| INTER PLANT STANDARD IN STEEL INDUSTRY | | |
|---|---|---|
| IPSS | **SPECIFICATION FOR SINGLE STAGE UNDER DRIVEN WORM REDUCTION GEAR BOXES** | **IPSS: 1-01-001-18** (First Revision) |
| | | Formerly: IPSS: 1-01-001-77 |

## 0. FOREWORD

0.1 Interplant standardization in steel industry has been initiated under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). The Interplant Standards prepared by the standard committee on Mechanical Drives, IPSS 1:1, with the active participation of the representatives of all the steel plants and leading consultants and was first adopted in December, 1977. Thereafter, this standard revised with first revision in **November, 2018**.

0.2 Interplant standardization for steel industry primarily aims at achieving rationalization and unification of capacities and characteristics of remote control hydraulic jacks used in steel plant and provides guidance in indenting stores or equipment for existing or new installations by individual steel plants. For exercising effective control on the inventories, it is advisable to select a fewer number of sizes (or type) from among the products mentioned in this standards for the purpose of company standards of individual steel plants. It is not desirable to make deviations in technical requirements.

0.3 The centre to centre distance between the input and output shafts (dimension A in table 1) is a critical dimension since it involves the internal design features of the gear box. Even a slight change in this dimension would need corresponding changes in production facilities which may involve high expenditure on the part of the gear box manufacturers. They are not yet ready for making such investments due to several reasons including collaboration obligations, relatively low demand for worm deduction gear boxes by steel industry, etc. In view of this, it has not yet been possible to effect complete metrication in the values for centre distances included in this standard. A few metric sizes which are in the range of current Industrial Production or which the manufacturers have yet to develop have been specified.

0.3.1 The principal external dimensions covered in this standard are agreeable to both the steel plants and the gear box manufacturers.

## 1. SCOPE

This standard covers the requirement of single stage under driven worm reduction gear boxes, such as centre distance, reduction ratio, input power, output torque, principal external dimensions, method of selection and supply conditions.

1.1 The internal design features of the gear boxes have not been covered in this standard.

1.2 This standard does not include gear boxes for EOT Cranes and mill drives.

2. **Dimensions**-: The dimensions of each unit shall be as given in Table-1. The keyway sizes shall be as given in Table-2.

3. **Rating-**: The unit size, centre distance between input and output shafts, reduction ratio, Input power and output torque of gear boxes shall be as given in Table-3.

4. **Construction**

4.1. Gear Box Casing – The gear box casing shall be made of closed grained cast iron conforming to Grade 260 or above specified in IS : 210-2009 'Specification of Grey Iron Castings (Fifth Revision)' or of fabricated construction, stress relieved, as agreed to between the suppliers and the users or Cast Steel Grade 280-520W as specified in IS: 1030-1998' Specifications for Carbon Steel Casting for General Engineering Purpose (Fifth Revision)'. It shall be free from harmful defects. Casing may also be fabricated out of steel conforming to IS:2062-2011 ' Specification for Structural Steel (Standard Quality)'

4.1.1. Cast Iron gear box casing shall be artificially aged

4.1.2. The casing shall have at least two lifting lugs suitably located for handling.

4.1.3. Breathers, Inspection covers, drain out plugs and dowel holes shall be provided at conveniently accessible locations. There shall be a provision for indicating the level of Oil. Dowel pins shall be supplied along with the gear box.

4.1.4. The joints of the casing shall be oil tight, dust proof and water proof.

4.1.5. The interior of the casing shall be painted with suitable anticorrosive paint.

4.1.6. Whenever shaft is extended on both sides of the casing, suitable safety cover for shaft shall be provided for fixing on any one side of the casing.

4.2. Bearings – The bearings shall be of antifriction type.

4.3. Oil Seals – There shall not be any seepage of oil at the sealing edges. Oil seals shall be conforming to IS -5129. Also see IPSS 1-02-013-18 for reference of Rotary shaft oil seal units.

5. **Design**

5.1. Gears and Shafts – The manufacturer shall make suitable design for the gears and shaft to suit the load and working conditions.

5.2. Direction of Rotation – All the gear boxes shall be capable of working in any direction of rotation of the input shaft.

5.3. Hold Back Devices – There shall be provision for fixing up a hold back device.

6. **Lubrication** – All the gears and bearings shall have adequate lubrication. The temperature of the lubricating oil shall not exceed $20^{o}$ (twenty degree) above ambient temperature. There shall be a provision to avoid mixing of grease with oil in case bearings are grease lubricated.

7. **Selection of Gear Boxes** – The following methods are suggested:

a) **Replacement of an existing gear box by a gear box as per this standard** – An output torque value is to be selected from Table 3 which is at least equal to the output torque of the existing gear box – for the corresponding rev / min of the prime mover shaft.

b) **Replacement of an existing gear box along with the prime mover or selection of a gear box for a new installation** – Depending upon the location, intended prime mover and rigour of duty, the service factor of the gear box is to be selected from Table 1 of IS: 7403 – 1974 (R2001) Code of Practice for selection of Standard worm and helical gear boxes. The minimum output torque is to be calculated by multiplying the selected service factor with the actual torque requirement of the driven machine; the nearest higher value of the output torque from Table-3 would give the other parameters of the gear box needed.

