



**INSTRUCTIONS - PROCESSES
METHODS**

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SECTION
STRUCTURES

CLASSIFICATION AND SPECIFICATIONS FOR STRUCTURES WITH CE MARKING STEEL 1090-2

EXECUTION CLASSES

SPECIFICATIONS	EXC1	EXC2	EXC3	EXC4
COMPRAS				
TRACEABILITY	DOES NOT APPLY	TRACEABILITY (IN CASE OF MARKING)	TOTAL TRACEABILITY Traceability of constituent materials and traceability of welders, equipment used, WPS, WPQR and welding consumables.	TOTAL TRACEABILITY Traceability of constituent materials and traceability of welders, equipment used, WPS, WPQR and welding consumables.
MATERIALS CERTIFICATE	3.1	3.1	3.1	3.1
TECHNICAL CONDITIONS OF SUPPLIES	TOLERANCES	TOLERANCES	TOLERANCES	TOLERANCES
For products: I, H SECTIONS CHANNELS T SECTIONS Equal and unequal leg angles PLATES Cold formed hollow sections Hot finished hollow sections	EN 10025 y EN 10163 - 3 class C1 En 10025 EN 1063-2 CLASE A2 EN 10210-1 EN 10219-1	EN 10025 y EN 10163 - 3 class C1 En 10025 EN 1063-2 CLASE A2 EN 10210-1 EN 10219-1	EN 10025 y EN 10163 class C1 En 10025 EN 1063-2 CLASE A2 EN 10210-1 EN 10219-1	EN 10025 y EN 10163 class C1 En 10025 EN 1063-2 CLASE A2 EN 10210-1 EN 10219-1
	EN 10034 EN 10279 EN 10055 EN 10056-2 EN 10056-2 EN 10029 Y EN 10051	EN 10034 EN 10279 EN 10055 EN 10056-2 EN 10056-2 EN 10029 Y EN 10051	EN 10034 EN 10279 EN 10055 EN 10056-2 EN 10056-2 EN 10029 Y EN 10051	EN 10034 EN 10279 EN 10055 EN 10056-2 EN 10056-2 EN 10029 Y EN 10051
			(if others required specify customer)	(if others required specify customer)
MARKING	NO	YES	YES	YES
PREPARATION AND ASSEMBLY				
IDENTIFICATION (For stamped, punched or punched marks. Only steels up to S500 Stainless steel is not allowed)	IN ALL PROCESSES CHISELLED NOTCHES ARE NOT PERMITTED	IN ALL PROCESSES CHISELLED NOTCHES ARE NOT PERMITTED	IN ALL PROCESSES + CERT. INSPECTION CHISELLED NOTCHES ARE NOT PERMITTED	IN ALL PROCESSES + CERT. INSPECTION CHISELLED NOTCHES ARE NOT PERMITTED
THERMAL CUTTING	Cut edges to be free from significant irregularities and dross shall be removed	Perpendicularity tolerance: Range 5 Profile height: Range 4	Perpendicularity tolerance: Range 4 Profile height: Range 4	Perpendicularity tolerance: Range 4 Profile height: Range 4
CUT OUTS	MINIMUM RADIUS=5mm (Unless otherwise specified, punched cut outs are permitted)	MINIMUM RADIUS=5mm (Unless otherwise specified, punched cut outs are permitted)	MINIMUM RADIUS=5mm (Unless otherwise specified, punched cut outs are permitted)	MINIMUM RADIUS=5mm (Unless otherwise specified, punched cut outs are permitted)
EXECUTION OF HOLING	Punching is permitted provided that the nominal thickness of the component is not greater than 1,4 times the nominal diameter of the hole Where untreated punched holes are not permitted, holes may be punched at least 2mm less than full size and then reamed or drilled	Punching is permitted provided that the nominal thickness of the component is not greater than 1,4 times the nominal diameter of the hole Where untreated punched holes are not permitted, holes may be punched at least 2mm less than full size and then reamed or drilled	Punching is permitted provided that the nominal thickness of the component is not greater than 1,4 times the nominal diameter of the hole. Where untreated punched holes are not permitted, holes may be punched at least 2mm less than full size and then reamed or drilled	Punching is permitted provided that the nominal thickness of the component is not greater than 1,4 times the nominal diameter of the hole Where untreated punched holes are not permitted, holes may be punched at least 2mm less than full size and then reamed or drilled
WELDING				
GENERAL	Elementary quality requirements 3834-4	Standard quality requirements 3834-3	Comprehensive quality requirements 3834-2	Comprehensive quality requirements 3834-2
WELDING PROCESSES	No requeriment	table 12 1090-2	table 12 1090-2 All parts must have welding plan	table 12 1090-2 All parts must have welding plan
WELDERS AND WELDING OPERATORS	Welders shall be qualified in accordance with EN ISO 9606-1 and welding operators in accordance with EN ISO 14732.	Welders shall be qualified in accordance with EN ISO 9606-1 and welding operators in accordance with EN ISO 14732.	Welders shall be qualified in accordance with EN ISO 9606-1 and welding operators in accordance with EN ISO 14732.	Welders shall be qualified in accordance with EN ISO 9606-1 and welding operators in accordance with EN ISO 14732.
WELDING COORDINATION	sufficient supervision as specified in EN ISO 3834-4	technical knowledge according to Tables 14 and 15 UNE EN 14731	technical knowledge according to Tables 14 and 15 UNE EN 14731	technical knowledge according to Tables 14 and 15 UNE EN 14731
JOINT PREPARATION	Sin requisito	Prefabrication primers shall not be left on the fusion faces or heat affected zone unless welding procedure tests have been completed	Prefabrication primers shall not be left on the fusion faces or heat affected zone unless welding procedure tests have been completed	Prefabrication primers shall not be left on the fusion faces or heat affected zone unless welding procedure tests have been completed
TEMPORARY ATTACHMENTS	No requeriment	No requeriment	Possible restrictions on the use of temporary attachments shall be specified. The removal locations shall be visually inspected and for steel grades ≥ S355 shall be subjected to NDT. Chipping and gouging are not permitted on steel grades ≥ S460	Possible restrictions on the use of temporary attachments shall be specified. The removal locations shall be visually inspected and for steel grades ≥ S355 shall be subjected to NDT. Chipping and gouging are not permitted on steel grades ≥ S460
TACK WELDS	No requeriment	Qualified welding procedure. The minimum length of the tack shall be the lesser of four times the thickness of the thicker part or 50 mm,	Qualified welding procedure. The minimum length of the tack shall be the lesser of four times the thickness of the thicker part or 50 mm,	Qualified welding procedure. The minimum length of the tack shall be the lesser of four times the thickness of the thicker part or 50 mm,
BUTT WELDS	No requeriment	Only applies if specified; run-on/run-off pieces shall be used for full penetration transverse butt welds. If specified run-on/run-off pieces shall be used for fullpenetration longitudinal butt welds or partial penetration butt welds (transverse or longitudinal)	run-on/run-off pieces shall be used for full penetration transverse butt welds. If specified run-on/run-off pieces shall be used for fullpenetration longitudinal butt welds or partial penetration butt welds (transverse or longitudinal)	run-on/run-off pieces shall be used for full penetration transverse butt welds. If specified run-on/run-off pieces shall be used for fullpenetration longitudinal butt welds or partial penetration butt welds (transverse or longitudinal)

