

RD163
RD193
RD163 Specialty
Disc Header

SERVICE MANUAL

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SERVICE MANUAL

**RD163 Specialty
RD163
RD193**

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INTRODUCTION

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INTRODUCTION

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Foreword - Important notice regarding equipment servicing

All repair and maintenance work listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given, and using, whenever possible, the special tools.

Anyone who performs repair and maintenance operations without complying with the procedures provided herein shall be responsible for any subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages caused by parts and/or components not approved by the manufacturer, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages caused by parts and/or components not approved by the manufacturer.

The manufacturer reserves the right to make improvements in design and changes in specifications at any time without notice and without incurring any obligation to install them on units previously sold. Specifications, descriptions, and illustrative material herein are as accurate as known at time of publication but are subject to change without notice.

In case of questions, refer to your CASE IH Sales and Service Networks.

Safety rules


Personal safety





This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

 DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

 WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

 CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.

Machine safety

NOTICE: Notice indicates a situation that, if not avoided, could result in machine or property damage.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

Information

NOTE: Note indicates additional information that clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

Safety rules - Personal safety

Carefully study these precautions, and those included in the external attachment operators manual, and insist that they be followed by those working with and for you.

1. Thoroughly read and understand this manual and the attachment Operator's Manual before operating this or any other equipment.
2. Be sure all people and pets are clear of the machine before starting. Sound the horn, if equipped, three times before starting engine.
3. Only the operator should be on the machine when in operation. Never allow anyone to climb on to the machine while it is in motion. If the machine is equipped with an Instructors Seat, this must only be used for training purposes. Passengers must not be allowed to use the Instructors Seat.
4. Keep all shields in place. Never work around the machine or any of the attachments while wearing loose clothing that might catch on moving parts.
5. Observe the following precautions whenever lubricating the machine or making adjustments.
 - Disengage all clutching levers or switches.
 - Lower the attachment, if equipped, to the ground or raise the attachment completely and engage the cylinder safety locks. Completing these actions will prevent the attachment from lowering unexpectedly.
 - Engage the parking brake.
 - Shut off the engine and remove the key.
 - Wait for all machine movement to stop before leaving the operators platform.
6. Always keep the machine in gear while travelling downhill.
7. The machine should always be equipped with sufficient front or rear axle weight for safe operation.
8. Under some field conditions, more weight may be required at the front or rear axle for adequate stability. This is especially important when operating in hilly conditions or/when using heavy attachments.
9. Always lower the attachment, shut off the engine, set the parking brake, engage the transmission gears, remove the key and wait for all machine movement to stop before leaving the operators platform.
10. If the attachment or machine should become obstructed or plugged; set the parking brake, shut off the engine and remove the key, engage the transmission gears, wait for all machine or attachment motion to come to a stop, before leaving the operators platform to removing the obstruction or plug.
11. Never disconnect or make any adjustments to the hydraulic system unless the machine and/or the attachment is lowered to the ground or the safety lock(s) is in the engaged position.
12. Use of the flashing lights is highly recommended when operating on a public road.
13. When transporting on a road or highway, use accessory lights and devices for adequate warning to the operators of other vehicles. In this regard, check local government regulations. Various safety lights and devices are available from your CASE IH dealer.
14. Practice safety 365 days a year.
15. Keep all your equipment in safe operating condition.
16. Keep all guards and safety devices in place.
17. Always set the parking brake, shut off the engine and remove the key, engage the transmission gears, wait for all machine or attachment motion to come to a stop, before leaving the operators platform to service the machine and attachment.
18. Remember: A careful operator is the best insurance against an accident.
19. Extreme care should be taken in keeping hands and clothing away from moving parts.

Safety rules - Ecology and the environment

Soil, air, and water quality is important for all industries and life in general. When legislation does not yet rule the treatment of some of the substances that advanced technology requires, sound judgment should govern the use and disposal of products of a chemical and petrochemical nature.

Familiarize yourself with the relative legislation applicable to your country, and make sure that you understand this legislation. Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, anti-freeze, cleaning agents, etc., with regard to the effect of these substances on man and nature and how to safely store, use, and dispose of these substances.

Helpful hints

- Avoid the use of cans or other inappropriate pressurized fuel delivery systems to fill tanks. Such delivery systems may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of these products contain substances that may be harmful to your health.
- Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
- Avoid spillage when you drain fluids such as used engine coolant mixtures, engine oil, hydraulic fluid, brake fluid, etc. Do not mix drained brake fluids or fuels with lubricants. Store all drained fluids safely until you can dispose of the fluids in a proper way that complies with all local legislation and available resources.
- Do not allow coolant mixtures to get into the soil. Collect and dispose of coolant mixtures properly.
- The air-conditioning system contains gases that should not be released into the atmosphere. Consult an air-conditioning specialist or use a special extractor to recharge the system properly.
- Repair any leaks or defects in the engine cooling system or hydraulic system immediately.
- Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
- Protect hoses during welding. Penetrating weld splatter may burn a hole or weaken hoses, allowing the loss of oils, coolant, etc.