8. **Designation** – The under driven worm reduction gear boxes shall be designated by the following

a) Unit Size

b) Reduction ratio

c) Input Power

d) Input Speed and

e) Output Torque

Example: An under driven worm reduction gear box of unit size U-5M with reduction ratio 31:1, Input Power 1.84, Input Speed 1500 rev / min and output torque of 2800 kg cm shall be designated as-:

U-5M X 31:1 X 1.84 X 1500 X 2800

9. **Marking** -: Every gear box shall have a name plate bearing the following particulars-:

a) Manufacturers Name, Trade Mark and year of manufacturer;

b) Designation of the gear box indicating its size; reduction ratio, input power, input speed and output torque; and

c) Manufacturers Serial Number

10. **Technical Specification** – Every gear box shall be accompanied with the following information

a) Specification and quality of lubricant

b) Bearing and oil seals used and

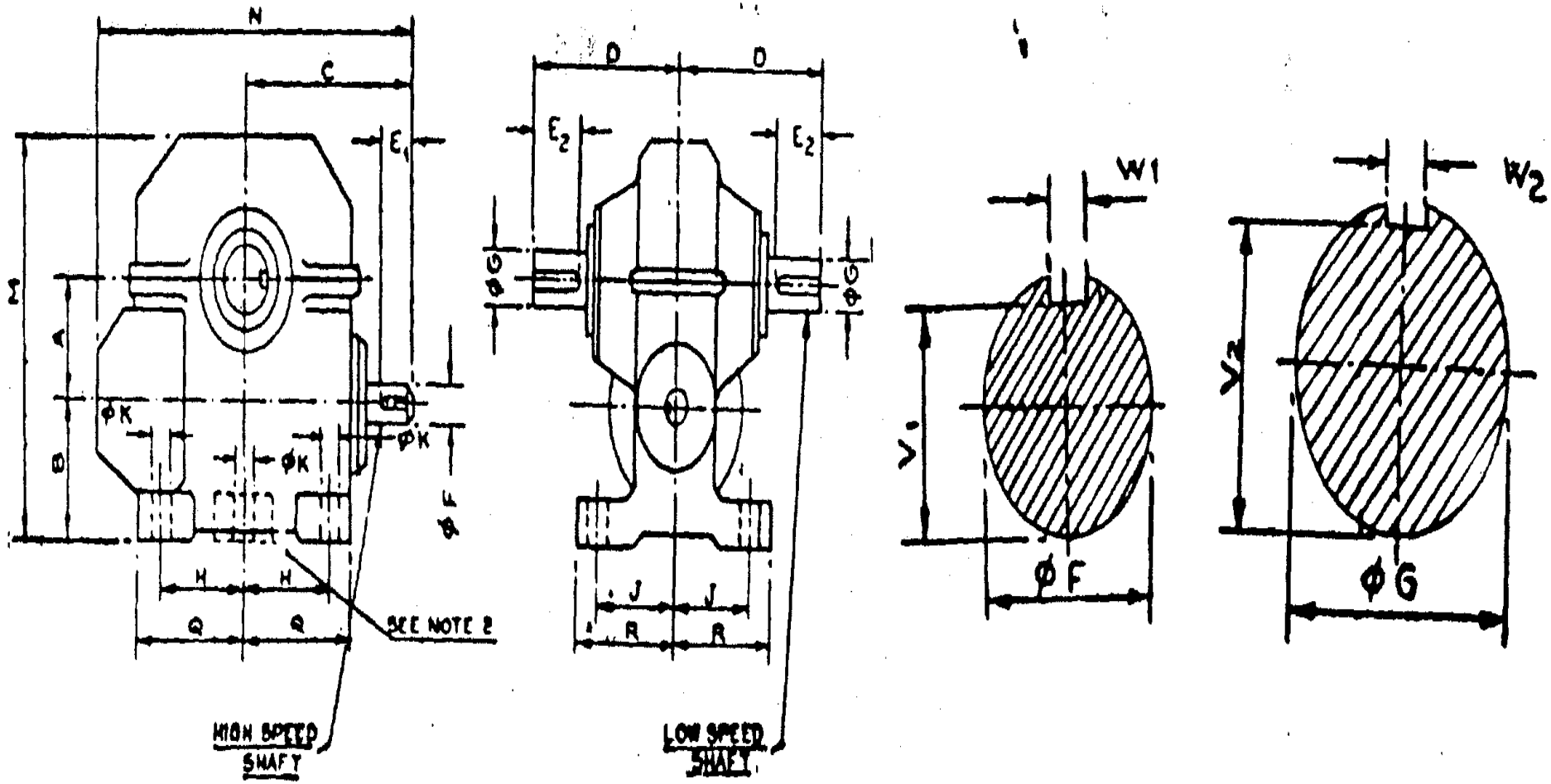
c) List and specifications of wearing parts

d) Inspection and Test certificate

11. **Guarantee** – The gear box shall be guaranteed by the manufacturer for satisfactory service for a minimum period of 18 Months from the date of dispatch and 12 Months from the date of commissioning whichever is earlier. The manufacturer shall replace the unit/ components free of cost to the satisfaction of purchaser. If any material flaw, poor workmanship or design defect is found during the guarantee period.