FILLED WELD	Fillet welds terminating at the ends or sides of components shall be returned continuously around the corners for a distance of not less than twice the leg length of the weld	Fillet welds terminating at the ends or sides of components shall be returned continuously around the corners for a distance of not less than twice the leg length of the weld	Fillet welds terminating at the ends or sides of components shall be returned continuously around the corners for a distance of not less than twice the leg length of the weld	Fillet welds terminating at the ends or sides of components shall be returned continuously around the corners for a distance of not less than twice the leg length of the weld
SINGLE SIDED WELDS	No requirement	No requirement	Permanent backing metal shall be made continuous by means of full penetration butt welds.	Permanent backing metal shall be made continuous by means of full penetration butt welds.
WELDING ACCEPTANCE CRITERIA	UNE EN ISO 5817 Quality level D (except level C for insufficient throat)	UNE EN ISO 5817 (Except level D for overlapping)	UNE EN ISO 5817 quality level B	UNE EN ISO 5817 minimum quality level B
FATIGUE REQUERIMENTS	No requirements	EN ISO 5817:2014 Annex C	EN ISO 5817:2014 Annex C	EN ISO 5817:2014 Annex C
HANDLING AND STORAGE ON SITE	No requirements	The procedure for restoration shall be documented	The procedure for restoration shall be documented	The procedure for restoration shall be documented
INSPECTION, TESTING AND CORRECTION				
END-WPS Qualified staff level 2				
VISUAL	VISUAL 100% throughout the entire weld length			
Transverse butt welds and partial penetration welds in butt joints				
cruciform joints	0% (PT o MT) <small>(10 % for such welds executed in steel ≥ S420.)</small>	10% (PT o MT)	20% (PT o MT)	Minimum level as EXC3
T joints	0% (PT o MT)	5% (PT o MT)	10% (PT o MT)	Minimum level as EXC3
Transverse fillet welds				
throat thickness > 12 o thickest material > 30mm	0% (PT o MT)	5% (PT o MT)	10% (PT o MT)	Minimum level as EXC3
throat thickness ≤ 12 y thickest material ≤ 30mm	0% (PT o MT)	0% (PT o MT)	5% (PT o MT)	Minimum level as EXC3
Full penetration longitudinal welds (parallel to the component axis) between web and top flange of crane girders	0% (PT o MT)	10% (PT o MT)	20% (PT o MT)	Minimum level as EXC3
Other longitudinal welds	0% (PT o MT)	0% (PT o MT)	5% (PT o MT)	Minimum level as EXC3
CORRECTION OF WELDS	No requirements	Documented procedure	Documented procedure	Documented procedure
PRODUCTION TESTS ON WELDING	No requirements	No requirements	Only if specified	Only if specified
ERECTION				
CONNECTIONS WITH PRELOADED MECHANICAL FASTENERS	No requirements	THE TIGHTENING PROCEDURE SHALL BE CHECKED (the torque wrench must have calibration certificates)	THE TIGHTENING PROCEDURE SHALL BE CHECKED (the torque wrench must have calibration certificates)	THE TIGHTENING PROCEDURE SHALL BE CHECKED (the torque wrench must have calibration certificates)
inspection of installed fasteners	No requirements	INSPECTED 5% SECOND STEP	INSPECTED 5% FIRST STEP AND 10% SECOND STEP	INSPECTED 5% FIRST STEP AND 10% SECOND STEP