Battery recycling

Batteries and electric accumulators contain several substances that can have a harmful effect on the environment if the batteries are not properly recycled after use. Improper disposal of batteries can contaminate the soil, groundwater, and waterways. CASE IH strongly recommends that you return all used batteries to a CASE IH dealer, who will dispose of the used batteries or recycle the used batteries properly. In some countries, this is a legal requirement.



Mandatory battery recycling

NOTE: *The following requirements are mandatory in Brazil.*

Batteries are made of lead plates and a sulfuric acid solution. Because batteries contain heavy metals such as lead, CONAMA Resolution 401/2008 requires you to return all used batteries to the battery dealer when you replace any batteries. Do not dispose of batteries in your household garbage.

Points of sale are obliged to:

- Accept the return of your used batteries
- Store the returned batteries in a suitable location
- Send the returned batteries to the battery manufacturer for recycling

Torque - Nominal tightening torques for normal assembly

NOTE: In the metric tables, nominal sizes M4 through M8 hardware torque specifications are shown as a Newton meters (pound-inches) numerical value.

Nominal sizes M10 through M24 hardware torque specifications are shown as a Newton meters (pound-feet) numerical value.

Metric hex head (non-flange) hardware

Plain (PLN) – an unplated hardware finish with residual manufacturing oils

Zinc-dichromate (ZND) – a yellow colored chemical plating formula yellow applied to the hardware

| Nominal size | Class (CL) 8.8 bolt and Class (CL) 8 nut | Class (CL) 10.9 bolt and Class (CL) 10 nut | Locknut CL 8 w/CL 8.8 bolt | Locknut CL 10 w/CL 10.9 bolt |
|--------------|--|--|----------------------------|------------------------------|
| | PLN and ZND | PLN and ZND | ZND | ZND |
| | N·m (lb in) | N·m (lb in) | N·m (lb in) | N·m (lb in) |
| M4 | 3.5 (31) | 5.0 (44) | 1.4 (13) | 2.8 (25) |
| M5 | 7.0 (62) | 10 (88) | 2.9 (26) | 5.5 (49) |
| M6 | 11.8 (104) | 17 (150) | 4.9 (43) | 9.4 (83) |
| M8 | 28.8 (255) | 41.3 (366) | 11.9 (105) | 23 (204) |
| | N·m (lb ft) | N·m (lb ft) | N·m (lb ft) | N·m (lb ft) |
| M10 | 57 (42) | 82 (60) | 24 (17) | 45 (33) |
| M12 | 100 (74) | 143 (105) | 41 (30) | 79 (38) |
| M14 | 159 (117) | 227 (168) | 66 (48) | 125 (92) |
| M16 | 248 (183) | 354 (261) | 102 (75) | 195 (144) |
| M18 | 352 (260) | 487 (359) | 145 (107) | 268 (198) |
| M20 | 500 (369) | 690 (509) | 206 (152) | 380 (280) |
| M24 | 865 (638) | 1195 (882) | 357 (263) | 657 (485) |

Metric flange head hardware

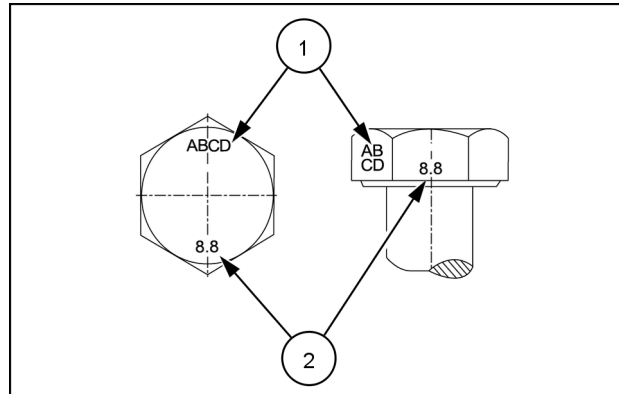
Plain (PLN) – an unplated hardware finish with residual manufacturing oils