# TABLE 1 DIMENSIONS OF SINGLE STAGE UNDER DRIVEN WORM REDUCTION GEAR BOXES

*( Clauses 0.3 and 2 )*



| Units Size | A | | B | C | D | $E_1$ | $E_2$ | For Input Shaft, $\phi F$ | | | For Output Shaft, $\phi G$ | | | H | J | Q | R | $\phi K$ | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | (mm) | | | | | | $\phi F$ | $W_1$ | $V_1$ | $\phi G$ | $W_2$ | $V_2$ | | | Max | Max | | Max | Max |
| U-3 | 3 | (76·20) | 85 | 170 | 165 | 38 | 57 | 24 | 8 | 20 | 38 | 10 | 33 | 75 | 70 | 90 | 90 | 22 | 260 | 325 |
| U-4 | 4 | (101·60) | 108 | 225 | 215 | 57 | 70 | 32 | 10 | 27 | 45 | 14 | 39·5 | 105 | 100 | 160 | 130 | 26 | 350 | 450 |
| U-5 | 5 | (127·00) | 115 | 260 | 245 | 54 | 70 | 38 | 10 | 33 | 55 | 16 | 49 | 125 | 110 | 165 | 140 | 28 | 400 | 515 |
| U-5M | — | (120) | 100 | 218 | 187 | 50 | 70 | 30 | 8 | 26 | 50 | 14 | 44·5 | 100 | 75 | 137·5 | 100 | 22 | 380 | 378 |
| U-6 | 6 | (152·40) | 127 | 275 | 270 | 64 | 80 | 38 | 10 | 33 | 60 | 18 | 53 | 135 | 120 | 200 | 160 | 30 | 465 | 550 |
| U-7 | 7 | (177·80) | 146 | 315 | 295 | 80 | 110 | 45 | 14 | 39·5 | 65 | 18 | 58 | 150 | 135 | 215 | 170 | 30 | 535 | 620 |
| U-7M | — | (180) | 140 | 300 | 260 | 70 | 90 | 45 | 14 | 39·5 | 60 | 18 | 53 | 150 | 130 | 210 | 160 | 24 | 540 | 596 |
| U-8 | 8 | (203·20) | 146 | 340 | 310 | 80 | 110 | 45 | 14 | 39·5 | 70 | 20 | 62·5 | 170 | 135 | 250 | 175 | 30 | 595 | 670 |
| U-9 | 9 | (228·60) | 155 | 360 | 315 | 90 | 125 | 50 | 14 | 44·5 | 80 | 22 | 71·5 | 200 | 145 | 225 | 185 | 30 | 635 | 695 |
| U-10 | 10 | (254·00) | 171 | 425 | 375 | 110 | 136 | 60 | 18 | 53 | 85 | 22 | 76·5 | 215 | 165 | 300 | 210 | 33 | 725 | 805 |
| U-10·5 | 10·5 | (266·70) | 170 | 450 | 350 | 114 | 151 | 65 | 18 | 58 | 85 | 22 | 76·5 | 235 | 175 | 315 | 215 | 33 | 740 | 735 |
| U-12 | 12 | (304·80) | 191 | 495 | 410 | 120 | 156 | 70 | 20 | 62·5 | 95 | 25 | 86 | 260 | 185 | 360 | 230 | 36 | 840 | 940 |
| U-12M | — | (300) | 195 | 482 | 385 | 90 | 150 | 60 | 18 | 53 | 90 | 28 | 81 | 260 | 180 | 337·5 | 222 | 32 | 870 | 947 |
| U-14 | 14 | (355·60) | 216 | 570 | 480 | 136 | 178 | 80 | 22 | 71·5 | 120 | 32 | 109 | 300 | 215 | 415 | 275 | 42 | 970 | 1 095 |
| U-17 | 17 | (431·80) | 254 | 635 | 545 | 140 | 200 | 85 | 22 | 76·5 | 140 | 36 | 128 | 380 | 255 | 505 | 325 | 42 | 1 165 | 1 325 |
| U-17M | — | (420) | 260 | 638 | 526 | 120 | 180 | 90 | 24 | 81 | 140 | 36 | 128 | 370 | 245 | 450 | 290 | 46 | 1 170 | 1 272 |
| U-20 | 20 | (508·00) | 295 | 810 | 610 | 197 | 240 | 100 | 28 | 90 | 170 | 40 | 157 | 445 | 290 | 585 | 380 | 48 | 1 365 | 1 565 |
| U-24 | 24 | (609·60) | 355 | 940 | 710 | 216 | 305 | 120 | 32 | 109 | 220 | 50 | 203 | 552 | 394 | 685 | 480 | 48 | 1 595 | 1 805 |

**Note 1** — All dimensions are in millimetres unless otherwise stated.

**Note 2** — Dimensions $E_1$ & $E_2$ are the portions of shaft available for coupling fitting purposes. At the discretion of the manufacturer, the shaft may be given a shoulder (with suitable radius) at this point.

**Note 3** — Units with six mounting pads are permissible.

## TABLE 2 TOLERANCES ON DIMENSIONS OF SHAFTS AND KEYWAYS

*(Clause 2)*

| SHAFT | | | KEYWAY | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Dimension $W_1$ or $W_2$ | | | Dimension $V_1$ or $V_2$ | | |
| Dia *F* or *G* mm | Tolerance-Symbol | Tolerance Value microns | Width mm | Tolerance symbol | Tolerance value microns | Value of $V_1$ or $V_2$ mm | Tolerance grade | Tolerance microns |
| 24 | j6 | + 9 − 4 | 6 | N9 | 0 − 30 | 18·5 | Grade 12 | 0 − 0·1 |
| 30 | | | 8 | | 0 − 36 | 20 | | |
| 32 | k6 | + 18 + 2 | 10 | | | 26 | | |
| 38 | | | 14 | | 0 − 43 | 27 | | |
| 45 | | | 16 | | | 33 | | |
| 50 | | | 18 | | | 39·5 | | |
| 55 | m6 | + 30 + 11 | 20 | | 0 − 52 | 42·5 | | |
| 60 | | | 22 | | | 44·5 | | |
| 65 | | | 25 | | | 49 | | |
| 70 | | | 28 | | | 53 | | |
| 80 | | | 32 | | | 58 | | |
| 85 | | | 36 | | 0 − 62 | 62·5 | | 0 − 0·15 |
| 90 | | | 40 | | | 71·5 | | |
| 95 | | + 35 + 13 | 50 | | | 76·5 | | |
| 100 | | | | | | 81 | | |
| 120 | | | | | | 86 | | |
| 140 | | + 40 + 15 | | | | 90 | | |
| 170 | | | | | | 109 | | |
| 220 | | + 46 + 17 | | | | 128 | | |
| | | | | | | 157 | | |
| | | | | | | 203 | | |

