ASTM A790 and ASTM A928 difference and Comparison

1 Standard Specifications

Both standards are specification standards for ferritic – austenitic stainless steel pipes used in corrosive environments. ASTM A790 specifies the elements and requirements for the manufacture of seamless and welded pipes, while ASTM A928 only includes electric – fusion welded pipes. ASTM A790 requires that duplex and super duplex steels be welded without adding any filler metal. ASTM A928 requires that weld seams use welding methods with filler metal addition.

2 Manufacturing Processes

The manufacturing processes specified in ASTM A790 and ASTM A928 also give manufacturers some room for independent selection. For example, under specific conditions where the raw material (coil or sheet) has been solution – annealed, both standards allow finished pipes not to be annealed. Such pipes will be marked with HT – 0. However, ASTM A790 has restrictions on this situation: when producing pipes using UNS S31803, S32205, S32750, S32760, and S32520 materials, it is necessary to supplement corrosion tests. The two standards must reach an agreement on the special differences.

ASTM A928 classifies products into five different levels:

Grade 1: All weld passes of the pipe shall be double – welded by methods using filler metal addition, and all shall be inspected by X – ray.
Grade 2: All weld passes of the pipe shall be double – welded by methods using filler metal addition, but X – ray inspection is not required.
Grade 3: All weld passes of the pipe shall be single – welded by methods using filler metal addition, and all shall be inspected by X – ray.
Grade 4: All weld passes of the pipe shall be single – welded by methods using filler metal addition, but the weld pass on the inner surface of the
Grade 5: All weld passes of the pipe shall be double – welded by methods using filler metal addition, and spot X – ray inspection shall be carried
3 Dimensions
ASTM A790 standard covers steel pipe diameters from 1/8" (10.29mm) to 30" (762.0mm), and wall thickness ranges from 1.24mm to 12.7mm.
To make the products meet the steel pipe tolerances specified by the two standards, the manufacturer is under great pressure (see Table 1).

4 (Batch) Destructive Testing
Inside BUTTING Company, for the destructive tests specified by ASTM A790 and ASTM A928 standards, from sample preparation to record
5 Non – destructive Testing
Table 3 shows the different non – destructive testing requirements of the two standards.
6 Importance of Practice
This article conducts a standard comparison based on the currently general standards
Table 1 Comparison of Steel Pipe Tolerances

Dimension	ASTM A790	ASTM A928
Wall Thickness (ASTM A999)	⩽ 12.5% nominal wall thickness	⩽ 12.5% nominal wall thickness
Diameter (ASTM A999)	1/8" (10.29mm) – 1/2" (48.2mm): + 0.4 / – 0.8mm	Same as ASTM A790
	2" (60.3mm) – 4" (114.3mm): + 0.8 / – 0.8mm	
	5" (141.3mm) – 18" (457.2mm): + 2.4 / – 0.8mm	
	20" (508.0mm) – 26" (660.4mm): + 3.2 / – 0.8mm	
	28" (711.2mm) – 34" (863.6mm): + 4.0 / – 0.8mm	
	36" (914.4mm) – 48" (1219.2mm): + 4.8 / – 0.8mm	
Out – of – roundness	For thin – wall pipes (t ⩽ 3% × nominal outer diameter OD_nom): ⩽ 1.5%	For thin – wall pipes (t ⩽ 3% × nominal outer diameter OD_nom): ⩽ 2 × diameter tolerance
	For thick – wall pipes, must meet the diameter tolerance deviation ⩽ 3.2mm per 3m length	For thick – wall pipes, must meet the diameter tolerance
		Same as ASTM A790
Straightness (ASTM A999)	For thick – wall pipes, must meet the diameter tolerance deviation ⩽ 3.2mm per 3m length	Same as ASTM A790
Weld Reinforcement	No requirement	Inner side, outer side ⩽ 3.0mm

*Based on AISI B36.10

Table 2 Comparison of Test Ranges (Destructive Tests)		
Test	**Specimen Size in ASTM A790**	**Specimen Size in ASTM A928**
Tensile Test	1. Sample from batches of up to 100 pipes	Φ < 60.3mm: Maximum 400 pipes of the same size as one batch
	2. Remaining pipes exceeding 100	60.3 ⩽ Φ ⩽ 141.1mm: Maximum 200 pipes of the same size as one batch
		Φ ⩾ 168.3mm: Maximum 100 pipes of the same size as one batch

Circumferential Tensile Test	5% of the number of pipes (but not less than 2 pipes)	No requirement
Bending Test	5% of the number of pipes (Φ ≥ 273mm)	1 pipe per batch (see tensile test)
Hardness Test	2 pipes per batch	No requirement
Definition of Batch	– Pipes of the same size, from the same furnace, and same heat	See tensile test
	– Pipes of the same size, from the same furnace, and same anne	

Table 3 Test Comparison (Non – destructive Testing)

Test	**ASTM A790**	**ASTM A928**
Hydrostatic Test	Each pipe (ASTM A999)	Each pipe (ASTM A999)
Eddy Current or Ultrasonic Testir	Eddy current or ultrasonic testing	After obtaining the buyer's approval, for pipes with wall thickness ≤ 4.2mm, eddy current testing can be used instead of hydrostatic testing. For pipes with diameter Φ ≤ 114.3mm, the entire pipe can be tested. For pipes with larger diameters, only the position near the weld can be tested.
Radiographic Testing	No requirement	Determined according to the steel pipe grade specified by the manufacturing process