Zinc-dichromate (ZND) – a yellow colored chemical plating formula yellow applied to the hardware

| Nominal size | Class (CL) 8.8 bolt and Class (CL) 8 nut | Class (CL) 10.9 bolt and Class (CL) 10 nut | Flange locknut CL 8 w/CL 8.8 bolt | Flange locknut CL 10 w/CL 10.9 bolt |
|--------------|--|--|-----------------------------------|-------------------------------------|
| | PLN and ZND | PLN and ZND | ZND | ZND |
| | N·m (lb in) | N·m (lb in) | N·m (lb in) | N·m (lb in) |
| M4 | 3.8 (34) | 5.5 (49) | 4.2 (37) | 6.1 (54) |
| M5 | 7.7 (68) | 11 (97) | 8.5 (75) | 12 (106) |
| M6 | 13 (115) | 18.7 (166) | 14.3 (127) | 20.6 (182) |
| M8 | 31.7 (281) | 45.5 (403) | 35 (310) | 50 (443) |
| | N·m (lb ft) | N·m (lb ft) | N·m (lb ft) | N·m (lb ft) |
| M10 | 63 (47) | 90 (66) | 69 (51) | 99 (73) |
| M12 | 110 (81) | 157 (116) | 121 (89) | 173 (128) |
| M14 | 175 (129) | 250 (184) | 193 (142) | 275 (202) |
| M16 | 272 (201) | 389 (287) | 299 (221) | 428 (316) |
| M18 | 387 (286) | 535 (395) | 426 (315) | 589 (435) |
| M20 | 550 (406) | 759 (560) | 605 (447) | 835 (616) |
| M24 | 951 (702) | 1315 (970) | 1046 (772) | 1447 (1067) |

Identification markings

Metric hex head, flange hex head and carriage bolts, Classes (CL) 5.6 and upward

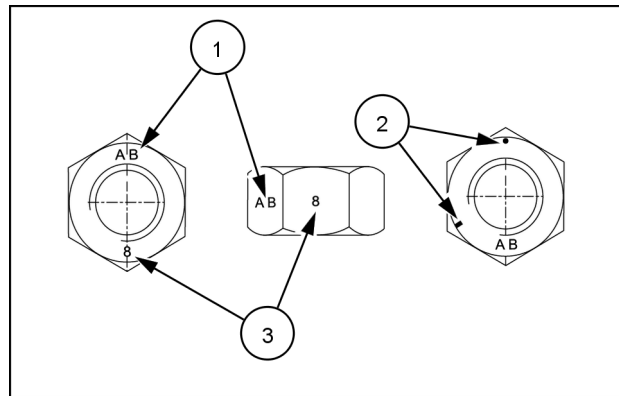


NHIL14RB00662AA 1

Metric bolt identification markings

1. Manufacturer's identification
2. Property class

Metric hex nuts and locknuts, Classes (CL) 05 and upward



NHIL14RB00663AA 2

Metric hex nut identification markings

- **(1)** – Manufacturer's identification
- **(3)** – Property class
- **(2)** – Clockwise type markings indicate property class and may include manufacturer identification (if applied), Example: property marks **240** ° apart (shown) at the eight o'clock position indicate a Class 8 property, and marks **300** ° apart at the ten o'clock position indicate a Class 10 property.

NOTE: In the Imperial units tables, the nominal sizes, **1/4 (0.25) in (inch)** and **5/16 (0.3125) in (inch)** hardware torque specifications are shown as a Newton meters (pound-inches) numerical value.
Nominal sizes **3/8 (0.375) in (inch)** through **1 (1.0) in (inch)** hardware torque specifications are shown as a Newton meters (pound-feet) numerical value.

Inch hex head (non-flange) hardware

Plain (PLN) – an unplated hardware finish with residual manufacturing oils

Zinc-dichromate (ZND) – a yellow colored chemical plating formula yellow applied to the hardware

| Nominal size | SAE Grade (GR) 5 bolt and nut | SAE Grade (GR) 8 bolt and nut | Locknut GR B w/ GR 5 bolt | Locknut GR C w/ GR 8 bolt |
|-------------------------|-------------------------------|-------------------------------|---------------------------|---------------------------|
| | PLN and ZND | PLN and ZND | ZND | ZND |
| | N·m (lb in) | N·m (lb in) | N·m (lb in) | N·m (lb in) |
| 1/4 (0.25) in | 13 (115) | 18 (159) | 7.2 (64) | 10 (89) |
| 5/16 (0.3125) in | 27 (239) | 38 (336) | 14.9 (132) | 21 (186) |
| | N·m (lb ft) | N·m (lb ft) | N·m (lb ft) | N·m (lb ft) |
| 3/8 (0.375) in | 47 (35) | 67 (49) | 26 (19) | 37 (27) |
| 7/16 (0.4375) in | 76 (56) | 107 (79) | 42 (31) | 59 (44) |
| 1/2 (0.50) in | 116 (85) | 164 (121) | 64 (47) | 90 (67) |
| 9/16 (0.5625) in | 167 (123) | 236 (174) | 92 (68) | 130 (96) |
| 5/8 (0.625) in | 231 (170) | 326 (240) | 127 (94) | 179 (132) |
| 3/4 (0.75) in | 410 (302) | 578 (426) | 226 (166) | 318 (234) |
| 7/8 (0.875) in | 660 (486) | 931 (687) | 363 (267) | 512 (378) |
| 1 (1.0) in | 989 (729) | 1396 (1030) | 544 (401) | 768 (567) |