Table 3

## TABLE 3 RATING OF SINGLE STAGE UNDER DRIVEN WORM REDUCTION GEAR BOXES

(*Clauses* 3 *and* 7)

| Unit Size | Centre Distance, *A* inches (mm) | Reduction Ratio | Capacity: Input power/Output torque | Values corresponding to Input speed 750 rev/min | 1 000 rev/min | 1 500 rev/min | Remarks |
|---|---|---|---|---|---|---|---|
| U-3 | 3 (76·20) | 5 : 1 | Input Power in kW* | 3·13 | 3·73 | 4·75 | R |
| | | | Output Torque in kg cm† | 1 890 | 1 700 | 1 450 | |
| | | 10 : 1 | Input Power in kW* | 2·22 | 2·93 | 3·73 | R |
| | | | Output Torque in kg cm† | 2 610 | 2 970 | 2 310 | |
| | | 15 : 1 | Input Power in kW* | 1·63 | 2·10 | 2·52 | R |
| | | | Output Torque in kg cm† | 2 830 | 2 670 | 2 170 | |
| | | 20 : 1 | Input Power in kW* | 1·43 | 1·75 | 2·24 | R |
| | | | Output Torque in kg cm† | 3 100 | 2 900 | 2 580 | |
| | | 25 : 1 | Input Power in kW* | 1·25 | 1·57 | 1·87 | R |
| | | | Output Torque in kg cm† | 3 140 | 3 120 | 2 540 | |
| | | 50 : 1 | Input Power in kW* | 0·78 | 0·94 | 1·07 | IR |
| | | | Output Torque in kg cm† | 3 530 | 3 250 | 2 610 | |
| | | 60 : 1 | Input Power in kW* | 0·68 | 0·79 | 0·93 | IR |
| | | | Output Torque in kg cm† | 3 600 | 3 300 | 2 634 | |
| | | 70 : 1 | Input Power in kW* | 0·57 | 0·72 | 0·83 | IR |
| | | | Output Torque in kg cm† | 3 243 | 3 197 | 2 576 | |
| U-4 | 4 (101·60) | 5 : 1 | Input Power in kW* | 8·64 | 9·71 | 12·50 | R |
| | | | Output Torque in kg cm† | 4 785 | 4 270 | 3 700 | |
| | | 7·5 : 1 | Input Power in kW* | 5·59 | 6·62 | 8·45 | R |
| | | | Output Torque in kg cm† | 5 040 | 4 480 | 3 860 | |
| | | 10 : 1 | Input Power in kW* | 4·85 | 5·96 | 7·45 | R |
| | | | Output Torque in kg cm† | 5 400 | 4 900 | 4 240 | |
| | | 12·5 : 1 | Input Power in kW* | 3·90 | 4·68 | 5·88 | R |
| | | | Output Torque in kg cm† | 5 730 | 5 230 | 4 410 | |
| | | 15 : 1 | Input Power in kW* | 3·51 | 4·25 | 5·37 | R |
| | | | Output Torque in kg cm† | 5 590 | 5 100 | 4 400 | |
| | | 20 : 1 | Input Power in kW* | 3·06 | 3·58 | 4·62 | R |
| | | | Output Torque in kg cm† | 6 150 | 5 600 | 4 950 | |
| | | 25 : 1 | Input Power in kW* | 2·54 | 2·98 | 3·80 | R |
| | | | Output Torque in kg cm† | 6 140 | 5 575 | 4 900 | |
| | | 40 : 1 | Input Power in kW* | 1·94 | 2·24 | 2·83 | IR |
| | | | Output Torque in kg cm† | 6 900 | 6 300 | 5 500 | |
| | | 50 : 1 | Input Power in kW* | 1·49 | 1·71 | 2·16 | IR |
| | | | Output Torque in kg cm† | 6 160 | 5 560 | 4 890 | |
| | | 60 : 1 | Input Power in kW* | 1·25 | 1·47 | 1·84 | IR |
| | | | Output Torque in kg cm† | 5 990 | 5 490 | 4 860 | |
| U-5 | 5 (127) | 7·5 : 1 | Input Power in kW* | 10·66 | 12·50 | 15·81 | R |
| | | | Output Torque in kg cm† | 9 620 | 8 480 | 7 230 | |
| | | 10 : 1 | Input Power in kW* | 9·12 | 11·03 | 14·23 | R |
| | | | Output Torque in kg cm† | 10 420 | 9 560 | 8 340 | |
| | | 12·5 : 1 | Input Power in kW* | 7·02 | 8·38 | 10·88 | R |
| | | | Output Torque in kg cm† | 10 300 | 9 340 | 8 070 | |
| | | 15 : 1 | Input Power in kW* | 5·88 | 7·09 | 9·19 | R |
| | | | Output Torque in kg cm† | 9 620 | 8 800 | 7 590 | |
| | | 20 : 1 | Input Power in kW* | 5·29 | 6·49 | 8·37 | R |
| | | | Output Torque in kg cm† | 11 100 | 10 350 | 9 150 | |

