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## Manufacturing Specifications

Standard North American DTIs are made to ASTM F959 or F959M (metric), which define the chemical, mechanical (read compression load vs. residual DTI gap), and dimensional requirements per ASME B18.2.6. Complete DTI dimensions and mechanical properties are available from ASTM and ASME. The following is a summary of ASTM F959.

### Chemical Requirements (%) Product Analysis

Carbon	.27 - .53
Manganese	.47 - .93
Phosphorus (max)	.043
Sulfur (max)	.048
Silicon	.13 - .37

### Mechanical Requirements

DTIs are made to compress in proportion to the applied load or bolt tension. A sample of the lot must demonstrate a compression load range at a residual gap of .015" within the following values (the minimum is based on 70% of the minimum ultimate tensile strength of the applicable bolt grade, and the maximum is 20% higher than that). Note that F959 stipulates that the compression load test gap of .015" be the same whether the DTI is plain finish, galvanized, or epoxy coated. Note that the laboratory certification compression load tests for DTIs DO NOT involve bolts, but rather the tests are performed with the DTIs compressed between hardened mandrels.

The compression load test ranges stipulated by ASTM F959 are as follows:

DTI Size – Inch Series	Type A325 (1000lb)	Type A490 (1000lb)
1/2	12-14	15-18
5/8	19-23	24-29
3/4	28-34	35-42
7/8	39-47	49-59
1	51-61	64-77
1 1/8	56-67	80-96
1 ¼	71-85	102-122
1 3/8	85-102	121-145
1 ½	103-124	148-178



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<b>DTI Size – Metric Series</b>	<b>Type 8.8 (kN)</b>	<b>Type 10.9 (kN)</b>
M16	91-109	114-131
M20	142-170	179-206
M22	176-211	221-254
M24	205-246	257-296
M27	267-320	334-384
M30	326-391	408-469
M36	475-570	595-684

### **Coatings**

F959 only allows for mechanical galvanizing (to ASTM B695) and epoxy coating on top of mechanical galvanizing. Other coatings are allowed with the approval of both the manufacturer and the purchaser. Coating of DTIs by anyone other than the manufacturer is prohibited because all compression testing and certification must be done after coating.

### **Certifications**

ASTM F959 requires that compression test certifications be issued which show the results of 29 pieces selected at random from the manufactured lot and compression tested according to the F959 Appendix A1. The compression load of all 29 pieces must be within the range stipulated above. Applied Bolting makes all product certifications available by .pdf download.

### **DTI Markings**

All DTIs are stamped with an individual unique lot mark, which can be related to the lot number. Through the lot number, all DTI lots are traceable to date of manufacture and compression load properties.