sharp notches	X	X	X	X		
	C	Smoothing of cut joint faces					X	X
<b>2.4 EXPOSED SAWCUT OR SHEARCUT JOINT FACES</b>								
	A	Cutting edges – No treatment						
	B	Burr removal from below	X	X	X	X		
	C	Chamfer cutting edges					X	X
<b>2.5 WELDING IMPERFECTIONS</b>								
2.5.1	A	Welding slag – No treatment						
	B	Removal of welding slag	X	X	X	X	X	X
2.5.2	A	Welding slag inclusions – No treatment	X	X	X	X		
	B	Removal of slag inclusions					X	X
2.5.3	A	Welding spatters – No treatment	X	X	X			
	B	Removal of all welding spatters				X	X	X
2.5.4	A	Pores and clusters of pores – No treatment		X				
	B	Closing of all pores	X		X	X	X	
	C	Removal of all pores						X
2.5.5	A	Undercuts – No treatment	X	X	X			
	B	Removal of all sharp undercuts				X	X	X
2.5.6	A	Misalignment – No treatment						
	B	Misalignment – Burr removal	X	X	X	X		
	C	Misalignment – Chamfer edges					X	X
2.5.7	A	Weld face – No treatment	X	X	X			
	B	Removal of all sharp edges				X	X	X
<b>2.6 EXECUTION OF THE WELD</b>								
	A	Skip welding – No treatment		X				
	B	Closing of non-welded weld sections	X		X			
	C	Full welding of non-welded weld sections				X	X	X
<b>2.7 FURTHER SURFACE IMPERFECTIONS</b>								
2.7.1		Removal of laminations	X	X	X	X	X	X
2.7.2	A	Mechanical damages – No treatment	X	X	X			
	B	Smoothing of sharp-edged grooves and burrs				X	X	X
2.7.3	A	Pits and craters – No treatment		X				
	B	Closing of sharp-edged pits and craters	X		X	X	X	X
2.7.4		Production related markings – No treatment	X	X	X	X	X	X

Table 1: Allocation of preparation grades and areas of application (outside areas)

Preparation grade		Areas of application/classes for preparation	Inside areas			
			Behind ceilings, underneath insulation and cladding	Visible areas within engine rooms, store rooms, service and technical rooms, shops, kitchens, living rooms and service routes (above 2m height)	Visible areas within engine rooms, store rooms, service and technical rooms, shops, kitchens, living rooms and service routes (0 to 2m height)	Bilges, areas under floors, sumps, battery and pool equipment rooms
			VII	VIII	IX	X
<b>2.3 EXPOSED THERMALLY CUT JOINT FACES</b>						
2.3.1	A	Cutting slag – No treatment	X			
	B	Removal of cutting slag		X	X	X
2.3.2	A	Cutting edges – No treatment	X	X		
	B	Burr removal from below			X	X
	C	Chamfer cutting edges				
2.3.3	A	Cutting grooves – No treatment	X	X		
	B	Removal of only individual sharp notches			X	X
	C	Smoothing of cut joint faces				
<b>2.4 EXPOSED SAWCUT OR SHEARCUT JOINT FACES</b>						
	A	Cutting edges – No treatment	X	X		
	B	Burr removal from below			X	X
	C	Chamfer cutting edges				
<b>2.5 WELDING IMPERFECTIONS</b>						
2.5.1	A	Welding slag – No treatment	X			
	B	Removal of welding slag		X	X	X
2.5.2	A	Welding slag inclusions – No treatment	X	X	X	X
	B	Removal of slag inclusions				
2.5.3	A	Welding spatters – No treatment	X	X	X	X
	B	Removal of all welding spatters				
2.5.4	A	Pores and clusters of pores – No treatment	X	X	X	
	B	Closing of all pores				X
	C	Removal of all pores				
2.5.5	A	Undercuts – No treatment	X	X	X	
	B	Removal of all sharp undercuts				X
2.5.6	A	Misalignment – No treatment	X	X		
	B	Misalignment – Burr removal			X	X
	C	Misalignment – Chamfer edges				
2.5.7	A	Weld face – No treatment	X	X		
	B	Removal of all sharp edges			X	X
<b>2.6 EXECUTION OF THE WELD</b>						
	A	Skip welding – No treatment	X	X	X	
	B	Closing of non-welded weld sections				X
	C	Full welding of non-welded weld sections				
<b>2.7 FURTHER SURFACE IMPERFECTIONS</b>						
2.7.1		Removal of laminations	X	X	X	X
2.7.2	A	Mechanical damages – No treatment	X	X		
	B	Smoothing of sharp-edged grooves and burrs			X	X
2.7.3	A	Pits and craters – No treatment	X	X		
	B	Closing of sharp-edged pits and craters			X	X
2.7.4		Production related markings – No treatment	X	X	X	X