*Rated
†Minimum

R = Reversible
IR = Irreversible



Table 3 Continued

**TABLE 3 RATING OF SINGLE STAGE UNDER DRIVEN WORM REDUCTION GEAR BOXES — *Contd***

| Unit Size | Centre Distance, *A* inches | Centre Distance, *A* (mm) | Reduction Ratio | Capacity: Input power/Output torque | Capacity: Values corresponding to input speed 750 rev/min | 1 000 rev/min | 1 500 rev/min | Remarks |
|---|---|---|---|---|---|---|---|---|
| U-5 *Contd* | 5 | (127) | 25 : 1 | Input Power in kW* | 4·10 | 5·00 | 7·16 | R |
| | | | | Output Torque in kg cm† | 10 500 | 9 620 | 8 450 | |
| | | | 30 : 1 | Input Power in kW* | 3·88 | 4·63 | 5·97 | R |
| | | | | Output Torque in kg cm† | 11 600 | 10 540 | 9 270 | |
| | | | 35 : 1 | Input Power in kW* | 3·31 | 3·97 | 5·31 | R |
| | | | | Output Torque in kg cm† | 11 500 | 10 700 | 9 520 | |
| | | | 40 : 1 | Input Power in kW* | 2·90 | 3·65 | 4·70 | IR |
| | | | | Output Torque in kg cm† | 10 620 | 10 360 | 8 760 | |
| | | | 50 : 1 | Input Power in kW* | 2·54 | 3·06 | 3·80 | IR |
| | | | | Output Torque in kg cm† | 11 000 | 10 150 | 8 800 | |
| | | | 60 : 1 | Input Power in kW* | 2·09 | 2·54 | 3·28 | IR |
| | | | | Output Torque in kg cm† | 10 670 | 9 840 | 8 700 | |
| | | | 70 : 1 | Input Power in kW* | 1·87 | 2·24 | 2·84 | IR |
| | | | | Output Torque in kg cm† | 10 520 | 9 725 | 8 575 | |
| U-5M | — | (120) | 10·33 : 1 | Input Power in kW* | — | — | 3·68 | IR |
| | | | | Output Torque in kg cm† | — | — | 2 200 | |
| | | | 15·5 : 1 | Input Power in kW* | — | — | 2·94 | IR |
| | | | | Output Torque in kg cm† | — | — | 2 400 | |
| | | | 31 : 1 | Input Power in kW* | — | — | 1·84 | IR |
| | | | | Output Torque in kg cm† | — | — | 2 800 | |
| U-6 | 6 | (152·40) | 7·5 : 1 | Input Power in kW* | 14·86 | 18·24 | 22·80 | R |
| | | | | Output Torque in kg cm† | 13 800 | 12 800 | 10 600 | |
| | | | 10 : 1 | Input Power in kW* | 12·99 | 14·74 | 20·15 | R |
| | | | | Output Torque in kg cm† | 15 300 | 13 600 | 11 600 | |
| | | | 12·5 : 1 | Input Power in kW* | 11·10 | 13·49 | 17·50 | R |
| | | | | Output Torque in kg cm† | 16 660 | 15 300 | 13 100 | |
| | | | 15 : 1 | Input Power in kW* | 10·00 | 12·06 | 16·25 | R |
| | | | | Output Torque in kg cm† | 16 850 | 15 350 | 13 800 | |
| | | | 20 : 1 | Input Power in kW* | 7·75 | 9·39 | 12·80 | R |
| | | | | Output Torque in kg cm† | 17 400 | 16 100 | 14 500 | |
| | | | 25 : 1 | Input Power in kW* | 6·26 | 7·76 | 10·07 | R |
| | | | | Output Torque in kg cm† | 16 000 | 15 200 | 13 300 | |
| | | | 30 : 1 | Input Power in kW* | 5·59 | 6·84 | 9·04 | R |
| | | | | Output Torque in kg cm† | 17 600 | 16 400 | 14 600 | |
| | | | 35 : 1 | Input Power in kW* | 4·92 | 6·11 | 8·13 | IR |
| | | | | Output Torque in kg cm† | 17 400 | 16 400 | 14 700 | |
| | | | 40 : 1 | Input Power in kW* | 4·69 | 5·81 | 7·60 | IR |
| | | | | Output Torque in kg cm† | 17 950 | 17 150 | 15 300 | |
| | | | 45 : 1 | Input Power in kW* | 4·55 | 5·59 | 7·53 | IR |
| | | | | Output Torque in kg cm† | 19 400 | 18 140 | 16 600 | |
| | | | 50 : 1 | Input Power in kW* | 4·11 | 4·93 | 6·18 | IR |
| | | | | Output Torque in kg cm† | 19 000 | 17 300 | 15 000 | |
| | | | 60 : 1 | Input Power in kW* | 3·35 | 4·02 | 5·22 | IR |
| | | | | Output Torque in kg cm† | 17 530 | 16 100 | 14 420 | |
| | | | 70 : 1 | Input Power in kW* | 2·91 | 3·50 | 4·46 | IR |
| | | | | Output Torque in kg cm† | 16 800 | 15 650 | 13 730 | |

