

COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

Sub-Committee of Experts on the
Transport of Dangerous Goods

Thirty-fourth session
Geneva, 1-9 December 2008
Item 2 (c) of the provisional agenda

EXPLOSIVES AND RELATED MATTERS

Miscellaneous proposals

HSL Flash Composition Test – new drawings and removal of square brackets.

Addendum to ST/SG/AC.10/C.3/2008/105

Transmitted by the expert from the United Kingdom

1. This paper deals with the issues mentioned in the "Note" on page 2 of ST/SG/AC.10/C.3/2008/105.
2. The text and drawings (Appendix X) attached to this paper replace those in ST/SG/AC.10/C.3/2008/105.

The changes to the text include:

- a) Replacement of pyrotechnic composition with pyrotechnic substance to align it to the definition in 2.1.1.3 (b) of the Model Regulations. The term Flash composition remains in the text;
- b) The apparatus containing the substance is tapped three times on a hard surface;
- c) The test will be determined by the minimum T/P value of three firings; and
- d) The removal of square brackets from paragraph X.3.1 and "Examples of Results in X.4. The inclusion of a "not flash composition" result in X.4.

Appendix X

HSL Flash Composition Test

X.1 Introduction

This test is used to determine whether pyrotechnic substances in powder form or as pyrotechnic units as presented in the fireworks, that are used to produce an aural effect, or used as a bursting charge or lifting charge, are considered to be flash compositions for the purposes of determining the classification of fireworks using the UN default fireworks classification table in 2.1.3.5.5 of Model Regulations.

X.2 Apparatus and materials

X.2.1 The time/pressure apparatus (Figure X.X.2) consists of a cylindrical steel pressure vessel 89 mm in length and 60 mm in external diameter. Two flats are machined on opposite sides (reducing the cross-section of the vessel to 50 mm) to facilitate holding whilst fitting the cone in firing plug and vent plug. The vessel, which has a bore of 20 mm diameter, is internally rebated at either end to a depth of 19 mm and threaded to accept 1" British Standard Pipe (BSP). A pressure take-off, in the form of a side-arm, is screwed into the curved face of the pressure vessel 35 mm from one end and at 90° to the machined flats. The socket for this is bored to a depth of 12 mm and threaded to accept the 1/2" BSP thread on the end of the side-arm. A washer is fitted to ensure a gastight seal. The side-arm extends 55 mm beyond the pressure vessel body and has a bore of 6 mm. The end of the side-arm is rebated and threaded to accept a diaphragm type pressure transducer. Any pressure-measuring device may be used provided that it is not affected by the hot gases or decomposition products and is capable of responding to rates of pressure rise of 690-2070 kPa in not more than 1 ms.

X.2.2 The end of the pressure vessel furthest from the side-arm is closed with a cone in firing plug which is fitted with two electrodes, one insulated from and the other earthed to, the plug body. The other end of the pressure vessel is closed by an aluminium bursting disk 0.2 mm thick (bursting pressure approximately 2200 kPa) held in place with a retaining plug which has a 20 mm bore. A soft lead washer is used with both plugs to ensure a good seal.

X.2.3 A support stand (X.X.8) holds the assembly in the correct attitude during use. This comprises a mild steel base plate measuring 235 mm × 184 mm × 6 mm and a 185 mm length of square hollow section (S.H.S.) 70 × 70 × 4 mm. A section is cut from each of two opposite sides at one end of the length of S.H.S. so that a structure having two flat sided legs surmounted by an 86 mm length of intact box section results. The ends of these flat sides are cut to an angle of 60° to the horizontal and welded to the base plate.

X.2.4 A slot measuring 22 mm wide × 46 mm deep is machined in one side of the upper end of the base section such that when the pressure vessel assembly is lowered, firing plug end first, into the box section support, the side-arm is accommodated in this slot. A packing piece of steel 30 mm wide and 6 mm thick is welded to the lower internal face of the box section to act as a spacer. Two 7 mm thumb screws, tapped into the opposite face, serve to hold the pressure vessel

firmly in place. Two 12 mm wide strips of 6 mm thick steel, welded to the side pieces abutting the base of the box section, support the pressure vessel from beneath.