Inch flange head hardware

Plain (PLN) – an unplated hardware finish with residual manufacturing oils





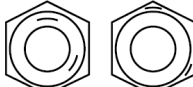




Zinc-dichromate (ZND) – a yellow colored chemical plating formula yellow applied to the hardware

| Nominal size | SAE Grade (GR) 5 bolt and nut | SAE Grade (GR) 8 bolt and nut | Flange locknut GR F w/ GR 5 bolt | Flange locknut GR G w/ GR 8 bolt |
|-------------------------|-------------------------------|-------------------------------|----------------------------------|----------------------------------|
| | PLN and ZND | PLN and ZND | ZND | ZND |
| | N·m (lb in) | N·m (lb in) | N·m (lb in) | N·m (lb in) |
| 1/4 (0.25) in | 14 (124) | 20 (177) | 15.4 (136) | 22 (195) |
| 5/16 (0.3125) in | 29 (257) | 42 (372) | 32 (283) | 46 (407) |
| | N·m (lb ft) | N·m (lb ft) | N·m (lb ft) | N·m (lb ft) |
| 3/8 (0.375) in | 52 (38) | 74 (54) | 57 (42) | 81 (9) |
| 7/16 (0.4375) in | 84 (62) | 118 (87) | 92 (68) | 130 (96) |
| 1/2 (0.50) in | 127 (94) | 180 (133) | 140 (103) | 198 (146) |
| 9/16 (0.5625) in | 184 (136) | 259 (191) | 202 (150) | 285 (210) |
| 5/8 (0.625) in | 254 (187) | 358 (264) | 279 (206) | 394 (290) |
| 3/4 (0.75) in | 450 (332) | 636 (469) | 495 (365) | 700 (516) |
| 7/8 (0.875) in | 725 (535) | 1024 (755) | 798 (589) | 1126 (831) |
| 1 (1.0) in | 1088 (802) | 1536 (1133) | 1197 (882) | 1690 (1246) |

Identification marking

Grades of inch bolts and free-spinning nuts


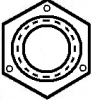
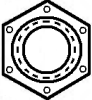

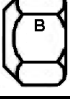




SAE (J995) bolt head and nut grade identification

| Grade identification marking | Grade Marking description |
|---|---|
|  | Grade 2 No line marks |
|  | Grade 5 Three line marks |
|  | Grade 8 Six line marks |
|  | Grade 2 No circumferential line marks |
|  | Grade 5 Two circumferential line marks located 120° apart |
|  | Grade 2 Two circumferential line marks located 60° apart |
|  | Grade 2 No circumferential line marks |
|  | Grade 5 Two circumferential line marks located 120° apart |
|  | Grade 8 Two circumferential line marks located 60° apart |

Grades of inch prevailing torque locknuts, all metal (three common marking methods)

On prevailing torque locknuts, the grade of nut is identified by one of three different sets of markings that denote the strength level and manufacturer.

Common prevailing torque locknut grade identification markings

| Grade identification marking | Grade Marking description |
|---|---|
|  | <p>Grade A No marks</p> |
|  | <p>Grade B (hex nut) and Grade F (flange nut) Three raised or indented dot marks (Marks do not have to be in corners.)</p> |
|  | <p>Grade C (hex nut) and Grade F (flange nut) Six raised or indented dot marks (Marks do not have to be in corners.)</p> |
|  | <p>Grade A No letter mark on side flat</p> |
|  | <p>Grade B Letter B on side flat</p> |
|  | <p>Grade C Letter C on side flat</p> |
|  | <p>Grade A No notches</p> |
|  | <p>Grade B One circumferential notch on all six corners</p> |
|  | <p>Grade C Two circumferential notches on all six corners</p> |

Torque - Standard torque data for hydraulic connections

General information

- Hydraulic connections require a minimum assembly torque in order to provide zero leakage at rated pressure with adequate fatigue resistance. Over-torquing of a hydraulic connection can also lead to leakage or failure. For some connections, CASE IH requires a different torque value than is listed in the ISO and SAE standards.
- The torque values in this document should be used whenever possible or applicable.

NOTICE: Always follow the instructions in this manual for specific torque values when you service components. The information in this section is for general guidance only when a procedure contains no specific torque value.

Tolerance

- The tolerance for all torque values is $\pm 10\%$. This tolerance must include all assembly variation, not only the torque wrench repeatability.