*Rated
†Minimum

R = Reversible
IR = Irreversible



Table 3 Continued

**TABLE 3 RATING OF SINGLE STAGE UNDER DRIVEN WORM REDUCTION GEAR BOXES — *Contd***

| Unit Size | Centre Distance, *A* inches (mm) | Reduction Ratio | Capacity: Input power/Output torque | Values corresponding to input speed: 750 rev/min | 1 000 rev/min | 1 500 rev/min | Remarks |
|---|---|---|---|---|---|---|---|
| U-7 | 7 (177·80) | 10 : 1 | Input Power in kW* | 17·50 | 21·18 | 27·21 | R |
| | | | Output Torque in kg cm† | 20 800 | 18 900 | 16 100 | |
| | | 12·5 : 1 | Input Power in kW* | 14·78 | 18·53 | 26·11 | R |
| | | | Output Torque in kg cm† | 22 000 | 20 700 | 19 550 | |
| | | 15 : 1 | Input Power in kW* | 13·60 | 16·99 | 22·28 | R |
| | | | Output Torque in kg cm† | 23 100 | 21 800 | 19 000 | |
| | | 20 : 1 | Input Power in kW* | 10·52 | 12·87 | 17·06 | R |
| | | | Output Torque in kg cm† | 23 100 | 21 100 | 18 750 | |
| | | 25 : 1 | Input Power in kW* | 9·56 | 11·77 | 15·96 | R |
| | | | Output Torque in kg cm† | 25 400 | 23 600 | 21 500 | |
| | | 35 : 1 | Input Power in kW* | 6·76 | 8·49 | 11·18 | IR |
| | | | Output Torque in kg cm† | 24 200 | 23 000 | 20 400 | |
| | | 40 : 1 | Input Power in kW* | 6·69 | 8·35 | 11·25 | IR |
| | | | Output Torque in kg cm† | 26 350 | 24 800 | 22 900 | |
| | | 45 : 1 | Input Power in kW* | 5·96 | 7·35 | 9·71 | IR |
| | | | Output Torque in kg cm† | 25 300 | 24 610 | 21 620 | |
| | | 50 : 1 | Input Power in kW* | 6·25 | 7·57 | 9·89 | IR |
| | | | Output Torque in kg cm† | 29 300 | 27 400 | 24 400 | |
| | | 60 : 1 | Input Power in kW* | 5·29 | 6·18 | 7·68 | IR |
| | | | Output Torque in kg cm† | 27 800 | 25 300 | 21 700 | |
| | | 70 : 1 | Input Power in kW* | 4·32 | 5·22 | 6·54 | IR |
| | | | Output Torque in kg cm† | 25 600 | 23 500 | 20 700 | |
| U-7M | — (180) | 12·3 : 1 | Input Power in kW* | — | 11·03 | — | IR |
| | | | Output Torque in kg cm† | — | 13 500 | — | |
| | | 18·5 : 1 | Input Power in kW* | — | 8·09 | — | IR |
| | | | Output Torque in kg cm† | — | 14 530 | — | |
| | | 37 : 1 | Input Power in kW* | — | 5·15 | — | IR |
| | | | Output Torque in kg cm† | — | 16 610 | — | |
| | | 51 : 1 | Input Power in kW* | — | 3·68 | — | IR |
| | | | Output Torque in kg cm† | — | 15 270 | — | |
| U-8 | 8 (203·80) | 5 : 1 | Input Power in kW* | 33·09 | 43·20 | 58·83 | R |
| | | | Output Torque in kg cm† | 20 200 | 20 000 | 18 300 | |
| | | 10 : 1 | Input Power in kW* | 23·53 | 28·68 | 35·81 | R |
| | | | Output Torque in kg cm† | 27 400 | 25 300 | 21 300 | |
| | | 12·5 : 1 | Input Power in kW* | 20·00 | 25·30 | 35·30 | R |
| | | | Output Torque in kg cm† | 31 800 | 29 300 | 27 000 | |
| | | 15 : 1 | Input Power in kW* | 18·31 | 22·87 | 29·78 | R |
| | | | Output Torque in kg cm† | 31 500 | 29 600 | 25 500 | |
| | | 20 : 1 | Input Power in kW* | 14·12 | 17·21 | 22·36 | R |
| | | | Output Torque in kg cm† | 32 000 | 29 400 | 25 600 | |
| | | 25 : 1 | Input Power in kW* | 12·72 | 15·52 | 20·66 | R |
| | | | Output Torque in kg cm† | 35 500 | 32 300 | 29 300 | |
| | | 30 : 1 | Input Power in kW* | 10·81 | 13·09 | 16·91 | R |
| | | | Output Torque in kg cm† | 33 400 | 30 900 | 27 600 | |
| | | 40 : 1 | Input Power in kW* | 8·60 | 10·81 | 14·16 | IR |
| | | | Output Torque in kg cm† | 35 000 | 33 600 | 29 600 | |