Table 1: Allocation of preparation grades and areas of application (inside areas)

Preparation grade		Areas of application/classes for preparation	Tanks *					
			Voids and cofferdams **	Tanks for lubricating oil and hydraulic oil, circulation oil tanks, fuel oil tanks	Crude oil and heavy oil tanks	Ballast water tanks and heeling tanks	Slop tanks, grey water and dirt water tanks, boiler water tanks and distillate tanks	Tanks for fresh water and drinking water
			XI	XII	XIII	XIV	XV	XVI
<b>2.3 EXPOSED THERMALLY CUT JOINT FACES</b>								
2.3.1	A	Cutting slag – No treatment			X			
	B	Removal of cutting slag	X	X		X	X	X
2.3.2	A	Cutting edges – No treatment	X	X	X			
	B	Burr removal from below						
	C	Chamfer cutting edges				X	X	X
2.3.3	A	Cutting grooves – No treatment	X	X	X			
	B	Removal of only individual sharp notches						
	C	Smoothing of cut joint faces				X	X	X
<b>2.4 EXPOSED SAWCUT OR SHEARCUT JOINT FACES</b>								
	A	Cutting edges – No treatment	X	X	X			
	B	Burr removal from below						
	C	Chamfer cutting edges				X	X	X
<b>2.5 WELDING IMPERFECTIONS</b>								
2.5.1	A	Welding slag – No treatment			X			
	B	Removal of welding slag	X	X		X	X	X
2.5.2	A	Welding slag inclusions – No treatment	X		X			
	B	Removal of slag inclusions		X		X	X	X
2.5.3	A	Welding spatters – No treatment	X		X			
	B	Removal of all welding spatters		X		X	X	X
2.5.4	A	Pores and clusters of pores – No treatment	X	X	X			
	B	Closing of all pores				X		
	C	Removal of all pores					X	X
2.5.5	A	Undercuts – No treatment	X	X	X			
	B	Removal of all sharp undercuts				X	X	X
2.5.6	A	Misalignment – No treatment	X	X	X			
	B	Misalignment – Burr removal						
	C	Misalignment – Chamfer edges				X	X	X
2.5.7	A	Weld face – No treatment	X	X	X			
	B	Removal of all sharp edges				X	X	X
<b>2.6 EXECUTION OF THE WELD</b>								
	A	Skip welding – No treatment	X	X	X			
	B	Closing of non-welded weld sections						
	C	Full welding of non-welded weld sections				X	X	X
<b>2.7 FURTHER SURFACE IMPERFECTIONS</b>								
2.7.1		Removal of laminations	X	X	X	X	X	X
2.7.2	A	Mechanical damages – No treatment	X	X	X			
	B	Smoothing of sharp-edged grooves and burrs				X	X	X
2.7.3	A	Pits and craters – No treatment	X	X	X			
	B	Closing of sharp-edged pits and craters				X	X	X
2.7.4		Production related markings – No treatment	X	X	X	X	X	X

Table 1: Allocation of preparation grades and areas of application (tanks)