Lubrication

Application of grease or other lubricants to hydraulic connectors should be avoided. If clean hydraulic oil is already on the connection, it is not required to remove the oil. Generally, application of grease:

- May cause a significant change in the torque required to properly tighten the connection.
- May reduce the connection's resistance to vibration.
- Excessive grease may displace an elastomer seal during tightening.
- Grease extrusion when connection is tightened may be mistaken for leakage.

CASE IH products generally use O-Ring Boss (ORB) connectors that have Teflon™-coated O-rings, eliminating the need for O-ring lubrication during installation. For connections which are made into aluminum manifolds or with stainless steel connectors, it may be required to apply a lubricant to prevent galling.

Use of **LOCTITE®** and other thread-locking compounds is prohibited. These compounds:

- May cause a significant change in the torque required to properly tighten the connections.
- Reduce the serviceability of the joint.
- May prevent the O-ring from properly sealing if the compound gets on the O-ring.

INTRODUCTION

Torque values for metric O-Ring Boss (ORB) port connections

| Metric thread | S-Series * | | L-Series ** | |
|---------------|-------------------------------|-----------------------------------|-------------------------------|-----------------------------------|
| | Ferrous N·m (lb ft) ± 10 % | Non-Ferrous N·m (lb ft) ± 10 % | Ferrous N·m (lb ft) ± 10 % | Non-Ferrous N·m (lb ft) ± 10 % |
| M8 x 1 | 10.5 (7.7) | 6.3 (4.6) | 8.5 (6.3) | 5 (3.7) |
| M10 x 1 | 21 (15.5) | 12.5 (9.2) | 15.5 (11.4) | 9.3 (6.9) |
| M12 x 1.5 | 37 (27.3) | 22 (16.2) | 27 (19.9) | 16 (11.8) |
| M14 x 1.5 | 47 (34.7) | 28 (20.7) | 37 (27.3) | 22 (16.2) |
| M16 x 1.5 | 58 (42.8) | 35 (25.8) | 42 (31) | 25 (18.4) |
| M18 x 1.5 | 74 (54.6) | 44 (32.5) | 47 (34.7) | 28 (20.7) |
| M22 x 1.5 | 105 (77.4) | 63 (46.5) | 63 (46.5) | 38 (28) |
| M27 x 2 | 178 (131.3) | 107 (78.9) | 105 (77.4) | 63 (46.5) |
| M30 x 2 | 225 (166) | 135 (99.6) | 136 (100.3) | 82 (60.5) |
| M33 x 2 | 325 (239.7) | 195 (143.8) | 168 (123.9) | 101 (74.5) |
| M42 x 2 | 345 (254.5) | 207 (152.7) | 220 (162.3) | 132 (97.4) |
| M48 x 2 | 440 (324.5) | 264 (194.7) | 273 (201.4) | 164 (121) |
| M60 x 2 | 525 (387.2) | 315 (232.3) | 330 (243.4) | 198 (146) |

* S-Series connectors are used with O-Ring Face Seals (ORFS).

** L-Series connectors are used with 37 ° flare.

Torque values for metric O-Ring Boss (ORB) port plugs

| Metric thread | Ferrous | | Non-ferrous N·m (lb ft) ± 10 % |
|---------------|------------------------------------|------------------------------------|-----------------------------------|
| | Internal hex N·m (lb ft) ± 10 % | External hex N·m (lb ft) ± 10 % | |
| M8 x 1 | 8.5 (6.3) | 10.5 (7.7) | 6.3 (4.6) |
| M10 x 1 | 16 (11.8) | 21 (15.5) | 12.5 (9.2) |
| M12 x 1.5 | 23 (17) | 37 (27.3) | 22 (16.2) |
| M14 x 1.5 | 47 (34.7) | 47 (34.7) | 28 (20.7) |
| M16 x 1.5 | 58 (42.8) | 58 (42.8) | 35 (25.8) |
| M18 x 1.5 | 74 (54.6) | 74 (54.6) | 44 (32.5) |
| M22 x 1.5 | 105 (77.4) | 105 (77.4) | 63 (46.5) |
| M27 x 2 | 178 (131.3) | 178 (131.3) | 107 (78.9) |
| M30 x 2 | 225 (166) | 225 (166) | 135 (99.6) |
| M33 x 2 | 325 (239.7) | 325 (239.7) | 195 (143.8) |
| M42 x 2 | 345 (254.5) | 345 (254.5) | 207 (152.7) |
| M48 x 2 | 440 (324.5) | 440 (324.5) | 264 (194.7) |
| M60 x 2 | 525 (387.2) | 525 (387.2) | 315 (232.3) |