		INSTRUCTIONS - PROCESSES METHODS			Number:	013
SECTION STRUCTURES		CLASSIFICATION AND SPECIFICATIONS FOR STRUCTURES WITH CE MARKING ALUMINIUM 1090-3			Rev.:	1
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EXECUTION CLASSES						
SPECIFICATIONS	EXC1	EXC2	EXC3	EXC4		
PURCHASING						
TRACEABILITY	DOES NOT APPLY	DOES NOT APPLY <small>If different alloys and/or tempers of a constituent product are in circulation together, each item of material shall be designated with a mark that identifies its alloy and temper.</small>	TOTAL TRACEABILITY <small>constituent products shall be traceable at all stages of execution between delivery and incorporation in the structure. If different alloys and/or tempers of a constituent product are in circulation together, each item of material shall be designated with a mark that identifies its alloy and temper</small>	TOTAL TRACEABILITY <small>constituent products shall be traceable at all stages of execution between delivery and incorporation in the structure. If different alloys and/or tempers of a constituent product are in circulation together, each item of material shall be designated with a mark that identifies its alloy and temper</small>		
INSPECTION DOCUMENTS FOR STRUCTURAL ALUMINIUM MATERIALS AND WELDING CONSUMABLES	2.2	3.1	3.1	3.1		
TECHNICAL CONDITIONS OF SUPPLIES	TOLERANCES	TOLERANCES	TOLERANCES	TOLERANCES		
For products	EN 755-1	EN 755-1	EN 755-1	EN 755-1		
Round bars	EN 755-3	EN 755-3	EN 755-3	EN 755-3		
Square bars	EN 755-4	EN 755-4	EN 755-4	EN 755-4		
Rectangular bars	EN 755-5	EN 755-5	EN 755-5	EN 755-5		
Hexagonal bars	EN 755-6	EN 755-6	EN 755-6	EN 755-6		
Profiles	EN 755-9	EN 755-9	EN 755-9	EN 755-9		
PLATE	EN 573	EN 573	EN 573	EN 573		
Welding consumables	EN 18273	EN 18273	EN 18273	EN 18273		
			(IF REQUIRE OTHERS, SPECIFY CUSTOMER)	(IF REQUIRE OTHERS, SPECIFY CUSTOMER)		
MARKING	NO	YES <small>(no chisel or heavy stamping allowed)</small>	YES <small>(no chisel or heavy stamping allowed)</small>	YES <small>(no chisel or heavy stamping allowed)</small>		
PREPARATION AND ASSEMBLY						
IDENTIFICATION	DOES NOT APPLY	the constituent products shall be marked clearly or shall be uniquely identifiable	the constituent products shall be marked clearly or shall be uniquely identifiable	the constituent products shall be marked clearly or shall be uniquely identifiable		
THERMAL CUTTING	Cut edges to be free from significant irregularities and dross shall be removed	Perpendicularity tolerance: Range 5 Profile height: Range 4	Perpendicularity tolerance: Range 4 Profile height: Range 4	Perpendicularity tolerance: Range 4 Profile height: Range 4		
CUT OUTS	Unless otherwise specified, re-entrant corners and notches shall be rounded off minimum radius = 5mm.	Unless otherwise specified, re-entrant corners and notches shall be rounded off minimum radius = 5mm.	Unless otherwise specified, re-entrant corners and notches shall be rounded off minimum radius = 5mm.	Unless otherwise specified, re-entrant corners and notches shall be rounded off minimum radius = 5mm.		