X.2.5 The ignition system consists of a Vulcan electric fusehead, with lead wires, of the type commonly used for igniting pyrotechnic substances. Fuseheads with equivalent properties may be used.

X.2.6 The wires of the fusehead are cut to such a length that the fusehead sits 10 mm above the substance contained within the cone of the firing plug (see Figure X.X.1) The fusehead leads are held in position using the grub screws (see Figure X.X.3).

Note Copies of Drawings X.X.1 to X.X.8 may be obtained from the Health and Safety Laboratory, UK.

X.3 Procedure

X.3.1 The apparatus, assembled complete with pressure transducer but without the aluminium bursting disk in position, is supported firing plug end down. 0.5g of the substance is introduced into the cone of the firing plug. The apparatus is tapped three times on a hard surface after filling the apparatus. Where the pyrotechnic composition is in consolidated form larger than 0.5g it should be broken to produce a piece as close to 0.5g as possible. Where the composition is in consolidated form less than 0.5g then whole and broken units should be chosen to give 0.5g pyrotechnic composition. The lead washer and aluminium bursting disc are placed in position and the retaining plug is screwed in tightly. The charged vessel is transferred to the firing support stand, bursting disk uppermost, which should be contained in a suitable, armoured fume cupboard or firing cell. An exploder dynamo is connected to the external terminals of the firing plug and the charge is fired. The signal produced by the pressure transducer is recorded on a suitable system which allows both evaluation and a permanent record of the time/pressure profile to be achieved (e.g. transient recorder coupled to a chart-recorder).

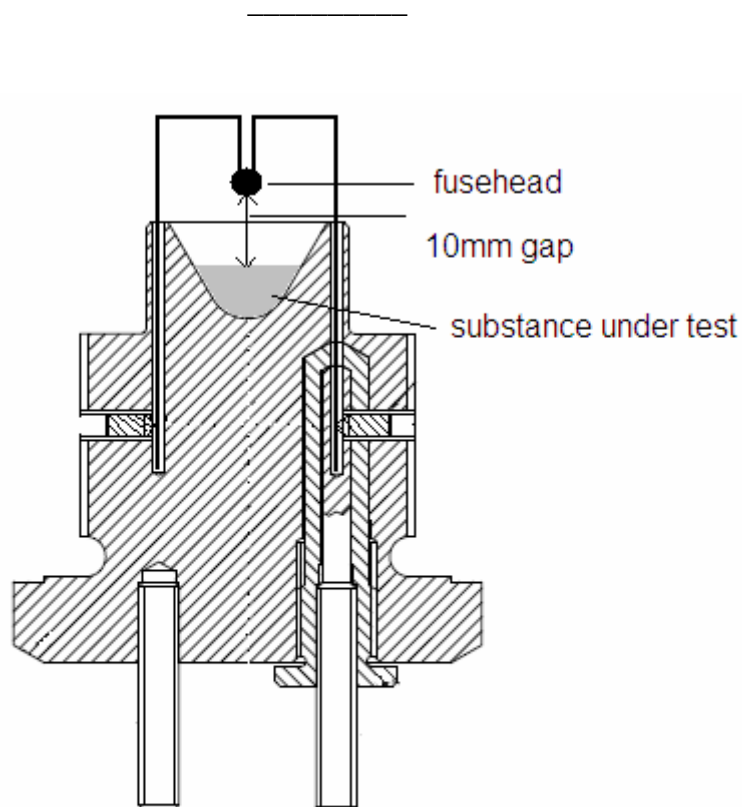
X.3.2 The test is carried out three times. The time taken for the pressure to rise from 690 kPa to 2070 kPa above atmospheric is noted. The shortest interval of three firings should be used for classification.