INTRODUCTION

Torque values for port connections (British Standard Pipe Parallel (BSPP) thread ports and stud ends)

| BSPP thread G- Gas; A- medium coarse threads | Metric tube Outside Diameter (OD) mm (in) | | Ferrous | | Non-Ferrous | |
|---|---|--------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| | S-Series * | L-Series ** | S-Series N·m (lb ft) ± 10 % | L-Series N·m (lb ft) ± 10 % | S-Series N·m (lb ft) ± 10 % | L-Series N·m (lb ft) ± 10 % |
| G 1/8 A | – | 6 (0.236) | – | 21 (15.5) | – | 12.5 (9.2) |
| G 1/4 A | 6 (0.236) or 8 (0.315) | 8 (0.315) or 10 (0.394) | 63 (46.5) | 53 (39.1) | 38 (28) | 32 (23.6) |
| G 3/8 A | 10 (0.394) or 12 (0.472) | 12 (0.472) | 95 (70.1) | 84 (62) | 57 (42) | 50 (36.9) |
| G 1/2 A | 16 (0.630) | 15 (0.591) or 18 (0.709) | 136 (100.3) | 105 (77.4) | 82 (60.5) | 63 (46.5) |
| G 3/4 A | 20 (0.787) | 22 (0.866) | 210 (154.9) | 210 (154.9) | 126 (92.9) | 126 (92.9) |
| G 1 A | 25 (0.984) | 28 (1.102) | 400 (295) | 400 (295) | 240 (177) | 240 (177) |
| G 1 1/4 A | 30 (1.181) | 35 (1.378) | 525 (387.2) | 525 (387.2) | 315 (232.3) | 315 (232.3) |
| G 1 1/2 A | 38 (1.496) | 42 (1.654) | 660 (486.8) | 660 (486.8) | 396 (292.1) | 396 (292.1) |

* S-Series connectors are used with O-Ring Face Seals (ORFS).

** L-Series connectors are used with 37 ° flare.

Torque values for metric port connections (Metric face-seal ports and stud ends)

| Metric thread | Metric tube Outside Diameter (OD) mm (in) | | Ferrous | | Non-Ferrous | |
|---------------|---|-------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| | S-Series * | L-Series ** | S-Series N·m (lb ft) ± 10 % | L-Series N·m (lb ft) ± 10 % | S-Series N·m (lb ft) ± 10 % | L-Series N·m (lb ft) ± 10 % |
| M10 x 1 | – | 4 (0.157) | – | 21 (15.5) | – | 12.5 (9.2) |
| M12 x 1.5 | 4 (0.157) | 6 (0.236) | 47 (34.7) | 32 (23.6) | 28 (20.7) | 19 (14) |
| M14 x 1.5 | 5 (0.197) | 7 (0.276) | 63 (46.5) | 53 (39.1) | 38 (28) | 32 (23.6) |
| M16 x 1.5 | 7 (0.276) | 9 (0.354) | 84 (62) | 63 (46.5) | 50 (36.9) | 38 (28) |
| M18 x 1.5 | 8 (0.315) | 11 (0.433) | 105 (77.4) | 84 (62) | 63 (46.5) | 50 (36.9) |
| M20 x 1.5 | 10 (0.394) | – | 147 (108.4) | – | 88 (64.9) | – |
| M22 x 1.5 | 12 (0.472) | 14 (0.551) | 158 (116.5) | 147 (108.4) | 95 (70.1) | 88 (64.9) |
| M26 x 1.5 | – | 18 (0.709) | – | 210 (154.9) | – | 126 (92.9) |
| M27 x 1.2 | 16 (0.630) | – | 210 (154.9) | – | 126 (92.9) | – |
| M33 x 2 | 20 (0.787) | 23 (0.906) | 400 (295) | 400 (295) | 240 (177) | 240 (177) |
| M42 x 2 | 25 (0.984) | 30 (1.181) | 525 (387.2) | 525 (387.2) | 315 (232.3) | 315 (232.3) |
| M48 x 2 | 32 (1.260) | 36 (1.417) | 630 (464.7) | 630 (464.7) | 396 (292.1) | 396 (292.1) |

* S-Series connectors are used with O-Ring Face Seals (ORFS).