*Rated
†Minimum

R = Reversible
IR = Irreversible



Table 3 Continued

**TABLE 3 RATING OF SINGLE STAGE UNDER DRIVEN WORM REDUCTION GEAR BOXES — *Contd***

| Unit Size | Centre Distance, *A* Inches (mm) | Reduction Ratio | Capacity: Input power/Output torque | Values corresponding to Input speed 750 rev/min | 1 000 rev/min | 1 500 rev/min | Remarks |
|---|---|---|---|---|---|---|---|
| U-8 *Contd* | 8 (203·80) | 45 : 1 | Input Power in kW* | 7·57 | 9·63 | 12·65 | IR |
| | | | Output Torque in kg cm† | 33 810 | 32 660 | 28 680 | |
| | | 50 : 1 | Input Power in kW* | 7·28 | 9·41 | 12·06 | IR |
| | | | Output Torque in kg cm† | 36 000 | 35 300 | 30 800 | |
| | | 60 : 1 | Input Power in kW* | 6·86 | 8·13 | 10·44 | IR |
| | | | Output Torque in kg cm† | 36 600 | 33 800 | 29 700 | |
| | | 70 : 1 | Input Power in kW* | 5·74 | 6·86 | 8·90 | IR |
| | | | Output Torque in kg cm† | 34 000 | 32 600 | 28 100 | |
| U-9 | 9 (228·60) | 30 : 1 | Input Power in kW* | 12·98 | 16·55 | 20·66 | R |
| | | | Output Torque in kg cm† | 43 750 | 42 600 | 36 000 | |
| U-10 | 10 (254) | 5 : 1 | Input Power in kW* | 37·50 | 47·58 | 66·33 | R |
| | | | Output Torque in kg cm† | 22 700 | 21 500 | 20 100 | |
| | | 10 : 1 | Input Power in kW* | 33·46 | 41·92 | 58·46 | R |
| | | | Output Torque in kg cm† | 41 700 | 39 400 | 36 900 | |
| | | 15 : 1 | Input Power in kW* | 27·50 | 35·15 | 46·77 | R |
| | | | Output Torque in kg cm† | 47 900 | 46 200 | 41 100 | |
| | | 20 : 1 | Input Power in kW* | 20·14 | 27·00 | 35·05 | R |
| | | | Output Torque in kg cm† | 47 500 | 46 700 | 41 300 | |
| | | 25 : 1 | Input Power in kW* | 18·20 | 23·00 | 30·89 | R |
| | | | Output Torque in kg cm† | 52 200 | 50 000 | 44 900 | |
| | | 30 : 1 | Input Power in kW* | 15·59 | 19·78 | 26·11 | R |
| | | | Output Torque in kg cm† | 50 700 | 48 400 | 43 200 | |
| | | 35 : 1 | Input Power in kW* | 13·05 | 16·55 | 22·36 | IR |
| | | | Output Torque in kg cm† | 48 250 | 46 000 | 42 000 | |
| | | 40 : 1 | Input Power in kW* | 12·39 | 15·88 | 21·25 | IR |
| | | | Output Torque in kg cm† | 51 400 | 49 500 | 45 300 | |
| U-10·5 | 10·5 (266·70) | 10 : 1 | Input Power in kW* | 42·65 | 53·68 | 77·95 | R |
| | | | Output Torque in kg cm† | 53 000 | 50 300 | 48 400 | |
| | | 30 : 1 | Input Power in kW* | 19·12 | 26·47 | 31·62 | R |
| | | | Output Torque in kg cm† | 66 200 | 69 100 | 59 500 | |
| | | 50 : 1 | Input Power in kW* | 10·30 | 13·46 | 17·94 | IR |
| | | | Output Torque in kg cm† | 52 000 | 51 000 | 45 250 | |
| | | 60 : 1 | Input Power in kW* | 8·97 | 11·18 | 15·15 | IR |
| | | | Output Torque in kg cm† | 48 500 | 45 500 | 41 200 | |
| U-12 | 12 (304·80) | 10 : 1 | Input Power in kW* | 45·45 | 58·10 | 77·44 | R |
| | | | Output Torque in kg cm† | 54 000 | 51 750 | 46 500 | |
| | | 15 : 1 | Input Power in kW* | 36·48 | 47·36 | 63·24 | R |
| | | | Output Torque in kg cm† | 64 000 | 61 500 | 55 200 | |
| | | 20 : 1 | Input Power in kW* | 29·42 | 37·95 | 50·37 | R |
| | | | Output Torque in kg cm† | 67 500 | 65 000 | 58 250 | |
| | | 25 : 1 | Input Power in kW* | 25·30 | 32·72 | 43·20 | R |
| | | | Output Torque in kg cm† | 70 700 | 67 900 | 61 000 | |
| | | 30 : 1 | Input Power in kW* | 21·91 | 27·94 | 37·21 | R |
| | | | Output Torque in kg cm† | 72 500 | 69 500 | 62 600 | |

*Rated
†Minimum

R = Reversible
IR = Irreversible

Table 3 Continued

**TABLE 3 RATING OF SINGLE STAGE UNDER DRIVEN WORM REDUCTION GEAR BOXES — *Contd***

| Unit Size | Centre Distance, *A* inches (mm) | Reduction Ratio | Capacity: Input power/Output torque | Values corresponding to input speed 750 rev/min | 1 000 rev/min | 1 500 rev/min | Remarks |
|---|---|---|---|---|---|---|---|
| U-12 *Contd* | 12 (304·88) | 35 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 18·38<br>69 950 | 23·16<br>69 000 | 30·89<br>60 640 | R |
| | | 40 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 17·28<br>72 600 | 22·36<br>70 100 | 30·15<br>64 500 | IR |
| | | 50 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 14·16<br>72 250 | 18·24<br>70 000 | 24·34<br>63 250 | IR |
| | | 60 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 12·21<br>72 600 | 15·96<br>71 250 | 21·62<br>65 750 | R |
| | | 70 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 10·00<br>67 600 | 12·80<br>65 500 | 17·50<br>61 250 | IR |
| U-12M | — (300) | 16·33 : 1 | Input Power in kW*<br>Output Torque in kg cm† | —<br>— | 27·94<br>39 420 | —<br>— | IR |
| | | 24·5 : 1 | Input Power in kW*<br>Output Torque in kg cm† | —<br>— | 20·59<br>42 690 | —<br>— | IR |
| | | 49 : 1 | Input Power in kW*<br>Output Torque in kg cm† | —<br>— | 13·24<br>47 350 | —<br>— | IR |
| U-14 | 14 (355·60) | 7·5 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 59·35<br>54 600 | 74·50<br>51 750 | 102·96<br>47 750 | R |
| | | 10 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 61·30<br>74 200 | 77·58<br>69 000 | 103·69<br>62 000 | R |
| | | 20 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 40·74<br>94 250 | 51·84<br>89 500 | 70·41<br>82 100 | R |
| | | 25 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 35·08<br>99 000 | 44·71<br>94 250 | 61·04<br>86 800 | R |
| | | 30 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 28·97<br>100 000 | 37·28<br>96 600 | 52·95<br>92 000 | R |
| | | 35 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 26·99<br>105 800 | 34·56<br>101 200 | 45·96<br>90 850 | R |
| | | 40 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 23·68<br>102 200 | 30·59<br>99 000 | 41·77<br>91 000 | IR |
| | | 45 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 21·25<br>101 775 | 26·84<br>96 600 | 36·40<br>88 550 | IR |
| | | 50 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 17·94<br>93 400 | 23·83<br>93 000 | 34·27<br>90 300 | IR |
| U-17 | 17 (431·80) | 7·5 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 83·47<br>76 500 | 102·22<br>70 200 | 137·15<br>63 250 | R |
| | | 10 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 80·89<br>98 900 | 100·01<br>90 850 | 131·64<br>80 500 | R |
| | | 15 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 69·86<br>123 500 | 87·36<br>115 000 | 113·99<br>101 000 | R |
| | | 20 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 59·71<br>138 500 | 76·11<br>131 000 | 102·96<br>119 800 | R |
| | | 25 : 1 | Input Power in kW*<br>Output Torque in kg cm† | 49·20<br>144 325 | 63·24<br>139 150 | 80·16<br>118 450 | R |