X.4 Test criteria and method of assessing results

The test results are interpreted in terms of whether a gauge pressure of 2070 kPa is reached and, if so, the time taken for the pressure to rise from 690 kPa to 2070 kPa gauge. The pyrotechnic substances in powder form or as pyrotechnic units as presented in the fireworks, that are used to produce an aural effect, or used as a bursting charge or lifting charge, is to be considered as flash composition if the minimum pressure rise time is shown to be less than, or equal to, 8ms for 0.5g of pyrotechnic composition.

Example of Results:

Substance	Maximum Pressure Rise (kPa)	Mean time for a pressure rise from 690 to 2070kPa (m/s)	Result
1	>2070	0.70	Flash Composition
2	>2070	4.98	Flash Composition
4	>2070	1.51	Flash Composition
5	>2070	0.84	Flash Composition
6	>2070	[?]	Not Flash Composition



Sample setup

Figure X.X.1

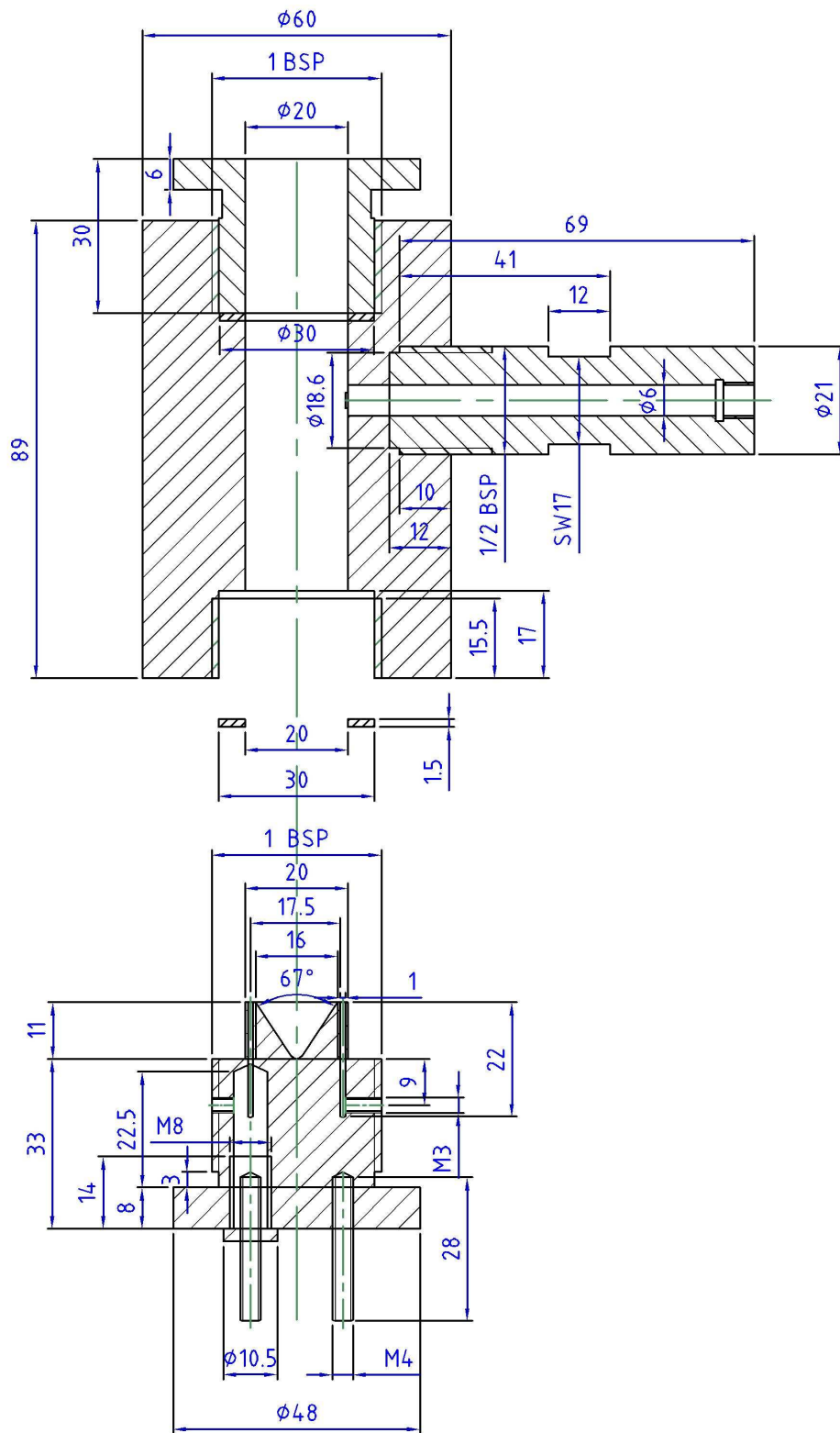


Figure X. X .2 Apparatus

MACHINING/ASSEMBLY SEQUENCE

1. SCREW JN0003490:B2 INTO PRESSURE PLUG BODY
2. SCREW JN0003490:A2 INTO JN0003490:B2
2. DRILL & TAP M3 * 0,5P * 7 DEEP HOLE
3. SCREWCUT 1" BSP PARALLEL THREAD ON PRESSURE PLUG BODY.