** L-Series connectors are used with 37 ° flare.

INTRODUCTION

Torque values for Inch O-Ring Boss (ORB) port non-adjustable connections

| SAE dash size | UN/UNF thread size | Inch tube OD mm (in) | S-Series * | | L-Series ** | |
|---------------|--------------------|----------------------|----------------------------|--------------------------------|----------------------------|--------------------------------|
| | | | Ferrous N·m (lb ft) ± 10 % | Non-Ferrous N·m (lb ft) ± 10 % | Ferrous N·m (lb ft) ± 10 % | Non-Ferrous N·m (lb ft) ± 10 % |
| 2 | 5/16-24 | 3.18 (0.125) | – | – | 8.5 (6.3) | 5 (3.7) |
| 3 | 3/8-24 | 4.76 (0.187) | 15.5 (11.4) | 9.3 (6.9) | 10.5 (7.7) | 6.3 (4.6) |
| 4 | 7/16-20 | 6.35 (0.250) | 37 (27.3) | 22 (16.2) | 19 (14) | 11.5 (8.5) |
| 5 | 1/2-20 | 7.94 (0.313) | 42 (31) | 25 (18.4) | 26 (19.2) | 15.5 (11.4) |
| 6 | 9/16-18 | 9.52 (0.375) | 47 (34.7) | 28 (20.7) | 32 (23.6) | 19 (14) |
| 8 | 3/4-16 | 12.7 (0.500) | 89 (65.6) | 53 (39.1) | 53 (39.1) | 32 (23.6) |
| 10 | 7/8-14 | 15.88 (0.625) | 121 (89.2) | 73 (53.8) | 63 (46.5) | 38 (28) |
| 12 | 1-1/16-12 | 19.05 (0.750) | 178 (131.3) | 107 (78.9) | 100 (73.8) | 60 (44.3) |
| 14 | 1-3/16-12 | 22.22 (0.875) | 225 (166) | 135 (99.6) | 131 (96.6) | 79 (58.3) |
| 16 | 1-5/16-12 | 25.4 (1.000) | 283 (208.7) | 170 (125.4) | 156 (115.1) | 94 (69.3) |
| 20 | 1-5/8-12 | 31.75 (1.250) | 300 (221.3) | 180 (132.8) | 210 (154.9) | 126 (92.9) |
| 24 | 1-7/8-12 | 38.1 (1.500) | 388 (286.2) | 233 (171.9) | 220 (162.3) | 132 (97.4) |
| 32 | 2-1/2-12 | 50.8 (2.000) | 388 (286.2) | 233 (171.9) | 315 (232.3) | 189 (139.4) |

* S-Series connectors are used with O-Ring Face Seals (ORFS).

** L-Series connectors are used with 37 ° flare.

Torque values for inch O-Ring Boss (ORB) port adjustable connections

| SAE dash size | UN/UNF thread size | Inch tube OD mm (in) | S-Series * | | L-Series ** | |
|---------------|--------------------|----------------------|----------------------------|--------------------------------|----------------------------|--------------------------------|
| | | | Ferrous N·m (lb ft) ± 10 % | Non-Ferrous N·m (lb ft) ± 10 % | Ferrous N·m (lb ft) ± 10 % | Non-Ferrous N·m (lb ft) ± 10 % |
| 2 | 5/16-24 | 3.18 (0.125) | – | – | 8.5 (6.3) | 5 (3.7) |
| 3 | 3/8-24 | 4.76 (0.187) | 10.5 (7.7) | 9.3 (6.9) | 10.5 (7.7) | 6.3 (4.6) |
| 4 | 7/16-20 | 6.35 (0.250) | 21 (15.5) | 21 (15.5) | 19 (14) | 11.5 (8.5) |
| 5 | 1/2-20 | 7.94 (0.313) | 42 (31) | 25 (18.4) | 26 (19.2) | 15.5 (11.4) |
| 6 | 9/16-18 | 9.52 (0.375) | 47 (34.7) | 28 (20.7) | 32 (23.6) | 19 (14) |
| 8 | 3/4-16 | 12.7 (0.500) | 89 (65.6) | 53 (39.1) | 53 (39.1) | 32 (23.6) |
| 10 | 7/8-14 | 15.88 (0.625) | 121 (89.2) | 73 (53.8) | 63 (46.5) | 38 (28) |
| 12 | 1-1/16-12 | 19.05 (0.750) | 178 (131.3) | 107 (78.9) | 100 (73.8) | 60 (44.3) |
| 14 | 1-3/16-12 | 22.22 (0.875) | 225 (166) | 135 (99.6) | 131 (96.6) | 79 (58.3) |
| 16 | 1-5/16-12 | 25.4 (1.000) | 285 (210.2) | 170 (125.4) | 156 (115.1) | 94 (69.3) |
| 20 | 1-5/8-12 | 31.75 (1.250) | 300 (221.3) | 180 (132.8) | 210 (154.9) | 126 (92.9) |
| 24 | 1-7/8-12 | 38.1 (1.500) | 388 (286.2) | 233 (171.9) | 220 (162.3) | 132 (97.4) |
| 32 | 2-1/2-12 | 50.8 (2.000) | 388 (286.2) | 233 (171.9) | 315 (232.3) | 189 (139.4) |

* S-Series connectors are used with O-Ring Face Seals (ORFS).