*Rated
†Minimum

R = Reversible
IR = Irreversible

Table 3 Continued

**TABLE 3 RATING OF SINGLE STAGE UNDER DRIVEN WORM REDUCTION GEAR BOXES — *Contd***

| Unit Size | Centre Distance, *A* Inches (mm) | Reduction Ratio | Capacity: Input power/Output torque | Values corresponding to input speed 750 rev/min | 1 000 rev/min | 1 500 rev/min | Remarks |
|---|---|---|---|---|---|---|---|
| U-17 *Contd* | 17 (43·80) | 30 : 1 | Input Power in kW* | 46·15 | 58·83 | 74·50 | R |
| | | | Output Torque in kg cm† | 154 000 | 146 000 | 126 500 | |
| | | 40 : 1 | Input Power in kW* | 35·59 | 45·59 | 60·30 | IR |
| | | | Output Torque in kg cm† | 156 400 | 149 500 | 133 400 | |
| | | 45 : 1 | Input Power in kW* | 31·77 | 40·63 | 54·42 | IR |
| | | | Output Torque in kg cm† | 156 000 | 149 500 | 133 400 | |
| | | 50 : 1 | Input Power in kW* | 29·60 | 37·69 | 50·37 | IR |
| | | | Output Torque in kg cm† | 154 700 | 148 400 | 134 700 | |
| U-17M | — (420) | 19·67 : 1 | Input Power in kW* | 44·49 | 53·68 | — | IR |
| | | | Output Torque in kg cm† | 101 000 | 91 500 | — | |
| | | 29·5 : 1 | Input Power in kW* | 33·46 | 39·71 | — | IR |
| | | | Output Torque in kg cm† | 110 000 | 99 000 | — | |
| | | 59 : 1 | Input Power in kW* | 20·59 | 23·90 | — | IR |
| | | | Output Torque in kg cm† | 121 000 | 108 000 | — | |
| U-20 | 20 (508) | 15 : 1 | Input Power in kW* | 97·80 | 120·75 | 155·17 | R |
| | | | Output Torque in kg cm† | 174 000 | 161 000 | 138 000 | |
| | | 20 : 1 | Input Power in kW* | 83·61 | 104·43 | 131·27 | R |
| | | | Output Torque in kg cm† | 195 500 | 184 000 | 154 000 | |
| | | 25 : 1 | Input Power in kW* | 70·97 | 88·25 | 112·52 | R |
| | | | Output Torque in kg cm† | 207 000 | 192 000 | 163 000 | |
| | | 30 : 1 | Input Power in kW* | 66·00 | 82·73 | 104·43 | IR |
| | | | Output Torque in kg cm† | 224 500 | 209 500 | 178 000 | |
| | | 45 : 1 | Input Power in kW* | 45·59 | 56·62 | 73·17 | R |
| | | | Output Torque in kg cm† | 224 000 | 209 500 | 182 000 | |
| U-24 | 24 (609·60) | 7·5 : 1 | Input Power in kW* | 143·40 | 170·61 | 208·85 | R |
| | | | Output Torque in kg cm† | 134 000 | 119 600 | 97 800 | |
| | | 15 : 1 | Input Power in kW* | 124·28 | 148·55 | 173·55 | R |
| | | | Output Torque in kg cm† | 224 000 | 208 000 | 144 000 | |
| | | 20 : 1 | Input Power in kW* | 119·87 | 145·24 | 158·85 | R |
| | | | Output Torque in kg cm† | 232 000 | 255 000 | 187 500 | |
| | | 25 : 1 | Input Power in kW* | 99·28 | 123·03 | 141·71 | R |
| | | | Output Torque in kg cm† | 289 000 | 267 000 | 208 000 | |
| | | 30 : 1 | Input Power in kW* | 92·66 | 111·78 | 126·49 | R |
| | | | Output Torque in kg cm† | 318 550 | 287 500 | 213 500 | |
| | | 45 : 1 | Input Power in kW* | 63·61 | 79·42 | 97·81 | IR |
| | | | Output Torque in kg cm† | 322 000 | 299 000 | 247 250 | |

*Rated
†Minimum

R = Reversible
IR = Irreversible

**Note** — *Reversibility* — A gear box is considered to be reversible if the rotation of output shaft is possible without any damage to gear box when input power is switched off.

*Irreversibility* — A worm gear is irreversible if the reversed efficiency is zero or negative i.e. if the lead angle of worm is equal to or less than the angle of the friction.

*Caution* — Irreversible gear boxes shall not be used where the reversibility is required.