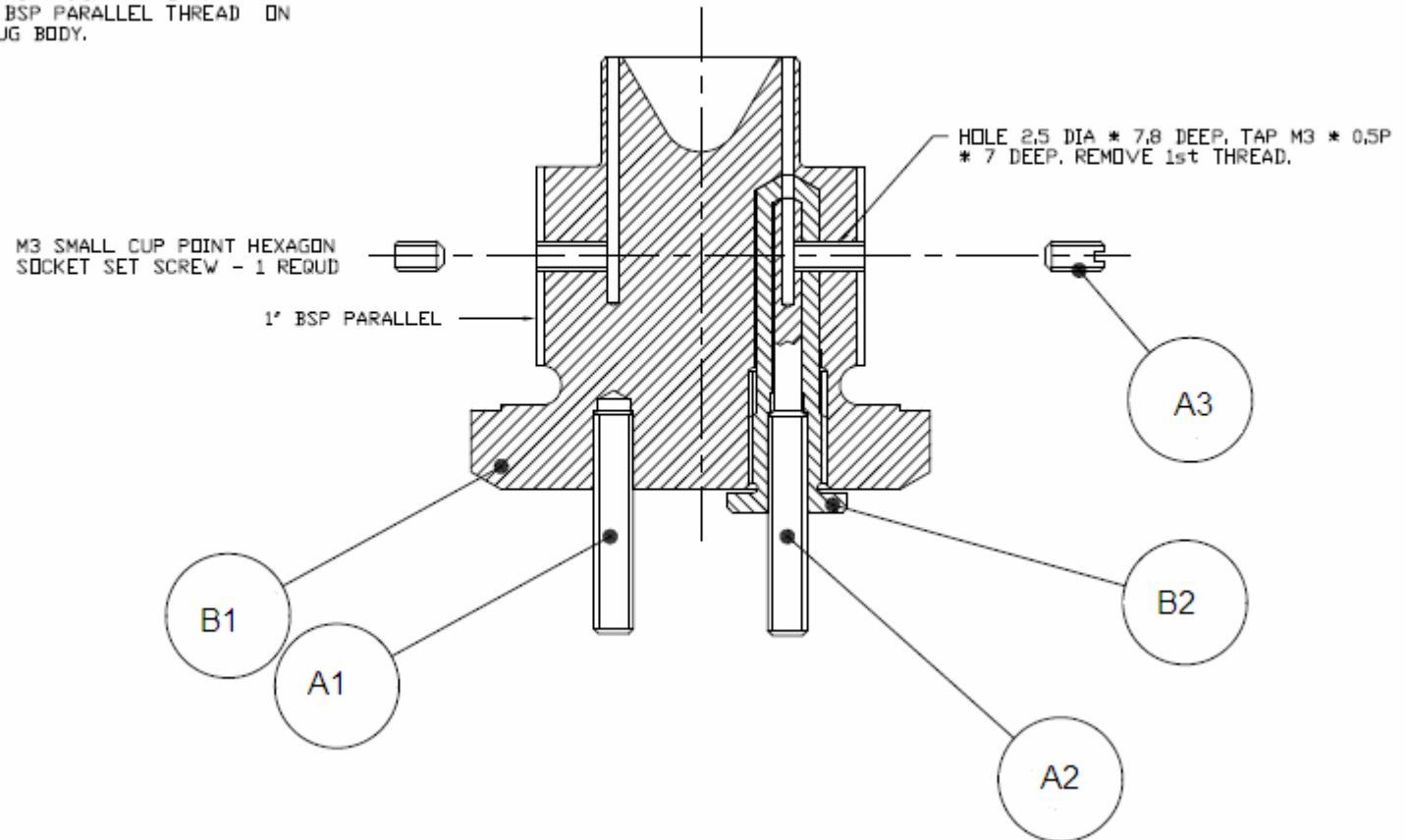