HOLING FOR FASTENERS	<p>Maximum clearance for holes according to table 8 UNE EN 1090-3</p> <p>Maximum punching thickness 25 mm; Thicknesses between 16mm - 25mm shall be punched at least 2mm undersize in diameter, followed by reaming.</p> <p>Always neutral coolants or lubricants</p> <p>Holes for fitted bolting assemblies are drilled at least 2 mm smaller than the diameter of the thread or shaft respectively and reamed subsequently.</p> <p>After countersinking, the bolt should be flush with the outer face of the outer layer.</p> <p>Countersinking angle corresponds to the angle of the countersunk head.</p> <p>Length of holes deviation ± 1 for bolt < 20 and deviation ± 2 for bolt diameter ≥ 20mm</p> <p>Width, should not exceed Ø+1mm (EN 19991-1), Maximum length 1,5 (Ø+1) mm for short oval holes and max 2,5 (Ø+1) mm for long holes.</p>					
NUTS	Locking devices are not required unless specified.				Nuts of non-preloaded bolts must be secured	
STRAIGHTENING	Distortion corrections by warm straightening are not allowed except for cold work hardening alloys.					
WELDING						
GENERAL	Elementary quality requirements 3834-4 Welding plan does not apply	Standard quality requirements 3834-3 Must have welding plan	Comprehensive quality requirements 3834-2 Must have welding plan	Comprehensive quality requirements 3834-2 Must have welding plan		
WELDING PROCEDURE	No requirement	Point 7.4.1 UNE EN 1090-3	Point 7.4.1 UNE EN 1090-3	Point 7.4.1 UNE EN 1090-3		
WELDERS AND WELDING OPERATORS	Welders shall be qualified in accordance with EN ISO 9606-2 and welding operators in accordance with EN ISO 14732.	Welders shall be qualified in accordance with EN ISO 9606-2 and welding operators in accordance with EN ISO 14732.	Welders shall be qualified in accordance with EN ISO 9606-2 and welding operators in accordance with EN ISO 14732.	Welders shall be qualified in accordance with EN ISO 9606-2 and welding operators in accordance with EN ISO 14732.		
WELDING COORDINATOR	No requirement	Supervision according to UNE EN 14731	Supervision according to UNE EN 14731	Supervision according to UNE EN 14731		
JOINT PREPARATION	According to EN 1011-1 y 1011-4					
TEMPORARY ATTACHMENTS	It shall be specified if welding of temporary attachments is permitted. If permitted, the locations where this welding is not allowed shall be specified.					
TACK WELDS	No requirement	No requirement	The conditions for deposition of tack welds shall be included in the welding procedure specification.	The conditions for deposition of tack welds shall be included in the welding procedure specification.		
BUTT WELDS	No requirement	Only applicable if specified; run-on/run-off pieces shall be used to ensure full throat thickness at the edge	Run-on/run-off pieces shall be used to ensure full throat thickness at the edge	Run-on/run-off pieces shall be used to ensure full throat thickness at the edge		
FILLET WELD	If specified, fillet welds finishing at the ends or sides of parts should be returned continuously, full size, around the corner for a distance of at least twice the throat thickness of the weld.					
SINGLE SIDED WELDS	Full penetration welds welded from one side should have backing					
WELDING ACCEPTANCE CRITERIA	If customer does not specify otherwise, UNE EN ISO 10042 Class D is applied.					
INSPECTION TESTING AND REPAIR						
END-WPS Qualified staff level 2						
VISUAL	VISUAL 100% throughout the entire weld length					
BUTT WELD	PT	PT o RT o UT	PT + (RT o UT)	PT + (RT o UT)		
PARTIAL PENETRATION WELDS	PT + UT <small>(UT is applicable for penetration depth ≥ 12 mm)</small>		PT + UT <small>(UT is applicable for penetration depth ≥ 12 mm)</small>	PT + UT <small>(UT is applicable for penetration depth ≥ 12 mm)</small>		
FILLET WELD	PT					
FSW (Friction Stir Welding)	Bend test					