** L-Series connectors are used with 37 ° flare.

INTRODUCTION

Torque values for inch O-Ring Boss (ORB) port plugs

| SAE dash size | UN/UNF thread size | Ferrous | | Non-Ferrous |
|---------------|--------------------|---------------------------------------|---------------------------------------|-----------------------|
| | | Internal hex N·m (lb ft) ± 10 % | External hex N·m (lb ft) ± 10 % | N·m (lb ft) ± 10 % |
| 2 | 5/16-24 | 7.5 (5.5) | 12.5 (9.2) | 7.5 (5.5) |
| 3 | 3/8-24 | 14.5 (10.7) | 21 (15.5) | 12.5 (9.2) |
| 4 | 7/16-20 | 21 (15.5) | 37 (27.3) | 22 (16.2) |
| 5 | 1/2-20 | 28 (20.7) | 42 (31) | 25 (18.4) |
| 6 | 9/16-18 | 47 (34.7) | 47 (34.7) | 28 (20.7) |
| 8 | 3/4-16 | 89 (65.6) | 89 (65.6) | 53 (39.1) |
| 10 | 7/8-14 | 116 (85.6) | 116 (85.6) | 70 (51.6) |
| 12 | 1-1/16-12 | 176 (129.8) | 176 (129.8) | 106 (78.2) |
| 14 | 1-3/16-12 | 247 (182.2) | 247 (182.2) | 148 (109.2) |
| 16 | 1-5/16-12 | 284 (209.5) | 284 (209.5) | 170 (125.4) |
| 20 | 1-5/8-12 | 357 (263.3) | 357 (263.3) | 214 (157.8) |
| 24 | 1-7/8-12 | 441 (325.3) | 441 (325.3) | 265 (195.5) |
| 32 | 2-1/2-12 | 536 (395.3) | 536 (395.3) | 322 (237.5) |

Torque values for four-bolt flange connections (Metric Screws, Class 10.9)

| Metric size mm | Imperial size in | Screw code 61 | Code 61 N·m (lb ft) ± 10 % | Screw code 62 | Code 62 N·m (lb ft) ± 10 % |
|----------------|------------------|---------------|----------------------------------|---------------|----------------------------------|
| 13 | 1/2 | M8 x 1.25 | 34 (25.1) | M8 x 1.25 | 34 (25.1) |
| 19 | 3/4 | M10 x 1.5 | 74 (54.6) | M10 x 1.5 | 74 (54.6) |
| 25 | 1 | M10 x 1.5 | 74 (54.6) | M12 x 1.75 | 137 (101) |
| 32 | 1-1/4 | M10 x 1.5 | 74 (54.6) | M12 x 1.75 | 137 (101) |
| | | | | M14 x 1.5 | 189 (139.4) |
| 38 | 1-1/2 | M12 x 1.75 | 137 (101) | M16 x 2 | 310 (228.6) |
| 51 | 2 | M12 x 1.75 | 137 (101) | M20 x 2.5 | 575 (424.1) |
| 64 | 2-1/2 | M12 x 1.75 | 137 (101) | M24 x 3 | 575 (424.1) |
| 76 | 3 | M16 x 2 | 310 (228.6) | M30 x 3.5 | 680 (501.5) |
| 89 | 3-1/2 | M16 x 2 | 310 (228.6) | – | – |
| 102 | 4 | M16 x 2 | 310 (228.6) | – | – |
| 127 | 5 | M16 x 2 | 310 (228.6) | – | – |

Torque values for four-bolt flange connections (Metric Screws, Class 8.8)

| Metric size mm | Imperial size in | Screw code 61 | Code 61 N·m (lb ft) ± 10 % | Screw code 62 | Code 62 N·m (lb ft) ± 10 % |
|----------------|------------------|---------------|----------------------------------|---------------|----------------------------------|
| 13 | 1/2 | M8 x 1.25 | 29 (21.4) | M8 x 1.25 | 29 (21.4) |
| 19 | 3/4 | M10 x 1.5 | 57(42) | M10 x 1.5 | 57(42) |
| 25 | 1 | M10 x 1.5 | 57(42) | M12 x 1.75 | 100 (73.8) |
| 32 | 1-1/4 | M10 x 1.5 | 57(42) | M12 x 1.75 | 100 (73.8) |
| | | | | M14 x 1.5 | 160 (118) |
| 38 | 1-1/2 | M12 x 1.75 | 100 (73.8) | M16 x 2 | 250 (184.4) |
| 51 | 2 | M12 x 1.75 | 100 (73.8) | M20 x 2.5 | 500 (368.8) |
| 64 | 2-1/2 | M12 x 1.75 | 100 (73.8) | M24 x 3 | 575 (424.1) |
| 76 | 3 | M16 x 2 | 250 (184.4) | M30 x 3.5 | 680 (501.5) |
| 89 | 3-1/2 | M16 x 2 | 250 (184.4) | – | – |
| 102 | 4 | M16 x 2 | 250 (184.4) | – | – |
| 127 | 5 | M16 x 2 | 250 (184.4) | – | – |

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