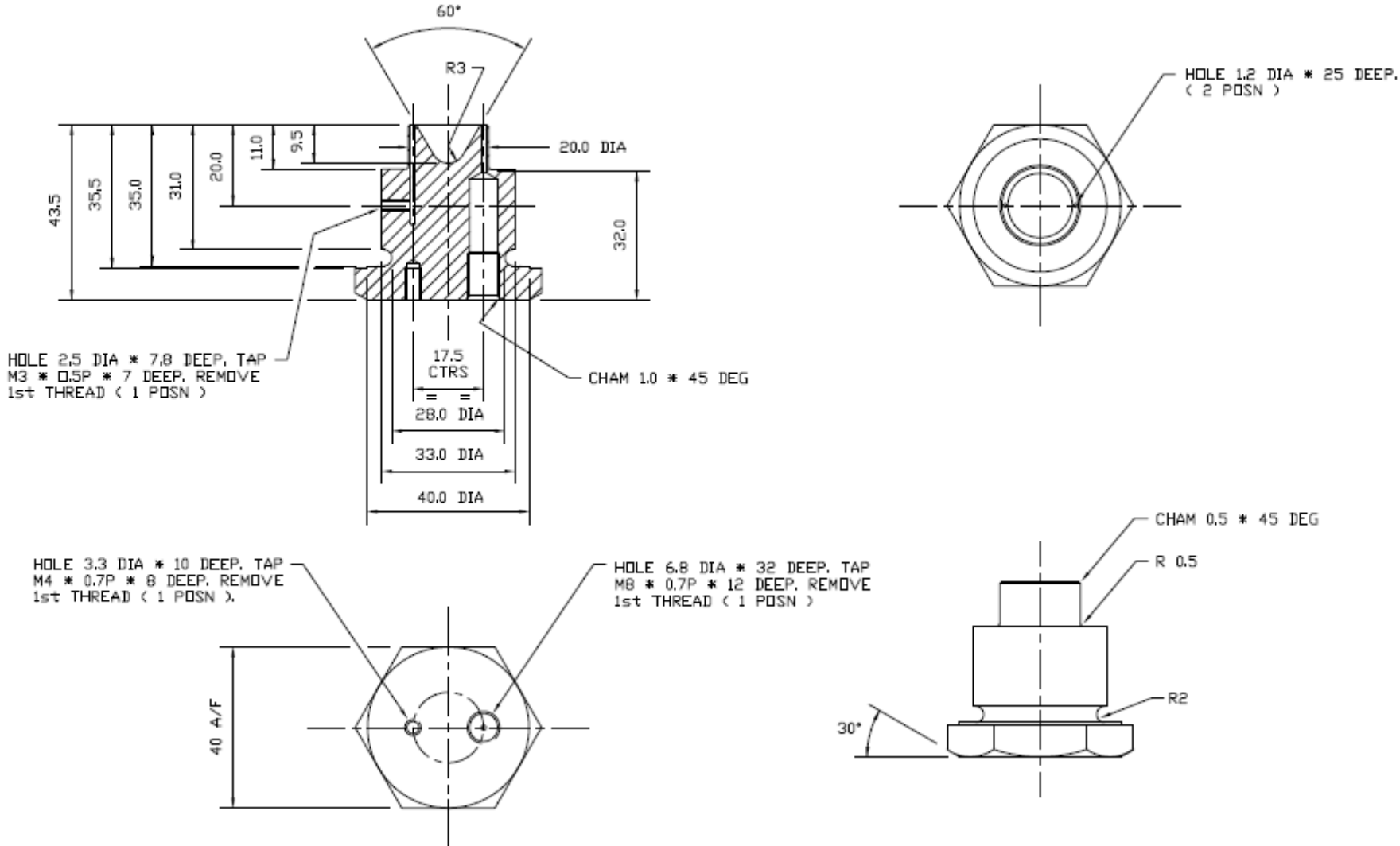


Figure X.X.3



B1

Figure X.X.4

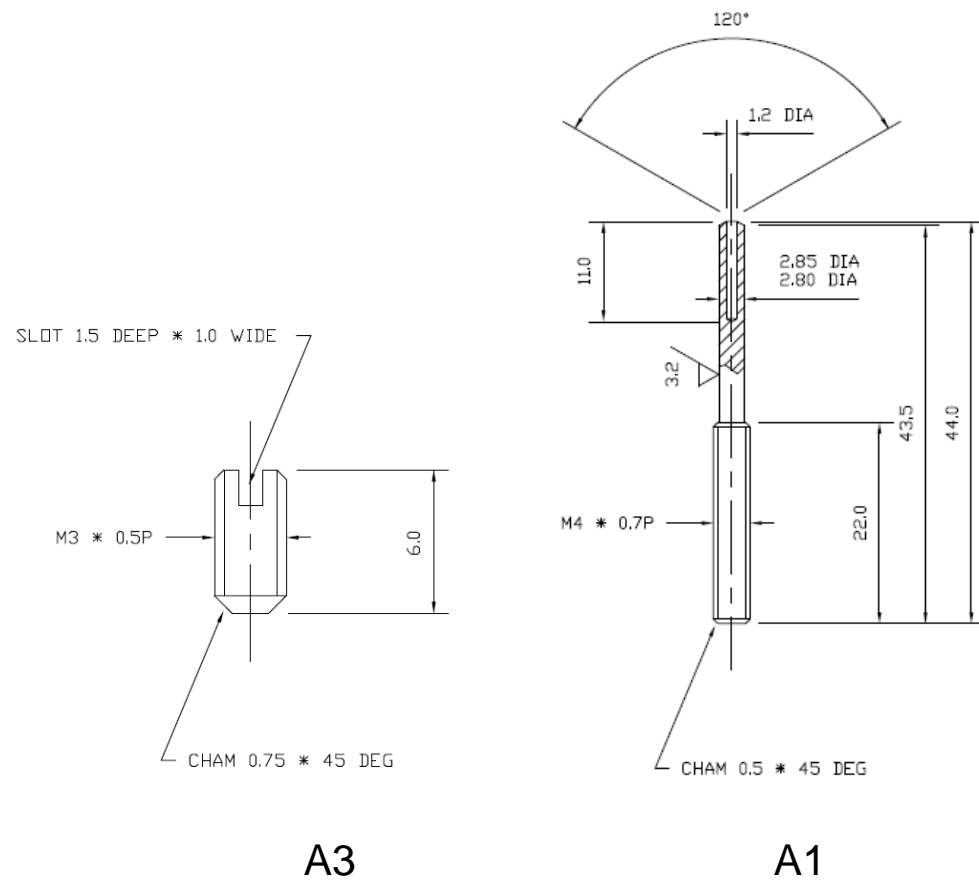
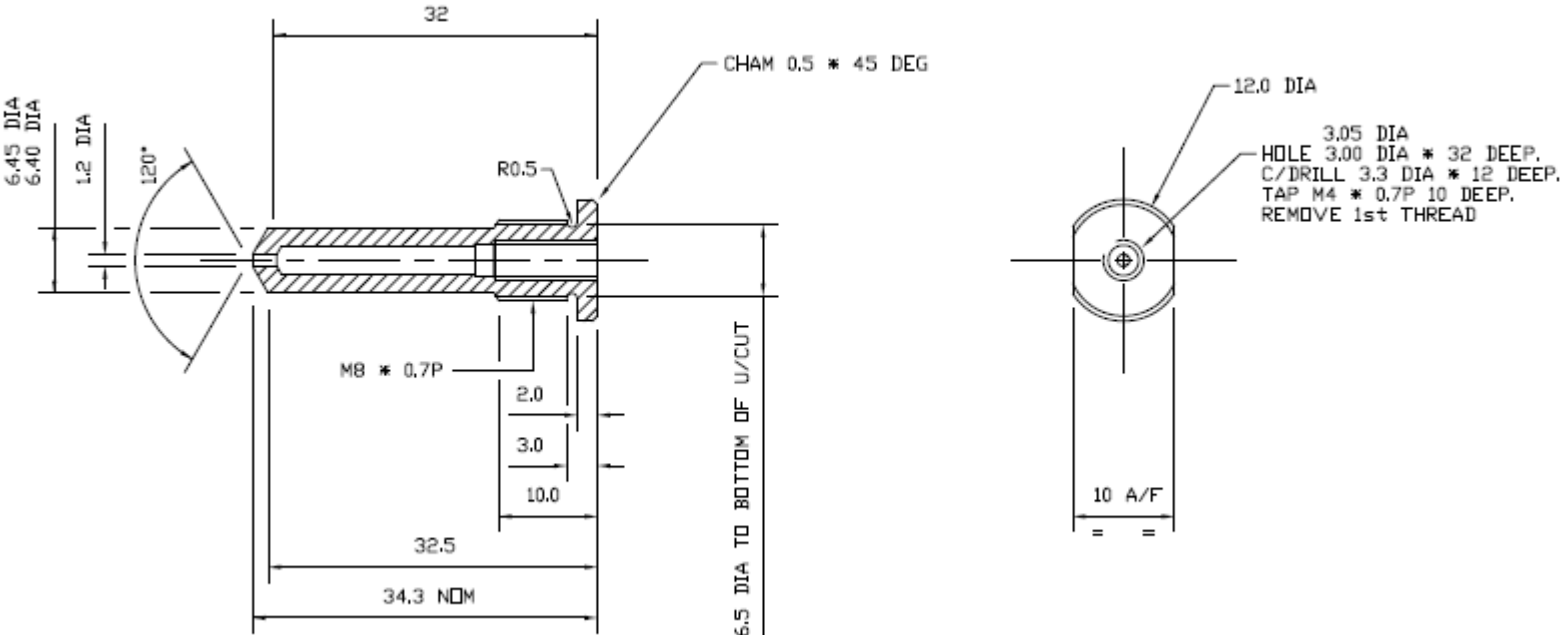
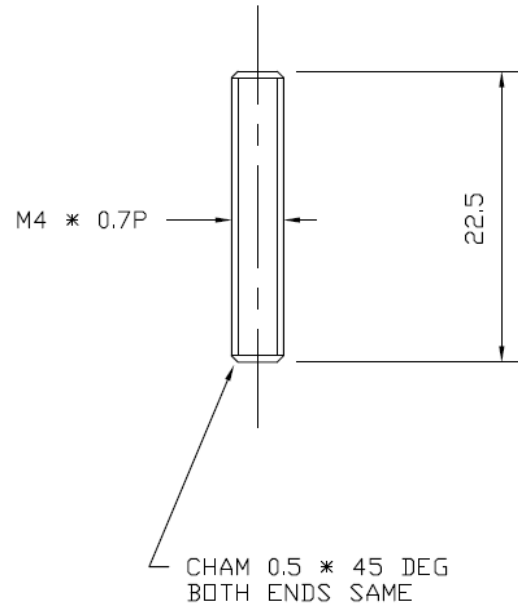


Figure X.X.5



B2

Figure X.X.6



A1

Figure X.X.7

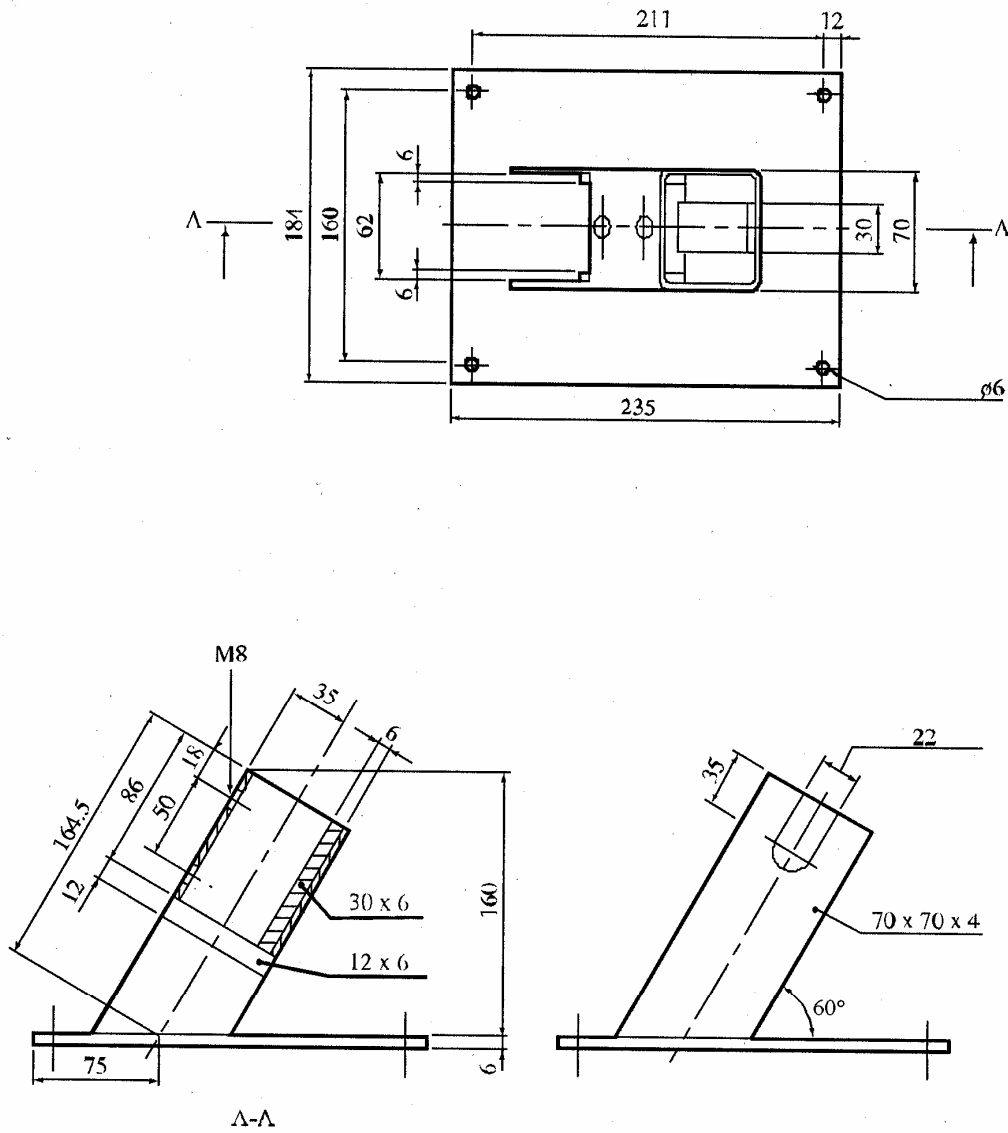


Figure X.X.8 Support Stand